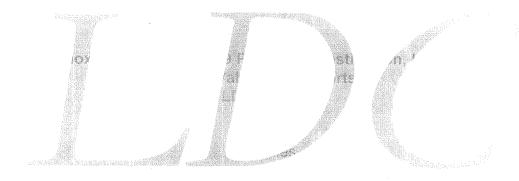
## Tronox LLC Facility, 2009 Phase B Investigation, Henderson Data Validation Reports LDC #21495

Volatiles



## Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

May 27 through June 4, 2009

LDC Report Date:

September 30, 2009

Matrix:

Water

Parameters:

Volatiles

Validation Level:

Stage 4

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903006

## Sample Identification

MC-3B

EB052709

TB052709-GW1

M-127B

M-127BDL

TB052809-GW1

FB060409

TB060409

### Introduction

This data review covers 8 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

The following are definitions of the data qualifiers:

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

## I. Technical Holding Times

All technical holding time requirements were met.

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<sup>2</sup>) were greater than or equal to 0.990.

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

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
5/6/09	2-Methyl-2-propanol	0.021 (≥0.05)	MC-3B EB052709 TB052709-GW1 M-127B M-127BDL TB052809-GW1 156849MB	J (all detects) UJ (all non-detects)	А
6/12/09	2-Methyl-2-propanol	0.018 (≥0.05)	FB060409 TB060409 157676MB	J (all detects) UJ (all non-detects)	А

## IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

Date	Compound	%D	Associated Samples	Flag	A or P
7/9/09	Bromomethane	33.5	MC-3B EB052709 TB052709-GW1 M-127B M-127BDL TB052809-GW1 156849MB	J- (all detects) UJ (all non-detects)	А
7/9/09	Di-isopropyl ether	27.9	MC-3B EB052709 TB052709-GW1 M-127B M-127BDL TB052809-GW1 156849MB	J (all detects) UJ (all non-detects)	А

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
7/9/09	2-Methyl-2-propanol	0.023 (≥0.05)	MC-3B EB052709 TB052709-GW1 M-127B M-127BDL TB052809-GW1 156849MB	J (all detects) UJ (all non-detects)	А
6/15/09	2-Methyl-2-propanol	0.015 (≥0.05)	FB060409 TB060409 157676MB	J (all detects) UJ (all non-detects)	А

### V. Blanks

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

Samples TB060407 (from SDG R0903051), TB052709-GW1, and TB052809-GW1 were identified as trip blanks. No volatile contaminants were found in these blanks with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
TB060409	6/4/09	Acetone Dichloromethane Toluene	2.8 ug/L 0.29 ug/L 0.29 ug/L	FB060409

Sample EB052709 was identified as an equipment blank. No volatile contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Compound	Concentration	Associated Samples
EB052709	5/27/09	Acetone Dichloromethane Toluene	7.3 ug/L 7.3 ug/L 0.25 ug/L	мс-зв

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

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB060409	6/4/09	Acetone Dichloromethane Toluene	2.1 ug/L 3.2 ug/L 1.7 ug/L	MC-3B M-127B M-127BDL

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

Sample	Compound	Reported Concentration	Modified Final Concentration
FB060409	Acetone	2.1 ug/L	2.1U ug/L

## VI. Surrogate Spikes

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

## VII. Matrix Spike/Matrix Spike Duplicates

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

## VIII. Laboratory Control Samples (LCS)

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

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
156849LCS	Bromomethane Dichlorodifluoromethane Hexachlorobutadiene	71 (75-125) 72 (75-125) 73 (75-125)	MC-3B EB052709 TB052709-GW1 M-127B M-127BDL TB052809-GW1 156849MB	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 with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
M-127B	Chloroform	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	А

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903006	All compounds reported below the PQL.	J (all detects)	А

## XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

## XIV. System Performance

The system performance was acceptable.

## XV. Overall Assessment of Data

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-127B	Chloroform	х	А
M-127BDL	All TCL compounds except Chloroform	х	А

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

## XVI. Field Duplicates

No field duplicates were identified in this SDG.

## Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Data Qualification Summary - SDG R0903006

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903006	MC-3B EB052709 TB052709-GW1 M-127B M-127BDL TB052809-GW1 FB060409 TB060409	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Initial calibration (RRF) (c)
R0903006	MC-3B EB052709 TB052709-GW1 M-127B M-127BDL TB052809-GW1	Bromomethane	J- (all detects) UJ (all non-detects)	A	Continuing calibration (%D) (c)
R0903006	MC-3B EB052709 TB052709-GW1 M-127B M-127BDL TB052809-GW1	Di-isopropyl ether	J+ (all detects)	А	Continuing calibration (%D) (c)
R0903006	MC-3B EB052709 TB052709-GW1 M-127B M-127BDL TB052809-GW1 FB060409 TB060409	2-Methyl-2-propanol	J- (all detects) UJ (all non-detects)	А	Continuing calibration (RRF) (c)
R0903006	MC-3B EB052709 TB052709-GW1 M-127B M-127BDL TB052809-GW1	Bromomethane Dichlorodifluoromethane Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0903006	M-127B	Chloroform	J (all detects)	А	Project Quantitation Limit (e)
R0903006	MC-3B EB052709 TB052709-GW1 M-127B M-127BDL TB052809-GW1 FB060409	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (PQL) (sp)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903006	M-127B	Chloroform	×	A	Overall assessment of data (o)
R0903006	M-127BDL	All TCL compounds except Chloroform	x	А	Overall assessment of data (o)

## Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Laboratory Blank Data Qualification Summary - SDG R0903006

No Sample Data Qualified in this SDG

## Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Field Blank Data Qualification Summary - SDG R0903006

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0903006	FB060409	Acetone	2.1U ug/L	А	bt

## Tronox Northgate Henderson

		VALIDATION COMPLETENCE WORKSHEET	
LDC #:_	21495B1	VALIDATION COMPLETENESS WORKSHEET	
SDG #:_	R0903006	Stage 4	
Laborato	ry: Columbia A	nalytical Services	

Reviewer: 34 2nd Reviewer: \(\sigma\)

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

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

	Validation Area		Comments
1	Technical holding times	A	Sampling dates: 5/27-28/09 6/64/69
11.	GC/MS Instrument performance check	A	,
111.	Initial calibration	SM	% RSD 12
IV.	Continuing calibration/4CV	SW	ca = 25 2
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	Client spec
VIII.	Laboratory control samples	SW	ies
IX.	Regional Quality Assurance and Quality Control	N	
Χ.	Internal standards	A	
XI.	Target compound identification	Α	
XII.	Compound quantitation/CRQLs	SM	
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 = 2 FB = 7 TB = 3, 6, FB666407 from Re

A = Acceptable Note:

N = Not provided/applicable SW = See worksheet

ND = No compounds detected D = Duplicate

R = Rinsate

TB = Trip blank

FB = Field blank

EB = Equipment blank

Validated Samples:

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<del>+</del> 1	MC-3B	11 1 156849 NB	21	31	
<del>1</del> 2	EB052709	12 7 157676	22	32	
3	TB052709-GW1	13	23	33	
4	M-127B	14	24	34	
<b>∔</b> 5	M-127BDL	15	25	35	
6	TB052809-GW1	16	26	36	
7 2	TB060409	17	27	37	
8	TB066409	18	28	38	
9		19	29	39	
10		20	30	40	

LDC#: 21495 B)
SDG#: See Cover

## **VALIDATION FINDINGS CHECKLIST**

Page: 1 of 2
Reviewer: 16
2nd Reviewer: 176

Method: Volatiles (EPA SW 846 Method 8260B)

Method: Volatiles (EPA SW 846 Method 8260B)				
Validation Area	Yes	No	NA	Findings/Comments
Technical holding times				
All technical holding times were met.	_			
Cooler temperature criteria was met.				
II. GCMS instrument performance check				
Were the BFB performance results reviewed and found to be within the specified				
criteria?			<u> </u>	
Were all samples analyzed within the 12 hour clock criteria?				
III initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?			<u> </u>	
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	_			
Was a curve fit used for evaluation?	/			
Did the initial calibration meet the curve fit acceptance criteria of > 0.990?				
Were all percent relative standard deviations (%RSD) ≤ 30% and relative response factors (RRF) > 0.05?		/	_	
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?				
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?				
Were all percent differences (%D) < 25% and relative response factors (RRF) > 0.05?		/		
V. Blanks				
Was a method blank associated with every sample in this SDG?	\			
Was a method blank analyzed at least once every 12 hours for each matrix and concentration?				
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.				
VI. Surrogate spikes				
Were all surrogate %R within QC limits?				
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			-	
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	Ü	/	-	
Was a MS/MSD analyzed every 20 samples of each matrix?				
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			_	
VIII. Laboratory control samples			·	
Was an LCS analyzed for this SDG?	Ĺ		<u> </u>	

LDC #: 21 495 81 SDG #: See Cover

## **VALIDATION FINDINGS CHECKLIST**

Page: 2 of 2
Reviewer: VZ
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per analytical batch?	/			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		/	1	
IX. Regional Quality Assurance and Quality Control			<b>,</b>	
Were performance evaluation (PE) samples performed?				
Were the performance evaluation (PE) samples within the acceptance limits?			_	
X. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?				
Were retention times within + 30 seconds of the associated calibration standard?				
XI Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	4		<u> </u>	
Did compound spectra meet specified EPA "Functional Guidelines" criteria?				
Were chromatogram peaks verified and accounted for?				
XII. Compound quantitation/CRQLs	1			
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	/			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	/			
XIII Tentatively identified compounds (TICs)				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?				2
Were relative intensities of the major ions within <u>+</u> 20% between the sample and the reference spectra?			Ì	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?		/		
XIV. System performance				
System performance was found to be acceptable.				
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.				
XVI. Field duplicates				
Field duplicate pairs were identified in this SDG.			/	
Target compounds were detected in the field duplicates.				
XVII. Field blanks				
Field blanks were identified in this SDG.		/		
Target compounds were detected in the field blanks.				

## TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

A. Chloromethane*	U. 1,1,2-Trichloroethane	OO. 2,2-Dichloropropane	III. n-Butylbenzene	CCCC.1-Chlorohexane
B. Bromomethane	V. Benzene	PP. Bromochloromethane	JJJ. 1,2-Dichlorobenzene	DDDD. Isopropyl alcohol
C. Vinyl choride**	W. trans-1,3-Dichloropropene	QQ. 1,1-Dichloropropene	KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
D. Chloroethane	X. Bromoform*	RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF. Acrolein
Dich lorg methan c E. <u>Methylana chlorid</u> e	Y. 4-Methyi-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG. Acrylonitrile
F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN. 1,2,3-Trichlorobenzene	НННН. 1,4-Dioxane
G. Carbon disulfide	AA. Tetrachioroethene	UU. 1,1,1,2-Tetrachloroethane	000. 1,3,5-Trichlorobenzene	IIII. Isobuty alcohol
H. 1,1-Dichloroethene**	BB. 1,1,2,2-Tetrachioroethane*	VV. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
I. 1,1-Dichloroethane*	CC. Toluene**	WW. Bromobenzene	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
J. 1,2-Dichloroethene, total	DD. Chlorobenzene⁺	XX. 1,2,3-Trichloropropane	RRR. m,p-Xylenes	LLLL. Ethyl ether
K. Chloroform**	EE. Ethylbenzene**	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
L. 1,2-Dichloroethane	FF. Styrene	ZZ. 2-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN. 2-Methyl-2-propanol
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	. дада
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	9000
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
Q. 1,2-Dichloropropane**	KK. Trichlorofluoromethane	EEE. sec-Butylbenzene	YYY. tert-Butanol	SSSS.
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohol	TTTT.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-Isopropyltoluene	AAAA. Ethyl tert-butyl ether	บบบบ.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	www.

<sup>\* =</sup> System performance check compounds (SPCC) for RRF; \*\* = Calibration check compounds (CCC) for %RSD.

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## VALIDATION FINDINGS WORKSHEET Initial Calibration

Page: Reviewer: 2nd Reviewer:

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

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

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

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

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

N (N/A AN (N)

1							
#	Date	Standard ID	Compound	Finding %RSD (Limit: <30.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Ottalffcations
	15/66/69	1421	7227		0.021	1-1 15CX40 MX	7/1 /A /A
	/ /						
- 1	6/2/00	ICAL	N N N N		0.018	7,8 1576TC MB	(v) 1
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LDC# 21495 B) SDG#:

## VALIDATION FINDINGS WORKSHEET Continuing Calibration

2nd Reviewer: Page: Reviewer:

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

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

Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ? Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ? Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?

*	Date	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF			
	1/69/63	29989	S S	╙			Qualifications	
	_					1-6 156849 MB	$\mathbb{I}$	J
			+)	47.9			J+ 25-15 A	<u></u>
			レンタン	-	0.023	. 1	T/101 /A	I
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								F
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	6/2/0	F0302	NNNN		210.0	7 8 157671. Asp	J /45 /2	1
						•	¥/50/2	1
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LDC #: 21	SDG #:

## VALIDATION FINDINGS WORKSHEET Field Blanks

Page: Zof Reviewer:\_\_\_ 2nd Reviewer:

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

Were field blanks identified in this SDG? Y N/N/A

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

Blank units: Associated sample units: Field blank / Rinsate (Trip Blank)Other.

Sample identification Associated Samples: Z 2.1 12) 1.7 ¢ Blank ID Blank ID 6/04/09 0.29 0.29 2,8 Sampling Date 11 Ħ Compound Methylene chloride Chloreform Aeetone

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

Sample Identification Associated Samples: Blank ID Blank ID Sampling Date Compound Methylene chloride Chloroform Acetone

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

21495 B1	75. 25
DC #:	# 50

## VALIDATION FINDINGS WORKSHEET Field Blanks

Reviewer: IVC Page: 1 of 2nd Reviewer:\_

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

Were field blanks identified in this SDG? Y/N/N/A

Were target compounds detected in the field blanks?

Blank units: Work Associated sample units: Work

(MD) Sample Identification Associated Samples: EB Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other. Blank ID Blank ID 2 5/27/09 0.25 1.3 3 Sampling Date  $\mathcal{S}$ W 11 Compound

4 Worde Associated Samples: Blank units: \( \text{Mg/L} \) Associated sample units: \( \text{NA} \) Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other:

4N

Blank units: 49/L

Sample Identification							
	Ŋ		(2/20)				
	4		(3002)				
Blank ID							
Blank ID 7	664 109	2.1	2.5	1.7			
Compound	Sampling Date 6/04 /6/	#	עע	29			

LDC#: 21 495 %)
SDG#: \sqrt{\lambda\_{\infty}} \lambda\_{\infty} \lambda\_{\i

## VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page:

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

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

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

Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	(25-125)	(	( )	1-6 156849 MB	J-/W/P (1)
	_	( )	( )		,
1	73 ( 1)	( )	( )	^	_
	( )	( )	( )		
	( )	( )	(	-	
	( )	( )	( )		
l	( )	( )	( )		
1	( )	( )	)		
	( )	( )	( )		
	( )	( )	( )		
	~	( )	( )		
	( )	( )	( )		
	( )	( )	( )		
	( )	( )	( )		
	( )	( )	( )		,
	( )	( )	( )		
	( )	( )	( )		
	( )	( )	( )		
	( )	( )	( )		
	( )	( )	( )		
	( )	( )	( )		
	( )	( )	( )		
	( )	( )	( )		
i		( )	( )		

Se Con LDC# 21 495 B1 SDG #:

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

Page:

Reviewer: 2nd Reviewer:

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

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

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?

	(e)	\									
Qualifications	J dets/A										
Associated Samples											
Finding	K > cal range	)									
Sample ID	4										
Date											
#											

Comments: See sample calculation verification worksheet for recalculations

LDC# 21445 B) SDG# S6 (294)

## VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Reviewer:

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

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

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 Wa

Was the overall quality and usability of the data acceptable?

*	Date	Semple ID	Finding	Associated Samples	Qualifications
		4	X V SEL rays		( */ X
				2	
		5	All exant Kail		1
Comm	Comments:				

LDC#: 21495 B) SDG#:

## Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Page:\_ Reviewer:

2nd Reviewer:

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

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

RRF =  $(A_x)(C_b)/(C_b)$  average RRF = sum of the RRFs/number of standards %RSD = 100 \* (S/X)

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

 $A_{\rm s}$  = Area of associated internal standard  $C_{\rm is}$  = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Refer	Compound (Reference Internal Standard)	Reported RRF	Recalculated RRF	Reported Average RRF (initial)	Recalculated Average RRF	Reported %RSD	Recalculated %RSD
+	i	5/06/04		(1st internal standard)	0,409	0, 469	0.420	0.420	7.4	7.4
			5	(2nd internal standard)	0, 25%	452 0	0,269	6. UG	7-7	7.7
	MS 10		AA	(3rd internal standard)	o: 120	esx 0	792.0	0, 264	7.9	2,9
			BB	(4th internal standard)	0.471	D, \$71	0.480	0,480	5.5	0;5
2	•	60/21/2	V	(1st internal standard)	0.532	255.0	0,541	0,54)	4.1	9,1
	1547	50/80/5	S	(2nd internal standard)	0.274	0.274	0.284	0.284	5.8	8.8
			AA	(3rd internal standard)	0.308	e. 308	0.307	0.367	4.9	4.97
			BB	(4th internal standard)	0.477	6,477	0,527	6,522	4.7	7.7
က				(1st internal standard)						
				(2nd internal standard)						
				(3rd internal standard)						
				(4th internal standard)						
4				(1st internal standard)						
				(2nd internal standard)						
				(3rd internal standard)						
				(4th internal standard)						

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

LDC #: 21495 B1 SDG #:

## Continuing Calibration Results Verification VALIDATION FINDINGS WORKSHEET

Page: Lof Reviewer: 114 2nd Reviewer:

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

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

% Difference = 100 \* (ave. RRF - RRF)/ave. RRF RRF =  $(A_{\chi})(C_{s})/(A_{s})(C_{\chi})$ 

Where: ave. RRF = initial calibration average RRF RRF = continuing calibration RRF  $A_x = Area \sigma f$  compound,  $A_y = Area \sigma G_x = Concentration of compound, <math>G_y = Concentration of compound$ 

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

		Calibration			Average RRF	Reported RRF	Recalculated RRF	Reported %D	Recalculated %D
+	Standard ID R ダムころ	Date 7 / 20 / 2		Compound (Reference Internal Standard)  (1st internal standard)	(initial) 0. 420	(CC)	(GC) 0, 483	6,21	6.5)
		(2/1-/	S		6,269	5/2 0	375.0	7,7	2,4
			AA	(3rd internal standard)	0.264	8.255	0, 25X	3.4	3,3
			v v		0, 980	0, 981	0. 481	2.0	٦,0
2	±030°	6/15/09	ی	(1st internal standard)	125'0	0. 490	0, 490	9.4	5.6
		2	9		0.284	562'0	540,0	スプ	y,
			AA	(3rd internal standard)	0.307	628,0	0,323	5.2	2.7
			BB		0, 523	0, 4%	6.420	221	7:7
ო				(1st internal standard)					
				(2nd internal standard)					
				(3rd internal standard)					
				(4th internal standard)					
4				(1st internal standard)					
				(2nd internal standard)					
				(3rd internal standard)					
			Workship	(4th 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 #: 21445 B/ SDG #: See Concer

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

Page:_	1 of 1
Reviewer:	JVt.
2nd reviewer:	

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

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

% Recovery: SF/SS \* 100

Where: SF = Surrogate Found SS = Surrogate Spiked

Sample ID: 5 # |

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8	50	53.74	107	107	©
Bromofluorobenzene		50.29	101	10)	
1,2-Dichloroethane-d4					
Dibromofluoromethane	<i>y</i>	48.15	96	96	

Sample ID:

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

Sample ID:

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

Sample ID:\_\_\_\_\_

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

Sample ID:

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

SDG #: See Coner

# VALIDATION FINDINGS WORKSHEET Laboratory Control Sample Results Verification

Reviewer: 3VZ 2nd Reviewer: 4

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

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

% Recovery = 100 \* SSC/SA W

Where: SSC = Spiked sample concentration SA = Spike added

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

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

1CS ID: (56 849 LC

	S	ike	Spiked S	ample	รวา	S	1 CSD	ď	/SD I	CS/I CSD
Compound	<b>Ad</b> թհ )	Added (7/5n)	Concentration ( 45/1)	ration	Percent Recovery	ecovery	Percent Recovery	ecovery	R	RPD
	1.08	I CSD	SDI	I CSD	Reported	Recalc	Renorted	Recalc	Renorted	Recalculated
1,1-Dichloroethene	26.0	NA	0.61	Ą	56	56				
Trichloroethene			8.71		78	58				
Benzene			(8.3		6	9				
Toluene			17.8		84	8 %				
Chlorobenzene	7	<b>→</b>	18.2		6	15				

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results. LDC #: 21495 B) SDG #: See Cover

## VALIDATION FINDINGS WORKSHEET <u>Sample Calculation Verification</u>

Page:	<u>l</u> of_l
Reviewer:	370
2nd reviewer:	- W

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

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?

Example:  $(A_{\nu})(I_{\nu})(DF)$ Concentration = (A<sub>k</sub>)(RRF)(V<sub>0</sub>)(%S) Sample I.D. 5 Area of the characteristic ion (EICP) for the compound to be measured Area of the characteristic ion (EICP) for the specific internal standard Conc. = (1055622, 50) (100)
(81758) (0,712)() Amount of internal standard added in nanograms Relative response factor of the calibration standard. RRF Volume or weight of sample pruged in milliliters (ml) or grams (g). 2 9100 mg/L Df Dilution factor. Percent solids, applicable to soils and solid matrices %S

#	Sample ID	Compound	Reported Concentration	Calculated Concentration	Qualification
<del>                                     </del>	Sample ib	Сопроши	<u> </u>		- Qualification
					:
$\vdash$					
<del>  </del>					
<b></b>					
				-	
			<u> </u>		

## 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 30, 2009

Matrix:

Soil/Water

Parameters:

Volatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

RSAJ3-0.5B

SA202-0.5B

Sample Delivery Group (SDG): R0903051

## Sample Identification

RSA12-0.5B

TB060109-001

**RSAI3-0.5B** 

TB060209-SO1

RSAJ5-0.5B

RSAK5-0.5B

SA76-0.5B

SA76009-0.5B

TB060309-SO1

TB060309-SO2

RSAL3-0.5B

SA100-0.5B

RSAM3-0.5B

RSAM2-0.5B

SA189-0.5B

SA88-0.5B

TB060409-SO1

SA152-0.5B

SA152009-0.5B

RSAJ2-0.5B

### Introduction

This data review covers 17 soil samples and 5 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

## I. Technical Holding Times

All technical holding time requirements were met.

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

## II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

### III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r²) were greater than or equal to 0.990.

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

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/12/09	2-Methyl-2-propanol	0.018 (≥0.05)	TB060109-001 157676MB	J (all detects) UJ (all non-detects)	А

## IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

Date	Compound	%D	Associated Samples	Flag	A or P
6/10/09	1,1,2,2-Tetrachloroethane 1,2,3-Trichloropropane n-Propylbenzene Bromobenzene 1,3,5-Trimethylbenzene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene p-Isopropyltoluene 1,3-Dichlorobenzene n-Butylbenzene 1,2-Dibromo-3-chloropropane 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	28.8 35.8 30.8 28.0 31.5 32.5 29.1 32.5 32.3 27.6 31.2 30.5 29.3 42.9 30.0 31.5	RSA12-0.5B RSAI3-0.5B RSAK5-0.5B SA76-0.5B SA76009-0.5B RSAL3-0.5B SA100-0.5B RSAM3-0.5B RSAM2-0.5B SA189-0.5B	J- (all detects) UJ (all non-detects)	A
6/11/09	Dichlorodifluoromethane	25.7	RSAJ5-0.5B SA88-0.5B SA152-0.5B SA152009-0.5B RSAJ2-0.5B RSAJ3-0.5B SA202-0.5B 157212MB	J+ (all detects)	A

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/15/09	2-Methyl-2-propanol	0.015 (≥0.05)	TB060109-001 157676MB	J (all detects) UJ (all non-detects)	A

### V. Blanks

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

Samples TB060109-001, TB060209-SO1, TB060309-SO1, TB060309-SO2, and TB060409-SO1, were identified as trip blanks. No volatile contaminants were found in these blanks with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
TB060109-001	6/1/09	Acetone	3.2 ug/L	RSA12-0.5B
TB060309-SO1	6/3/09	Dichloromethane	0.27 ug/L	SA76-0.5B SA76009-0.5B RSAL3-0.5B SA100-0.5B RSAM3-0.5B RSAM2-0.5B
TB060309-SO2	6/3/09	Dichloromethane	0.35 ug/L	SA76-0.5B SA76009-0.5B RSAL3-0.5B SA100-0.5B RSAM3-0.5B RSAM2-0.5B
TB060409-SO1	6/4/09	Dichloromethane	0.46 ug/L	SA189-0.5B SA88-0.5B SA152-0.5B SA152009-0.5B RSAJ2-0.5B RSAJ3-0.5B SA202-0.5B

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

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072109-SO	7/21/09	Acetone Bromoform	3.7 ug/L 0.28 ug/L	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 with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
RSAJ3-0.5B	Dichloromethane	0.85 ug/Kg	0.85U ug/Kg
SA202-0.5B	Dichloromethane Acetone	0.60 ug/Kg 2.8 ug/Kg	0.60U ug/Kg 2.8U ug/Kg
RSAK5-0.5B	Acetone	5.9 ug/Kg	5.9U ug/Kg
RSAL3-0.5B	Acetone	7.2 ug/Kg	7.2U ug/Kg

Sample	Compound	Reported Concentration	Modified Final Concentration
SA189-0.5B	Acetone	7.1 ug/Kg	7.1U ug/Kg
SA88-0.5B	Acetone	4.1 ug/Kg	4.1U ug/Kg
SA152009-0.5B	Acetone	5.1 ug/Kg	5.1U ug/Kg
RSAJ2-0.5B	Acetone	6.3 ug/Kg	6.3U ug/Kg

## VI. Surrogate Spikes

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

## VII. Matrix Spike/Matrix Spike Duplicates

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

## VIII. Laboratory Control Samples (LCS)

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

## IX. Regional Quality Assurance and Quality Control

Not applicable.

### X. Internal Standards

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

## XI. Target Compound Identifications

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 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 of Data

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 volatiles were detected in any of the samples with the following exceptions:

	Concentration (ug/Kg)		555	D:#		
Compound	SA76-0.5B	SA76009-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P
Acetone	15	7.8	-	7.2 (≤24)	-	· -
Dichloromethane	2.9	1.7	-	1.2 (≤5.9)	-	-
Toluene	1.1	0.94	-	0.16 (≤5.9)	<u>-</u>	-

	Concentration (ug/Kg)					
Compound	SA152-0.5B	SA152009-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P
Acetone	9.8	5.1	-	4.7 (≤19)	-	-
Dichloromethane	3.9	2.2	-	1.7 (≤4.9)	_	*
Toluene	1.2	1.0	-	0.2 (≤4.9)	-	-

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

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903051	TB060109-001	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	Α	Initial calibration (RRF) (c)
R0903051	RSA12-0.5B RSAI3-0.5B RSAK5-0.5B SA76-0.5B SA76009-0.5B RSAL3-0.5B SA100-0.5B RSAM3-0.5B RSAM2-0.5B SA189-0.5B	1,1,2,2-Tetrachloroethane 1,2,3-Trichloropropane n-Propylbenzene Bromobenzene 1,3,5-Trimethylbenzene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene p-lsopropyltoluene 1,3-Dichlorobenzene n-Butylbenzene 1,2-Dibromo-3-chloropropane 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J- (all detects) UJ (all non-detects)	Α	Continuing calibration (%D) (c)
R0903051	RSAJ5-0.5B SA88-0.5B SA152-0.5B SA152009-0.5B RSAJ2-0.5B RSAJ3-0.5B SA202-0.5B	Dichlorodifluoromethane	J+ (all detects)	A	Continuing calibration (%D) (c)
R0903051	TB060109-001	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Continuing calibration (RRF) (c)
R0903051	RSA12-0.5B TB060109-001 RSAI3-0.5B TB060209-SO1 RSAJ5-0.5B RSAK5-0.5B SA76-0.5B SA76009-0.5B TB060309-SO1 TB060309-SO2 RSAL3-0.5B SA100-0.5B RSAM3-0.5B RSAM2-0.5B SA189-0.5B SA189-0.5B SA189-0.5B SA88-0.5B TB060409-SO1 SA152-0.5B SA152009-0.5B RSAJ2-0.5B RSAJ2-0.5B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (PQL) (sp)

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

# No Sample Data Qualified in this SDG

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

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0903051	RSAJ3-0.5B	Dichloromethane	0.85U ug/Kg	А	bt
R0903051	SA202-0.5B	Dichloromethane	0.60U ug/Kg	Α	bt
R0903051	SA202-0.5B	Acetone	2.8U ug/Kg	Α	bf
R0903051	RSAK5-0.5B	Acetone	5.9U ug/Kg	Α	bt
R0903051	RSAL3-0.5B	Acetone	7.2U ug/Kg	Α	bt
R0903051	SA189-0.5B	Acetone	7.1U ug/Kg	А	bt
R0903051	SA88-0.5B	Acetone	4.1U ug/Kg	Α	bt
R0903051	SA152009-0.5B	Acetone	5.1U ug/Kg	А	bt
R0903051	RSAJ2-0.5B	Acetone	6.3U ug/Kg	А	bt

# **Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET**

LDC #:	21495C1	VALIDATION COMPLET
SDG #:_	R0903051	Stage

e 2B

Page:_	l_of_l
Reviewer:	SVE
and Boyiowar.	

Date: 9/16/09

Laboratory: Columbia Analytical Services

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

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

	Validation Area		Comments	
l.	Technical holding times	A	Sampling dates: 6/61-04/09	
II.	GC/MS Instrument performance check	A`	,	
111.	Initial calibration	<b>VY</b> 2	2 RSD r	
IV.	Continuing calibration/Je∀	SW	CON £ 25 Z	
V.	Blanks	A		
VI.	Surrogate spikes	A		
VII.	Matrix spike/Matrix spike duplicates	Ŋ	Client spec	
VIII.	Laboratory control samples	<u> </u>	us	
IX.	Regional Quality Assurance and Quality Control	N		
X.	Internal standards	A		
XI.	Target compound identification	N		
XII.	Compound quantitation/CRQLs	N		, #V
XIII.	Tentatively identified compounds (TICs)	N		
XIV.	System performance	N		
XV.	Overall assessment of data	À		, ··· ===
XVI.	Field duplicates	SW	$D_2 = 18, 19$ $TB = 2, 4, 9, 10, 17, 24 + B = 23$ $FB = FB 072109-50 \text{ from } R0906010$	
XVII.	Field blanks	SN)	TB = 2, 4, 9, 10, 17, 24 +B = 23	RB=2

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

1:02 + Water

			3011		VV MET								
1	1	RSA12-0.5B	S	11	RSAL3-0.5B		ς	21 4	RSAJ3-0.5B	Ş	31 1	157075	MB
2	7	TB060109-001	W	12 1	SA100-0.5B			22 4	SA202-0.5B		32 )	15 7676	
3	١	RSAI3-0.5B	<u> </u>	13	RSAM3-0.5B		L	± 23 →	FB060409	W	33 <b>3</b>	15 7447	
4	3	TB060209-SO1	W	14	RSAM2-0.5B			<del>24 ~</del>	<del>XB060409</del>	<u> </u>	34 4	157212	L
<b>†</b> 5	4	RSAJ5-0.5B	S	15	SA189-0.5B			25			35		
† 6	1	RSAK5-0.5B		16	SA88-0.5B			26			36		
<del>1</del> 7	1	SA76-0.5B	<b>v</b> ,	173	TB060409-SO1		W	27			37		
<b>∤</b> 8	1	SA76009-0.5B	<i>b</i> , $$	18 4	SA152-0.5B	Dr	ς	28			38		
<del> </del> 9	3	TB060309-SO1	W	19 4	SA152009-0.5B	<b>Φ</b> <sub>γ</sub>		29			39		
10	3	TB060309-SO2		20 4	RSAJ2-0.5B			30			40		

(FB000409 > reported on R0903006) no 100)

# TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

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

<sup>\* =</sup> System performance check compounds (SPCC) for RRF; \*\* = Calibration check compounds (CCC) for %RSD.

5	73
2/495	4
LDC#:	SDG #

# VALIDATION FINDINGS WORKSHEET Initial Calibration

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

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

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

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

Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's? Was a curve fit used for evaluation?  $r^2 \ge 0$ .

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

	3				T			T	T											
Qualifications	J/NJ/A (																			
	QW																			
selc	JW 927251												٠							
ited Samp	1251 10 30	,																		
Associa	X																			
	2		-	-												_		-	_	1
Finding RRF (Limit: >0.05)	0.018																			
Finding %RSD (Limit: <30.0%)			-																	
Standard ID Compound (I	ママスス		,																	
Standard ID	15AL																			_
į	6/12/64	-																		_
*	7	+	T		T	T	T		T			L								_

SDG#: Bre Cor LDC #: 21 495 C.

# VALIDATION FINDINGS WORKSHEET Continuing Calibration

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

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

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

N N N	Y Y Y	Was a continuing calibration standard analyzed at least once every 12 hours for € Were percent differences (%D) and relative response factors (RRF) within metho Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF?	tion standard analyzed s (%D) and relative responsitely within the validation critical	at least once every ponse factors (RRF) eria of ≤25 %D and	least once every 12 hours for each instrument? nse factors (RRF) within method criteria for all C a of ≤25 %D and ≥0.05 RRF ?	Was a continuing calibration standard analyzed at least once every 12 hours for each instrument? Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ? Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?	ذ
	oje0	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	7 4 6 4	M8729	88	28.8		1 3 6-8 11-15	J=1/15/A (c)
	2		(-) XX	35,8			
			( <del>-</del> )	30.8			
			(S) MM	28.0			
			AAA (9)	31.5			
			(c) 222	32,5			
			( ) 00A	1.96			
<u></u>			() <i>3.3.3</i>	578			
			(+)555	32,3			
			FFFF	27.6			
<u> </u>			F I IC	31.2			
			MMCS	30.5			
<u></u>			KKK(-)	29.3			
			111(0)	42.9			
			MMM (-)	) ૧, ૭૮			
			(-)NNN	31.5		<del>}</del>	
			ľ				7+ 4°+ 7
	6/11/9	M 8750	47 (1)	25,7		1570 #8 MD	¥/613.6
					20.00	10 10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1/11/4
	to/51/9	F0303	. ~ ~ ~ ~		5	all a / a/s ( & a / a / a / a / a / a / a / a / a / a	

SDG #: Seg Grand LDC#: 24 495 C/

# VALIDATION FINDINGS WORKSHEET Field Blanks

Page: Tof 3 Reviewer: 2nd Reviewer:\_

> METHOD: GC/MS VOA (EPA SW 846 Method 8260B) Y/N/N/A

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

Blank units: 4/4 Associated sample units: Field blank type: (circle one) Field Blank / Rinsate AN N/A

Trip Blank / Other:

CAN

Associated Samples:

Sample Identification Blank ID Blank ID 7 66169 3 Sampling Date Compound Chloroform Acetone

Associated Samples: Field blank type: (circle one) Field Blank / Rinsate /(Trip Blank)/ Other: 5 Associated sample units: Blank units: 49 1/

(x)

7,8,11-14

Compound	Blank ID 9	Blank ID 10				Sample Ide	Sample Identification			
	6 62 60		7	9	-	-	<u>-</u>	71		
Sampling Date   V02/04	- k 0/60/ x		,	0		1		ţ		
Dichloromethane $(E)$	0,27	0,35	(2.9)	(f.7)	(0.85)	(1,4)	(3.2)	0:		
Acetone	,			)	)	)		)		
Chloroform										
CROL									:	

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT.

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

LDC#: 2/495 C/ SDG#: 54 Cm

# VALIDATION FINDINGS WORKSHEET Field Blanks

Page: 20 02 Reviewer: 3/6 2nd Reviewer:

18-22

15,16,2

Associated Samples:

МЕТНОD: GC/MS VOA (EPA SW 846 Method 8260В) Y/N/N/A

Were field blanks identified in this SDG?

Were target compounds detected in the field blanks?

Associated sample units: X N N/A

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

Sample Identification 3.9 u 7/611 Associated sample units: Blank ID Blank ID 17 0.46 Sampling Date (0.92) Wichlyone chloride have (E) Blank units: 49/1 Compound Chloroform Acetone

N Be Sample Identification Associated Samples: Field blank type: (circle one) Field Blank / Rinsate / (Trip Blank)/Other Blank ID Blank ID 24 6/04/09 0.29 Sampling Date Compound M<del>ethylene chioride</del> Chloreform Acetene

CRQL

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

SDG#: See Con LDC#: 214 95C1

**VALIDATION FINDINGS WORKSHEET** 

Field Blanks

Page: 3 of Reviewer:\_ 2nd Reviewer:

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

Associated Samples: Were field blanks identified in this SDG?

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

Blank units: NA Associated sample units: NA Field blank / Other:

									(77)	1								
Octobro de Caracteria de Carac									7)			22	2,8/4	,				
										Soils		જ	6,3/4					
ntification										A 1)	≝	6	5.1 /y		MB)	•		
Sample Identification										Associated Samples:	Sample Identification	16	4.7 y		ND 05 >			
										Associ		15	7.1/M		either A			
										er:		11	7.2/U		All others		The state of the s	
									us he	/ Trip Blank / Other:		و	n/6.3		CAI			
Blank ID										Rinsate / Trip	Blank ID							
Blank ID 32	6/04/09	1 1	2./	1.7	,				Associated sample units:	Field Blank	FB 07 210 9 - 50 Blank ID	1/21/09	3.7	0,28				
Compound	Sampling Date	Ħ	1	E					Blank units: Wg /L Asso	k type: (circle one	FB 0 チョ 0 9 - S d Blank ID Blank ID	Sampling Date	V.	×				
						:			Blank uni	Field blan			1.4 ×	oxle				

LDC #: 21495 C/ SDG #: SPE Cory

# VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:	of	L
Reviewer:	JV4_	
2nd reviewer:	D	

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

YN N/A YN N/A Were field duplicate pairs identified in this SDG?

Were target compounds detected in the field duplicate pairs?

	Concentration ( US /kg)		
Compound	7	8	RPD
F	5	7, 8	7.2 (= 24 Diff)
E	2,9	1.7	1.2 (25,9 Diff)
CC	1,1	0.94	0.16
	,		

	Concentration ( 49 ts)		
Compound	18	19	RPD
F	9.8	5.	4.7 (= 190iff)
E	3.9	2.2	1.7 (= 4.9 pi#)
ce	1, 2	1.0	0.2

	Concentration (	
Compound	·	RPD

	Concentration ( )	
Compound		RPD
	·	

# Laboratory Data Consultants, Inc. Data Validation Report

**Project/Site Name:** 

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

**Collection Date:** 

June 9 through June 16, 2009

LDC Report Date:

October 5, 2009

Matrix:

Water

Parameters:

Volatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903243

# Sample Identification

H-28AB

TB060909-GW1

AW-BW-02B

TB061009-GW1

M-142B

TB061209-GW1

M-130B

M-130BDL

TB061509-GW

M-29B

TB061609-GW1

## 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 8260B for Volatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

# I. Technical Holding Times

All technical holding time requirements were met.

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

## II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

## III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r²) were greater than or equal to 0.990.

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

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/18/09	2-Methyl-2-propanol	0.026 (≥0.05)	All samples in SDG R0903243	J (all detects) UJ (all non-detects)	А

# IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/22/09	2-Methyl-2-propanol	0.029 (≥0.05)	TB060909-GW1 TB061009-GW1 M-142B TB061209-GW1 M-130B TB061509-GW 158621MB	J (all detects) UJ (all non-detects)	А
6/23/09	2-Methyl-2-propanol	0.024 (≥0.05)	H-28AB AW-BW-02B M-130BDL TB061 609-GW1 158836MB	J (all detects) UJ (all non-detects)	А
6/24/09	2-Methyl-2-propanol	0.022 (≥0.05)	M-29B 159019MB	J (all detects) UJ (all non-detects)	А

## V. Blanks

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

Samples TB060909-GW1, TB061009-GW1, TB061209-GW1, TB061509-GW, and TB061609-GW1 were identified as trip blanks. No volatile contaminants were found in these blanks with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
TB060909-GW1	6/9/09	Methylene chloride	0.30 ug/L	H-28AB
TB061009-GW1	6/10/09	Acetone	1.9 ug/L	AW-BW-02B
TB061209-GW1	6/12/09	Acetone	1.7 ug/L	M-142B
TB061509-GW	6/15/09	2-Methyl-2-propanol Acetone Methylene chloride	1.7 ug/L 3.3 ug/L 0.29 ug/L	M-130B M-130BDL

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

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB060409-SO	6/4/09	Acetone Methylene chloride Toluene	2.1 ug/L 3.2 ug/L 1.7 ug/L	H-28AB AW-BW-02B M-142B M-130B M-130BDL

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

Sample	Compound	Reported Concentration	Modified Final Concentration
M-142B	Acetone	2.3 ug/L	2.3U ug/L
M-130B	Methylene chloride	0.20 ug/L	0.20U ug/L
M-130BDL	Acetone	4.7 ug/L	4.7U ug/L

# VI. Surrogate Spikes

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

# VII. Matrix Spike/Matrix Spike Duplicates

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

# VIII. Laboratory Control Samples (LCS)

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

# IX. Regional Quality Assurance and Quality Control

Not applicable.

### X. Internal Standards

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

# XI. Target Compound Identifications

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
M-130B	Chloroform	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 R0903243	All compounds reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

# XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

# XIV. System Performance

Raw data were not reviewed for this SDG.

## XV. Overall Assessment of Data

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-130B	Chloroform	×	А
M-130BDL	All TCL compounds except Chloroform	х	А

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

# XVI. Field Duplicates

No field duplicates were identified in this SDG.

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

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903243	H-28AB TB060909-GW1 AW-BW-02B TB061009-GW1 M-142B TB061209-GW1 M-130B M-130BDL TB061509-GW M-29B TB061609-GW1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Initial calibration (RRF) (c)
R0903243	TB060909-GW1 TB061009-GW1 M-142B TB061209-GW1 M-130B TB061509-GW H-28AB AW-BW-02B M-130BDL TB061609-GW1 M-29B	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	Α	Continuing calibration (RRF) (c)
R0903243	M-130B	Chloroform	J (all detects)	Α	Project Quantitation Limit (e)
R0903243	H-28AB TB060909-GW1 AW-BW-02B TB061009-GW1 M-142B TB061209-GW1 M-130B M-130BDL TB061509-GW M-29B TB061609-GW1	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (PQL) (sp)
R0903243	M-130B	Chloroform	х	Α	Overall assessment of data (o)
R0903243	M-130BDL	All TCL compounds except Chloroform	х	Α	Overall assessment of data (o)

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

No Sample Data Qualified in this SDG

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

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0903243	M-142B	Acetone	2.3U ug/L	А	bt, bf
R0903243	M-130B	Methylene chloride	0.20U ug/L	А	bt, bf
R0903243	M-130BDL	Acetone	4.7U ug/L	А	bt

# **Tronox Northgate Henderson**

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LDC #:_	21495D1	VALIDATION COMPLETENESS WORKSHEET	Date: 10 /6<
SDG #:_	R0903243	Stage 2B	Page: 1 of
Laborate	ory: <u>Columbia Ana</u>	alytical Services	Reviewer: W
			2nd Reviewer

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

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
11.	GC/MS Instrument performance check	A	· ·
III.	Initial calibration	SW	3 RSD rx
IV.	Continuing calibration/ICV	SW2	
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	Client spec
VIII.	Laboratory control samples	A	us
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	<b>A</b>	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	SM	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	Ŋ	
KVII.	Field blanks	SW	TB = 24.6,9 $FB = FB060409-50$ (R0403006)
e:	A = Acceptable ND = N	o compounds	detected D = Duplicate (R04030%)

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected D = Duplicate

R = Rinsate FB = Field blank TB = Trip blank

EB = Equipment blank

Validated Samples:

All WEATER

	<u> </u>	М		
1	H-28AB	11 TB061609-GW1	21 1 158621 MB	31
2 1	TB060909-GW1	12	22 7 158876	32
3 >	AW-BW-02B	13	23 3 15 9019	33
4	TB061009-GW1	14	24	34
5	M-142B	15	25	35
6 1	TB061209-GW1	16	26	36
7 <b>l</b>	M-130B	17	27	37
8 <b>&gt;</b>	M-130BDL	18	28	38
9	TB061509-GW	19	29	39
103	M-29B	20	30	40

# TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

A. Chloromethane*	U. 1,1,2-Trichloroethane	OO. 2,2-Dichloropropane	III. n-Butylbenzene	CCCC.1-Chlorohexane
B. Bromomethane	V. Benzene	PP. Bromochloromethane	JJJ. 1,2-Dichlorobenzene	DDDD. Isopropyt atcohol
C. Vinyl choride**	W. trans-1,3-Dichloropropene	QQ. 1,1-Dichloropropene	KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
D. Chloroethane	X. Bromoform*	RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF. Acrolein
E. Methylene chloride	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG. Acrylonitrile
F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN. 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
G. Carbon disulfide	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachloroethane	OOO. 1,3,5-Trichlorobenzene	IIII. Isobuty alcohol
H. 1,1-Dichloroethene**	BB. 1,1,2,2-Tetrachloroethane*	VV. isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacrytonitrile
I. 1,1-Dichloroethane*	CC. Toluene**	WW. Bromobenzene	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
J. 1,2-Dichloroethene, total	DD. Chlorobenzene*	XX. 1,2,3-Trichloropropane	RRR. m,p-Xylenes	LLLL. Ethyl ether
K. Chloroform**	EE. Ethylbenzene**	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
L. 1,2-Dichloroethane	FF. Styrene	ZZ. 2-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN. 2-Methyl-2-propanel
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	дере
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	2000.
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
Q. 1,2-Dichloropropane**	KK. Trichlorofluoromethane	EEE. sec-Butylbenzene	YYY. tert-Butanol	SSSS.
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohoi	TTTT.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-Isopropyltoluene	AAAA. Ethyl tert-butyl ether	טטטט.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	ww.

<sup>\* =</sup> System performance check compounds (SPCC) for RRF; \*\* = Calibration check compounds (CCC) for %RSD.

LDC #: 21 495D/

# **VALIDATION FINDINGS WORKSHEET** Initial Calibration

ō Page: Reviewer. 2nd Reviewer:

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

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

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

Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's? Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation?  $r > \ge 6,99$ 

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

N/A

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<b>9</b>	(J																									
Qualification	女/ bw/ b																									
Associated Samples	411 + BIKS															-										
Finding RRF (Limit: >0.05)	0.026																									
Finding %RSD (Limit: <30.0%)																										
Compound								·							,						-					
Standard ID	NNN		-																						-	
Date	18/601 1	1																								
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See love 21495 01 SDG #:\_\_ LDC #:

# **VALIDATION FINDINGS WORKSHEET** Continuing Calibration

ال اص Page: Reviewer:

2nd Reviewer:

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

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

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

Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ? Were all %D and RRFs within the validation criteria of <25 %D and ≥0.05 RRF?

LDC#: 21495D1 SDG #: Se Con

# **VALIDATION FINDINGS WORKSHEET** Field Blanks

Page: Reviewer:\_

2nd Reviewer:

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

Y N /N/A Were field blanks identified in this SDG? Y N /N/A

Were target compounds detected in the field blanks?

My Associated sample units: My Kg Mg A

Blank units: Wg 化 Associated sample units: Wg/大有 いらパ Field blank type: (circle one) Field Blank / Rinsate 代前 Blank)Other:

Associated Samples: 1 (ND)

(e) Sample Identification Sample Identification Associated Samples: Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other Res WH Associated sample units: 45 48 49 1 Blank ID Blank ID 6/10/04 Blank ID 4 69/69/9 Blank ID 0.30 Sampling Date Sampling Date ш Compound Blank units: 4 1 Compound

SDG #: 21 495 D/

# **VALIDATION FINDINGS WORKSHEET**

Page: Reviewer: 2nd Reviewer:

Field Blanks

Were field blanks identified in this SDG? METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

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

**Bfank units: いった Associated sample units: いらん Pfull** Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other:

y

Sample Identification Associated Samples: 8,30 Blank ID Blank ID 6 69/27 Compound

705 Blank units: 45/L Associated sample units: 45/L Field blank type: (circle one) Field Blank / Rinsate (Trip Blank) Other:

Associated Samples: 7, 8

		_				 	 	
ntification	-							
Sample Identification								
	8		4.7/4					
	7			h/02.0	,			
Blank ID								
Blank ID9		١٠ /	3.3	be'0				
Compound	Sampling Date:	NNNN	#	$\mu$				
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21495 01 LDC #: SDG#:

# **VALIDATION FINDINGS WORKSHEET**

Field Blanks

Page: 3 of 3 Reviewer:

2nd Reviewer:

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W

Were field blanks identified in this SDG? МЁТНОD: GC/MS VOA (EPA SW 846 Method 8260В) Y/N/N/A

中 Sample Identification Associated Samples: E Ž either a thers 0.20/4 X N N/A Were target compounds detected in the field blanks?

Blank units: いう L Associated sample units: いっち L Associated sample units: いう L Associated sample units: いっと L Associated sample units: いっと L Associated s 2,3/4 Z. 1 /44/69 3 8 ſIJ Compound

Associated sample units: Blank units:

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

Associated Samples:

	Assessment of the Complete Com	Appropriate Control of the Control o	Approximate the second			A Companyage of Control Contro

# VALIDATION FINDINGS WORKSHEET Compound Quantitation and CRQLs

Page: 2nd Reviewer: Reviewer:

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

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

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

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

Comments: See sample calculation verification worksheet for recalculations

SDG #: 51 455 b)

# VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Reviewer: 3Vc\_\_\_\_\_\_2nd Reviewer:

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

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

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?

*	Dets	Semple ID	Finding	Associated Samples	Qualifications	
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					The first of the standard consumer of the superior of the property of the standard consumer of t	
	•					
S	Comments:					

# 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 28, 2009

Matrix:

Water

Parameters:

Volatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903404

# Sample Identification

M-78B

M-78BDL

TB061709-GW1

M-128B

TB061809-GW1

H-38B

M-19B

M-19BDL

TB061909-GW1

M-34B

M-34BDL

M-125B

TB062309-GW1

M-22AB

M-22ABDL

TB062409-GW1

M-17AB

M-17ABDL

M-125BMS

M-125BMSD

## Introduction

This data review covers 20 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

# I. Technical Holding Times

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

Sample	Compound	Total Days From Sample Collection Until Analysis	Required Holding Time (in Days) From Sample Collection Until Analysis	Flag	A or P
TB061709-GW1	All aromatic compounds	9	7	J- (all detects) UJ (all non-detects)	Р

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 (r²) were greater than or equal to 0.990.

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

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/18/09	2-Methyl-2-propanol	0.026 (≥0.05)	All samples in SDG R0903404	J (all detects) UJ (all non-detects)	А

# IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/25/09	2-Methyl-2-propanol	0.025 (≥0.05)	M-78B TB061709-GW1 M-128B TB061809-GW1 H-38B M-19B TB061909-GW1 M-34B TB062309-GW1 159353MB	J (all detects) UJ (all non-detects)	A
6/30/09	2-Methyl-2-propanol	0.027 (≥0.05)	M-78BDL M-19BDL M-34BDL M-125B M-22AB M-22ABDL TB062409-GW1 M-17AB M-17ABDL M-125BMS M-125BMSD 159620MB	J (all detects) UJ (all non-detects)	А

### V. Blanks

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

Samples TB061709-GW1, TB061809-GW1, TB061909-GW1, TB062309-GW1, and TB062409-GW1 were identified as trip blanks. No volatile contaminants were found in these blanks with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
TB061709-GW1	6/17/09	2-Methyl-2-propanol	1.6 ug/L	M-78B M-78BDL
TB061809-GW1	6/18/09	Dichloromethane Toluene	0.38 ug/L 0.23 ug/L	M-128B H-38B
TB061909-GW1	6/19/09	Dichloromethane	0.24 ug/L	M-19B M-19BDL M-34B
TB062309-GW1	6/23/09	Dichloromethane	0.28 ug/L	M-125B
TB062409-GW1	6/24/09	2-Methyl-2-propanol Dichloromethane	2.0 ug/L 0.24 ug/L	M-22AB M-22ABDL M-17AB M-17ABDL

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

Field Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
FB060409	6/4/09	Acetone Dichloromethane Toluene	2.1 ug/L 3.2 ug/L 1.7 ug/L	M-78B M-78BDL 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 with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
M-19B	Dichloromethane	0.29 ug/L	0.29U ug/L
M-34B	Dichloromethane	0.26 ug/L	0.26U ug/L
M-78B	Acetone	2.1 ug/L	2.1U ug/L
M-128B	Acetone	3.1 ug/L	3.1U ug/L

# 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 or MSD percent recoveries (%R) were not within QC limits for several compounds, the MS, MSD, or LCS 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 recoveries (%R) were not within QC limits for some compounds, 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 project quantitation limits were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
M-78B M-19B M-34B M-22AB M-17AB	Chloroform	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	А

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 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 of Data

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-78B M-19B M-34B M-22AB M-17AB	Chloroform	x	A
M-78BDL M-19BDL M-34BDL M-22ABDL M-17ABDL	All TCL compounds except Chloroform	×	А

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

# XVI. Field Duplicates

No field duplicates were identified in this SDG.

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

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903404	TB061709-GW1	Benzene Toluene Chlorobenzene Ethylbenzene Styrene Isopropylbenzene Bromobenzene n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene 1,2,3-Trichlorobenzene Naphthalene 1,2,3-Trichlorobenzene m,p-Xylenes o-Xylene	J- (all detects) UJ (all non-detects)	P	Technical holding times (h)
R0903404	M-78B M-78BDL TB061709-GW1 M-128B TB061809-GW1 H-38B M-19B M-19BDL TB061909-GW1 M-34B M-34BDL M-125B TB062309-GW1 M-22AB M-22ABDL TB062409-GW1 M-17AB M-17ABDL	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Initial calibration (RRF) (c)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903404	M-78B M-78BDL TB061709-GW1 M-128B TB061809-GW1 H-38B M-19B M-19BDL TB061909-GW1 M-34B M-34BDL M-125B TB062309-GW1 M-22AB M-22ABDL TB062409-GW1 M-17AB M-17ABDL	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Continuing calibration (RRF) (c)
R0903404	M-78B M-19B M-34B M-22AB M-17AB	Chloroform	J (all detects)	А	Project Quantitation Limit (e)
R0903404	M-78B M-78BDL TB061709-GW1 M-128B TB061809-GW1 H-38B M-19B M-19BDL TB061909-GW1 M-34B M-34BDL M-125B TB062309-GW1 M-22AB M-22ABDL TB062409-GW1 M-17AB M-17ABDL	All compounds reported below the PQL.	J (all detects)	А	Project Quantitation Limit (PQL) (sp)
R0903404	M-78B M-19B M-34B M-22AB M-17AB	Chloroform	X	А	Overall assessment of data (o)
R0903404	M-78BDL M-19BDL M-34BDL M-22ABDL M-17ABDL	All TCL compounds except Chloroform	x	А	Overall assessment of data (o)

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

#### No Sample Data Qualified in this SDG

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

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0903404	M-19B	Dichloromethane	0.29U ug/L	А	bt
R0903404	M-34B	Dichloromethane	0.26U ug/L	А	bt
R0903404	M-78B	Acetone	2.1U ug/L	А	bf
R0903404	M-128B	Acetone	3.1U ug/L	А	bf

#### **Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET**

LDC #: 21495E1 Stage 2B SDG #: R0903404

Laboratory: Columbia Analytical Services

Date: 9 /17 /09

Reviewer: 2nd Reviewer:

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

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: 6 /17 - 24 /69
II.	GC/MS Instrument performance check	Ā	'
III.	Initial calibration	SM	2 RSD r2 200 = 25 %
IV.	Continuing calibration/46V	Sw	2CV = 25 %
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	ŚW	
VIII.	Laboratory control samples	SW	VCS
IX.	Regional Quality Assurance and Quality Control	Z	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	SIN	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW)	
XVI.	Field duplicates	N	
XVII.	Field blanks	N2	TB = 3,5,9,13,14 FB= FB060419  mm R0903086
Note:	A = Acceptable ND = No	o compound	s detected D = Duplicate From R 0 9 0 3 0 66

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

	<u></u>						
1	M-78B	11 7	M-34BDL	21 1	159353	МВ	31
2	M-78BDL	12	M-125B	22	159 620	MB	32
<del>1</del> 1	TB061709-GW1	13	TB062309-GW1	23			33
4 1	M-128B	14 2	M-22AB	24			34
5	TB061809-GW1	15 7	M-22ABDL	25			35
6	H-38B	16	TB062409-GW1	26			36
7 1	M-19B	17 Z	M-17AB	27			37
8 7	M-19BDL	18	M-17ABDL	28			38
9	TB061909-GW1	19 7	M-125BMS	29			39
10	M-34B	20 7	M-125BMSD	30			40

# TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

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

<sup>\* =</sup> System performance check compounds (SPCC) for RRF; \*\* = Calibration check compounds (CCC) for %RSD.



LDC #:	•	t E/
SDG #:	Sy	Corr

#### VALIDATION FINDINGS WORKSHEET Technical Holding Times

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2nd Reviewer:_	9

All circled dates have exceeded the technical holding times.

		SW 846 Method	<u> </u>				T
Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qua
3	· W	N	6/7/09		6/26/09	9	J-/
		(pH = 5)	,		/ /	Arm	rti
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							7.4

#### **TECHNICAL HOLDING TIME CRITERIA**

Water unpreserved:

Aromatic within 7 days, non-aromatic within 14 days of sample collection.

Water preserved:

Both within 14 days of sample collection. Both within 14 days of sample collection.

Soil:

SDG #: 451 (22) LDC # 21 495 E

## VALIDATION FINDINGS WORKSHEET Initial Calibration

Page: Reviewer:\_ 2nd Reviewer:

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

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

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

Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's? Was a curve fit used for evaluation?  $r^2 = 2 \sigma$ ,  $\theta f$ 

Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation? X N N/A

Did the initial calibration meet the acceptance criteria?

Most all 9/ DSDs and DDEs within the velidation entering of 730 9/ DSD and 10 05 DDE 2

<b>≻</b> [	Y N'N'A	Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF?	RFs within the valida	tion criteria ot ≤30 %	RSD and >0.05 KRF	_		I
76	# Date	Standard ID	Compound	Finding %RSD (Limit: <30.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications	
	69/81/9		NNN		0.626	Au + Biks	J/M3/A (C)	П
								T
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LDC # 21495 E SDG#:

## **VALIDATION FINDINGS WORKSHEET** Continuing Calibration

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

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

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

Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?  Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's?  Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF?	nding RRF mit: >0.05) Associated Samples Qualifications	-	159353 MB		027 2,811214-20	159620 MB											
ځ	Qualification	1	,														
rument? I for all CCC's and SPCC's	Associated Samples	1,3-791013			21/1/8												
12 hours for each instraction (1) within method criteria ≥0.05 RRF?	Finding RRF (Limit: ≥0.05)	2 ده . ه			0.027												
d at least once every sponse factors (RRF iteria of <25 %D and	Finding %D (Limit: <25.0%)																
ion standard analyze (%D) and relative re-	Compound	NNN			2222												
Nas a continuing calibration standard analyzed at least once every 12 hours for exponse factors (RRF) within metho (N) N/A Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF?	Standard ID	89023			89089												
Mary Mary Mer Wei	ate	16/20/21			6/30/69	, ,											
	#										<u> </u>		<u></u>				

1495 E/	20 62
LDC #: 2	SDG #:

VALIDATION FINDINGS WORKSHEET FIELD FIELD Blanks

1 of 3	35	
Page:	Reviewer:_	2nd Reviewer:_

ዛ Sample Identification Associated Samples: n e METHOD: GC/MS VOA (EPA SW 846 Method 8260B)
Y/N/N/A Were field blanks identified in this SDG? Blank ID Blank ID 3 60/11/09 フィスス Compound Y N N/A CROL 3.7

Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other:	Field Blank	/ Rinsate / Tri	p Blank / Other:	Associated Samples:	4 6 ( <del>-NA)</del>
Compound	Blank ID $\mathcal{I}$	Blank ID		Sample Identification	tification
6 /8/69	6/8/09		9		
T	0.38		(500)		
3	0,23				
CROL					

Associated sample units:\_

Blank units:

LDC# 21495F SDG #:

# VALIDATION FINDINGS WORKSHEET

Field Blanks

Page: Vof 2nd Reviewer: Reviewer:\_

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)
Y N/N/A Were field blanks identified in this SDG?

(64) 7, 8, 10 Sample Identification Associated Samples: 3 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: 19 / Associated sample units: 25 / Associated sample units: 2 2 8 Blank ID Blank ID 9 6/19/09 0,24 Compound CROL

Associated Samples: Blank units: 45/L Associated sample units: 45/C Field blank type: (circle one) Field Blank / Rinsate /(Trip Blank) Other:

( N) 7

Compound	Blank ID /3	Blank ID		Sample Identification	ntification		
Sampling Pairs 6/23/04	6/23/04						
72	6.28						
CROL							

LDC#: 21495 E SDG#:

## VALIDATION FINDINGS WORKSHEET Field Blanks

₹<sub>0</sub> Page: Reviewer:\_ 2nd Reviewer:\_

> Were field blanks identified in this SDG? METHOD: GC/MS VOA (EPA SW 846 Method 8260B) Y N /N/A

Were target compounds detected in the field blanks?

Blank units: MS / L Associated sample uni

Blank units: M5/L Associated sample	ciated samp	ole units: V / Rinsate (Tri	vs / L rip Blapk / Other:	Associ	Associated Samples:	4	14 15 17 18	(MB)
Compound	Blank ID 16	Blank ID			Sample Identification	fication		
	6/24/01							
2 2 2 2	2.0							
m	0.24							
CROL								
Blank units: 49/L Associated sample units: 45/L Field blank/ Rinsate / Trip Blank / Other:	ciated samp	yle units: 45	$rac{\mathcal{L}}{ip  Blank / Other}$	Associ	Associated Samples:		1,2,4 6 12	(p t)
	TROKAGO							

Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other:	(Field Blank)	Rinsate / Trip	Blank / Other	er:	Associ	Associated Samples:	-	1,2,4 6 12	\ \ \ \
Compound	FB060409 Blank ID	Blank ID				Sample Id	Sample Identification		
	4/64/69		_	7					
#	2.1		2,1/4	3.1/4					
עו	32								
22	1.7								
			(AN)	All others either ND or	ther N		> 100 FB >		
CROL									

4.2

X

3. W

LDC# 21495 E SDG #: See Con

## VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

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

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

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

VN 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
		19/20	qq	( )	( es/-e/) 59	( )	12	No, grade (Msin
			Q	(33 (76-136)	l	( )		" (mspin
			X	( ) (	( ) ( )	( )		10Sin
			*	143 ( )	( ) %3	( )		
			KK	135 ( )	( )	( )		C MSD:
			0	145 ( 1)	137 ( // )		A	1 X (185)
				( )		( )		ر
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		-
				( )	( )	( )		
				( )	( )	( )		
				( )	)	( )		
				( )	( )	( )		
		Compound	punc	QC Lim	QC Limits (Soll)	RPD (Soil)	QC LImits (Water)	RPD (Water)
	ェ	1,1-Dichloroethene		59-1	59-172%	< 22%	61-145%	< 14%
	S.	Trichloroethene		62-1	62-137%	< 24%	71-120%	< 14%
	۷.	Benzene		66-1	66-142%	< 21%	76-127%	< 11%
	cc.	Toluene		59-1	59-139%	< 21%	76-125%	< 13%
	DD.	Chlorobenzene		60-1	60-133%	< 21%	75-130%	< 13%

SDG#: 2445 E)

## VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: 2nd Reviewer: Reviewer:

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

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

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

	2 ·																						····	
Qualifications	No qual (Ms/MDin)		\frac{1}{2}																					
Associated Samples	2, 8, 11, 12, 14-18	15 9620 MB		•																				
RPD (Limits)	( )	( )	( )	( )	( )	( )	( )		( )	( )	( )	( )	( )	( )	( )	(	( )	( )	( )	( )	( )	( )	( )	( )
LCSD %R (Limits)	( <	( )		( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )
LCS %R (Limits)	74 (75-125)	( 1 ) 27		(	( )	( )	( )		( )					( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )
Compound	222	KKK	177												***									
di dsɔr/sɔr	5)7 (2) 65)										-													
Date																								
*																			L					

14	}
56417	20
LDC#	SDG #:

# VALIDATION FINDINGS WORKSHEET Compound Quantitation and CRQLS

Page: of 1 Reviewer: NZ 2nd Reviewer:

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

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

Were the 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?

		Associated Samples	ations
10 14 17	K > Cal rang		J Mets /A (e)

Comments: See sample calculation verification worksheet for recalculations

LDC#: 21495 ET SDG#: Sec Cm

## VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page: Reviewer: 2nd Reviewer:

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

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

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

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

*	Dete	Ol ejdus	Finding	Associated Samples	Qualifications	
		1 7 10 14 17	K > al rank	,	X/A (0)	
				٥		
		2 8 11 15 18	All excurt K	4:1	<u>_</u>	T
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Comments:	nents:					1

#### 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 7, 2009

Matrix:

Soil/Water

Parameters:

Volatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

SA127-0.5BMS

SA127-0.5BMSD

Sample Delivery Group (SDG): R0903184

#### Sample Identification

SA127-0.5B

TB060409-SO1

RSAJ6-0.5B

RSAK6-0.5B

**RSAK8-0.5B** 

RSAL7-0.5B

RSAL8-0.5B

SA35-0.5B

SA55-0.5B

SA56-0.5B

SA176-0.5B

TB061009-SO1

RSAO3-0.5B

SA182-0.5B

SA201-0.5B

TB061109-SO1

SA166-0.5B

RSAK4-0.5B

RSAK4009-0.5B

SA134-0.5B

#### Introduction

This data review covers 19 soil samples and 3 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

#### I. Technical Holding Times

All technical holding time requirements were met.

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

#### II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

#### III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r²) were greater than or equal to 0.990.

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

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/12/09	2-Methyl-2-propanol	0.028 (≥0.05)	All water samples in SDG R0903184	J (all detects) UJ (all non-detects)	Α

#### IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

Date	Compound	%D	Associated Samples	Flag	A or P
6/11/09	Dichlorodifluoromethane	25.7	SA127-0.5B RSAJ6-0.5B RSAK6-0.5B SA127-0.5BMS SA127-0.5BMSD 157212MB	J+ (all detects)	А
6/17/09	Trichlorofluoromethane Di-isopropyl ether Ethyl-tert-butyl ether	26.9 25.5 26.7	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 SA201-0.5B SA166-0.5B RSAK4-0.5B	J+ (all detects) J+ (all detects) J+ (all detects)	A
6/19/09	Bromomethane	42.7	TB060409-SO1 TB061009-SO1 TB061109-SO1 158382MB	J- (all detects) UJ (all non-detects)	A

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/19/09	2-Methyl-2-propanol	0.014 (≥0.05)	TB060409-SO1 TB061009-SO1 TB061109-SO1 158382MB	J (all detects) UJ (all non-detects)	A

#### V. Blanks

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

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
158171MB	6/18/09	Acetone	2.1 ug/Kg	SA134-0.5B

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
158382MB	6/19/09	1,2,3-Trichlorobenzene Hexachlorobutadiene	0.35 ug/L 0.41 ug/L	TB060409-SO1 TB061009-SO1 TB061109-SO1
158352MB	6/22/09	Acetone	1.7 ug/Kg	RSAK4009-0.5B

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

Samples TB060409-SO1, TB061009-SO1, and TB061109-SO1 were identified as trip blanks. No volatile contaminants were found in these blanks with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
TB060409-SO1	6/5/09	Acetone	2.1 ug/L	SA127-0.5B RSAJ6-0.5B RSAK6-0.5B RSAK8-0.5B RSAL7-0.5B RSAL8-0.5B
TB061009-SO1	6/10/09	Dichloromethane	0.22 ug/L	SA35-0.5B SA55-0.5B SA56-0.5B SA176-0.5B RSAO3-0.5B

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

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072109-SO	7/21/09	Acetone Bromoform	3.7 ug/L 0.28 ug/L	All soil 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 with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
SA127-0.5B	Acetone	4.0 ug/Kg	4.0U ug/Kg

Sample	Compound	Reported Concentration	Modified Final Concentration
RSAK6-0.5B	Acetone	3.8 ug/Kg	3.8U ug/Kg
RSAL7-0.5B	Acetone	3.3 ug/Kg	3.3U ug/Kg
RSAJ6-0.5B	Acetone	5.3 ug/Kg	5.3U ug/Kg
RSAK8-0.5B	Acetone	4.4 ug/Kg	4.4U ug/Kg
RSAL8-0.5B	Acetone	5.4 ug/Kg	5.4U ug/Kg
SA35-0.5B	Acetone	4.0 ug/Kg	4.0U ug/Kg
SA55-0.5B	Acetone	3.6 ug/Kg	3.6U ug/Kg
SA56-0.5B	Acetone	3.1 ug/Kg	3.1U ug/Kg
RSAO3-0.5B	Acetone	3.3 ug/Kg	3.3U ug/Kg
RSAK4-0.5B	Acetone	3.9 ug/Kg	3.9U ug/Kg
RSAK4009-0.5B	Acetone	5.0 ug/Kg	5.0U ug/Kg
SA134-0.5B	Acetone	4.9 ug/Kg	4.9U ug/Kg

#### 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 or MSD percent recoveries (%R) were not within QC limits for several compounds, the LCS 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) were within QC limits.

#### IX. Regional Quality Assurance and Quality Control

Not applicable.

#### X. Internal Standards

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

#### XI. Target Compound Identifications

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 R0903184	All compounds reported below the PQL.	J (all detects)	Α	

Raw data were not reviewed for this SDG.

#### XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

#### XIV. System Performance

Raw data were not reviewed for this SDG.

#### XV. Overall Assessment of Data

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 volatiles were detected in any of the samples with the following exceptions:

	Concentration (ug/Kg)					
Compound	RSAK4-0.5B	RSAK4009-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P
Acetone	3.9	5.0	-	1.1 (≤21)	-	-
Dichloromethane	1.1	2.3	-	1.2 (≤5.2)	-	-

	Concentration (ug/Kg)					
Compound	RSAK4-0.5B	RSAK4009-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P
Toluene	0.69	1.2	-	0.59 (≤5.2)	-	-

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

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903184	TB060409-SO1 TB061009-SO1 TB061109-SO1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Initial calibration (RRF)
R0903184	SA127-0.5B RSAJ6-0.5B RSAK6-0.5B	Dichlorodifluoromethane	J+ (all detects)	А	Continuing calibration (%D)(c)
R0903184	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 SA201-0.5B SA201-0.5B SA166-0.5B	Trichlorofluoromethane Di-isopropyl ether Ethyl-tert-butyl ether	J+ (all detects) J+ (all detects) J+ (all detects)	А	Continuing calibration (%D)(c)
R0903184	TB060409-SO1 TB061009-SO1 TB061109-SO1	Bromomethane	J- (all detects) UJ (all non-detects)	А	Continuing calibration (%D)(c)
R0903184	TB060409-SO1 TB061009-SO1 TB061109-SO1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Continuing calibration (RRF) (c)
R0903184	SA127-0.5B TB060409-SO1 RSAJ6-0.5B RSAK6-0.5B RSAK8-0.5B RSAL7-0.5B RSAL8-0.5B SA35-0.5B SA55-0.5B SA56-0.5B SA176-0.5B TB061009-SO1 RSAO3-0.5B SA182-0.5B SA182-0.5B SA201-0.5B TB061109-SO1 SA182-0.5B RSAK4-0.5B RSAK4-0.5B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (PQL) (sp)

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

#### No Sample Data Qualified in this SDG

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

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0903184	SA127-0.5B	Acetone	4.0U ug/Kg	А	bt, bf
R0903184	RSAK6-0.5B	Acetone	3.8U ug/Kg	А	bt, bf
R0903184	RSAL7-0.5B	Acetone	3.3U ug/Kg	А	bt, bf
R0903184	RSAJ6-0.5B	Acetone	5.3U ug/Kg	А	bf
R0903184	RSAK8-0.5B	Acetone	4.4U ug/Kg	A	bf
R0903184	RSAL8-0.5B	Acetone	5.4U ug/Kg	A	bf
R0903184	SA35-0.5B	Acetone	4.0U ug/Kg	А	bf
R0903184	SA55-0.5B	Acetone	3.6U ug/Kg	А	bf
R0903184	SA56-0.5B	Acetone	3.1U ug/Kg	Α	bf
R0903184	RSAO3-0.5B	Acetone	3.3U ug/Kg	А	bf
R0903184	RSAK4-0.5B	Acetone	3.9U ug/Kg	А	bf
R0903184	RSAK4009-0.5B	Acetone	5.0U ug/Kg	А	bf
R0903184	SA134-0.5B	Acetone	4.9U ug/Kg	А	bf

#### **Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET**

LDC #: 21495F1

Stage 2B

SDG #: R0903184

Laboratory: Columbia Analytical Services

Reviewer: 2nd Reviewer:

from R090 4016

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

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

	Validation Area		Comments
1.	Technical holding times	A	Sampling dates: 6/05-11/09
II.	GC/MS Instrument performance check	Ā	
III.	Initial calibration	ŻM,	2 RSD r2
IV.	Continuing calibration/ICV	SW	
V.	Blanks	WZ	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	us
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	Δ	
XVI.	Field duplicates	SW	D = 18,19
XVII.	Field blanks	SW	TB = 2, 12, 16 + FB = FB072109-50

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: 501 MICT

	War	!	90[]					
1 ]	SA127-0.5B	11 3	SA176-0.5B S	21 /	SA127-0.5BMS 5	31 /	157212	MB
<u></u> 2 γ	TB060409-SO1	12 >	TB061009-SO1 W	22 1	SA127-0.5BMSD	327	158382	MB
3 (	RSAJ6-0.5B Ş	13 3	RSA <b>6</b> 3-0.5B S	23		33 7	157810	Mg
4 1	RSAK6-0.5B	14 3	SA182-0.5B	24		34 4	158352	МB
5 3	RSAK8-0.5B	15 3	SA201-0.5B	25		35 4	158171	Mŋ
6 3	RSAL7-0.5B	16 7	ТВ061109-SO1 W	26		36		
7 3	RSAL8-0.5B	173	SA166-0.5B S	27		37		
8 3	SA35-0.5B	18 🖥	RSAK4-0.5B	28		38		
9 3	SA55-0.5B	19 4	RSAK4009-0.5B <b></b>	29		39		
10 3	SA56-0.5B	20 3	SA134-0.5B	30		40		

(no IW) (#13 "0" letter not #)

# TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

A. Chloromethane*	U. 1,1,2-Trichloroethane	OO. 2,2-Dichloropropane	III. n-Butylbenzene	CCCC.1-Chlorohexane
B. Bromomethane	V. Benzene	PP. Bromochloromethane	JJJ. 1,2-Dichlorobenzene	DDDD. Isopropyl alcohol
C. Vinyl choride**	W. trans-1,3-Dichloropropene	QQ. 1,1-Dichloropropene	KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
D. Chloroethane	X. Bromoform*	RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF. Acrolein
E. Methylene chloride	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG. Acrylonitrile
F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN. 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
G. Carbon disulfide	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachloroethane	OOO. 1,3,5-Trichlorobenzene	IIII. Isobutyl alcohol
H. 1,1-Dichloroethene**	BB. 1,1,2,2-Tetrachloroethane*	VV. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
I. 1,1-Dichloroethane*	CC. Toluene**	WW. Bromobenzene	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
J. 1,2-Dichloroethene, total	DD. Chlorobenzene*	XX. 1,2,3-Trichloropropane	RRR. m,p-Xylenes	LLLL. Ethyl ether
K. Chloroform**	EE. Ethylbenzene**	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
L. 1,2-Dichloroethane	FF. Styrene	ZZ. 2-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN. 2- Mcthyl-2, proponol
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	dddd
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	9000
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
Q. 1,2-Dichloropropane**	KK. Trichlorofluoromethane	EEE, sec-Butylbenzene	YYY. tert-Butanol	SSSS.
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohol	1111.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-Isopropyltoluene	AAAA. Ethyl tert-butyl ether	.กบกด
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	ww.

<sup>\* =</sup> System performance check compounds (SPCC) for RRF; \*\* = Calibration check compounds (CCC) for %RSD.

SDG #: Sag Cont LDC # 24 445 F)

## **VALIDATION FINDINGS WORKSHEET** Initial Calibration

Page: \_\_lof\_ Reviewer:\_\_ 2nd Reviewer:\_

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

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

Did the laboratory perform a 5 point calibration prior to sample analysis? Y)N N/A X N N

Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's? Was a curve fit used for evaluation?  $r \ge a$ , q, q

N N N

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

		(3)													
	Qualifications	J/113 /4													
	Associated Samples	All Water + 158382MB													
Finding %RSD Finding RRF	(Limit: ≻0.05)	6.018													
	(Limit: <30.0%)		·												
	Compound	NNNN													
	Standard ID	ICAL													
I	Date	6/2/01													
	*														

SDG#: Se Goral LDC#: 21495 F)

## VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page: / of Reviewer: 2nd Reviewer:

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

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

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

		9-1		HHAT		
	Qualifications	8 J+arts/4 (	WB.	J-/MJ/A J/MJ/A		
Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?  Were all %D and RRFs within the validation criteria of ∠25 %D and ∠0.05 RRF ?	Associated Samples	1, 3, 4, 21, 22, 157212 MB	5-11 13-15 17 18 157810 MB	2, 12, 16, 15838>MB		
Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?	Finding RRF (Limit: ≥0.05)			6.014		
raticast office every sponse factors (RRF teria of ≤25 %D and	Finding %D (Limit: <25.0%)	25.7	26.9 25.5 20.7	42.7		
s (%D) and relative res	Compound	( <del>†</del> )	KK (4) XXX (4) AAAA (4)	B (r) NNNN		
Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?	Standard ID	M8756	M 8 864	F0424		
W W W	Date	6/11/69	6/2/9	679/69		
利江	#					

LDC# 21495 F

# **VALIDATION FINDINGS WORKSHEET**

Page:

2nd Reviewer:\_ Reviewer:

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

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

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

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

Blank analysis date: ७ //४/० व

(XZ)

Sample Identification 8 Associated Samples: 30 4,0 158171 MA Blank ID Compound Conc. units: ଏବ Methylene chloride Acetone

Blank analysis date: 6/19/69 Conc. units: 4/6		Associated Samples:	2, 12 16 (ND)	
Compound	Blank ID		Sample Identification	
	SN 186831			
Methylene chloride NNN 0.35	0.35			
Acetone-	0.41	•		
CROI				

LDC #: 21495 F)

# **VALIDATION FINDINGS WORKSHEET**

Page: Yof Reviewer:\_ 2nd Reviewer:

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

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

Was a method blank associated with every sample in this SDG?

Was a method blank analyzed at least once every 12 hours for each matrix and concentration?

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

Blank analysis date: 6/22/69 N/A

Sample Identification 5 Associated Samples: ار ره 158352 MB Blank 1D Compound Methylene chloride Conc. units: Acetone

Blank analysis date: \_ Conc. units:

Associated Samples:

		Associated Onlines.
Compound	Blank ID	Sample Identification
Methylene chloride		
Acetone		
CROI		

VALIDATION FINDINGS WORKSHEET

LDC #: 21495 F

SDG #:

Y N/N/A

101 3

Page: Reviewer:\_ 2nd Reviewer:

Field Blanks

Were field blanks identified in this SDG? METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

(bt) 3-7 Sample Identification 3 Associated Samples: 4.4 W, 80 Sign Were target compounds detected in the field blanks?

Blank units: WS / Associated sample units: 2 4,0 Blank ID Blank ID 7 6/05/09 ď Compound

4.

(2K)

8-11 13 Sample Identification Associated Samples: Blank units: いろノレ Associated sample units: ハタ 木のField blank type: (circle one) Field Blank / Rinsate (Trip Blank) Other: Blank ID Blank ID 2 Compound

(XZ)

no ha

100 Take L ( 4 J 22 0.94

SDG #: Se Clory LDC# 21405 F

## **VALIDATION FINDINGS WORKSHEET** Field Blanks

Page: 2 of 2 Reviewer: 376 2nd Reviewer:\_\_\_

( + 9)

A11 2016

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

Y N N/A

Were field blanks identified in this SDG

Y N N/A

Were target compounds detected in the SBI Method 8260B)

Y N N/A Were field blanks identified in this SDG?

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

Slank units: 1/9/L Associated sample units: 1/9/L Associated sample units: 1/9/Kg

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

(2)

7.4

						_	 _	 
		O/	3.1/4	,				
\		6	3.6/4					
5)10:		8	1,0/4	-				
S1:02 114	ification	\ \	5.4/4 4.0/W					
Associated Samples:_	Sample Identification	و	3.3/4					
Associat		N	4.4/4					
		4	3.8/4 4	,				
ank / Other:		3	1/6					
nsate / Trip Bl	ank-10		4,0/4 5.					
ield Blank / R	FBlank ID 9 - So Blank-ID	60/10/2	3.7 4,	0,28				
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other:	Compound B	Sampling Date 7		X				
Field blank t	Con							

Blank units: As	Associated sample units:	Same	to show	
Field blank type: (circle	Field blank type: (circle one) Field Blank / Rinsate / Trip Blank	Blank / Other:	Associated Samples: ( 0 .	\ \
parious	FB 072109 -SD		Samula Idantification	

	30	4.9 /4					
ntification	61	5.0/4 4.9 h					
Sample Identification	(8	3.9/4	,				
	()	(9.0)					
	15	(%)					
	13	3.3/W	,				
BlankTD /	11	(23)	)				
Blank ID Blank ID	7/24/69	4.8	88.0				
Compound	Sampling Date	+	X				

SDG #: Sul Conney LUC#: 21495 E)

## Matrix Spike/Matrix Spike Duplicates VALIDATION FINDINGS WORKSHEET

Page: Lof\_ Reviewer: 2nd Reviewer:

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

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

Qualifications			No gue (LCS in)																				
		<i>(</i> ) <i>(</i> ) <i>(</i> ) <i>( ( ( ( ( ( ( ( ( (</i>	No gue	No sur	N o sur	Nosur	No	N o Sur	Nogue	N	N	Nogue	N	N	Nogue	N	N Sur						
Sauchated Samples																							QC Limits (Water)
	<del>/</del> (																						
sixte brink	п																					RPD (Soil)	( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( (
3RI entrude		- C t	1	,	,	( )																	
2 2 2	22				-																	) ) ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( (	) ( ( ) ( ( ) ( ) ( ( ) ( ) ( ) ( ) ( )
4			)	_		_																	
(se attacher	(sa a#						_																
																						Compound	Compound
12/2																							C C 1,1-Dichloroethene
							-																
	1	1	+				_																

< 14% < 14% × 11% < 13% < 13%

61-145% 71-120% 76-127%

> < 24% < 21%

> > 66-142%

59-139%

62-137%

Trichloroethene

Benzene Toluene

> S

S.

8

Chlorobenzene

60-133%

76-125% 75-130%

< 21% < 21%

#### COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:

Northgate Environmental

Project:

Tronox LLC Henderson/2027.001

Sample Matrix:

Soil

Service Request: R0903184

Date Collected: 6/5/09 Date Received: 6/6/09 Date Analyzed: 6/11/09

#### Matrix Spike Summary Volatile Organic Compounds by GC/MS

Sample Name:

SA127-0.5B

Lab Code:

R0903184-001

Units: µg/Kg Basis: Dry

Analytical Method: 8260B

	Sample		Matrix Spike Q0904576-03				cate Matrix \ .Q0904576-04		% Rec		RPD
Analyte Name	Result	Result	Expected	% Rec		Result	Expected	% Rec	Limits	RPD	Limit
1,1,1,2-Tetrachloroethane	ND	35.0	46.6	75		36.1	50.9	71	70 - 130	3	30
1,1,1-Trichloroethane (TCA)	ND	47.5	46.6	102		46.1	50.9	91	70 - 130	3	30
1,1,2,2-Tetrachloroethane	ND	9.86	46.6	21	*	8.23	50.9	16	* 70 - 130	18	30
1,1,2-Trichloroethane	ND	36.2	. 46.6	78		37.5	50.9	74	70 - 130	4	30
1,1-Dichloroethane (1,1-DCA)	ND	41.7	46,6	89		42.8	50.9	84	70 - 130	3	30
1,1-Dichloroethene (1,1-DCE)	ND	44.2	46.6	95		46.6	50.9	92	70 - 130	5	30
1,1-Dichloropropene	ND	44.1	46.6	95		45.0	50.9	89	70 - 130	2	30
1,2,3-Trichlorobenzene	ND	19.7	46,6	42	*	19.7	50.9	39	* 70 - 130	0	30
1,2,3-Trichloropropane	ND	33.5	46.6	72		35.9	50.9	71	70 - 130	7	30
1,2,4-Trichlorobenzene	ND	18.7	46.6	40	*	18.4	50.9	36	* 70 - 130	2	30
1,2,4-Trimethylbenzene	ND	24.9	46.6	53	*	26.0	50.9	51	* 70 - 130	4	30
1,2-Dibromo-3-chloropropane (DBC	ND	30.2	46.6	65		36.5	50.9	72	50 - 150	19	30
1,2-Dibromoethane	ND	35.0	46.6	75		36.0	50.9	71	70 - 130	3	30
1,2-Dichlorobenzene	ND	-25.9	46.6	56	*	26.6	50.9	52	* 70 - 130	3	30
1,2-Dichloroethane	ND	43.5	46,6	93		42.5	50.9	84	70 - 130	2	30
1,2-Dichloropropane	ND	41.5	46.6	89		40.0	50.9	79	70 - 130	4	30
1,3,5-Trimethylbenzene	ND	25.7	46.6	55	*	26.3	50.9	52	* 70 - 130	2	30
1,3-Dichlorobenzene	ND	24.6	46.6	53	*	25.2	50.9	50	* 70 - 130	2	30
1,3-Dichloropropane	ND	34.4	46.6	74		37.6	50.9	74	70 - 130	9	30
1.4-Dichlorobenzene	ND	23.9	46.6	51	*	24.3	50.9	48	* 70 - 130	1	30
2,2-Dichloropropane	ND	44.7	46.6	96		44.7	50.9	88	70 - 130	0	30
2-Butanone (MEK)	ND	38.1	46.6	82		40.6	50.9	80	50 - 150	6	30
2-Chlorotoluene	ND	29.4	46.6	63	*	27.4	50.9	54	* 70 - 130	7	30
2-Hexanone	ND	30.1	46.6	-65	*	33.7	50.9	66	* 70 - 130	11	30
2-Methyl-2-propanol	ND	863	931	93		944	1020	93	50 - 150	9	30
4-Chlorotoluene	ND	26,6	46.6	57	*	26.8	50.9	53	* 70 - 130	1	30
4-Isopropyltoluene	ND	22.6	46.6	48	*	24.1	50.9	47	* 70 - 130	7	30
4-Methyl-2-pentanone	ND	39.4	46.6	85		44.6	50.9	88	70 - 130	12	30
Acetone	4.0	42.8	46.6	83		46.9	50.9	84	50 - 150	9	30
Benzene	ND	39.3	46.6	84		38.5	50.9	76	70 - 130	2	30
Bromobenzene	ND	27.9	46.6	60	*	28.2	50.9	55	* 70 - 130	1	30
Bromochloromethane	ND	40.0	46.6	86		38.6	50.9	76	70 - 130	4	30
Bromodichloromethane	ND	41.6	46.6	89		41.9	50.9	82	70 - 130	1	30

Comments:

Matrix Spike Summary

SuperSet Reference:

09-0000106668 rev 00

QA/QC Report

Client:

Northgate Environmental

Project:

Sample Matrix:

Soil

Tronox LLC Henderson/2027.001

Service Request: R0903184 Date Collected: 6/5/09 Date Received: 6/6/09 Date Analyzed: 6/11/09

## **Matrix Spike Summary** Volatile Organic Compounds by GC/MS

Sample Name: Lab Code:

SA127-0.5B

R0903184-001

Units: µg/Kg Basis: Dry

Analytical Method: 8260B

	Sample		Matrix Spike Q0904576-01				cate Matrix ! :Q0904576-04			% Rec		RPD
Analyte Name	Result	Result	Expected	% Rec		Result	Expected	% Rec		Limits	RPD	Limit
Bromoform	ND	34.5	46.6	74		36.6	50.9	72		70 - 130	6	30
Bromomethane	ND	37.5	46.6	80		41.5	50.9	82		50 - 150	10	30
Carbon Tetrachloride	ND	45.2	46.6	97		46.3	50.9	91		70 - 130	2	30
Chlorobenzene	ND	32.0	46.6	69	*	32.8	50.9	65	*	70 - 130	3	30
Chloroethane	ND	40.6	46.6	87		45.8	50.9	90		70 - 130	12	30
Chloroform	ND	41.2	46.6	88		40.1	50.9	79		70 - 130	3	30
Chloromethane	ND	41.1	46.6	88		42.4	50.9	83		70 - 130	3	30
Dibromochloromethane	ND	35.9	46.6	77		37.3	50.9	73		70 - 130	4	30
Dibromomethane	ND	39.6	46.6	85		39.1	50.9	77		70 - 130	1	30
Dichlorodifluoromethane (CFC 12)	ND	42,4	46.6	91		47.2	50.9	93		70 - 130	11	30
Dichloromethane	1.3	40.9	46.6	85		40.2	50.9	77		70 - 130	2	30
Diisopropyl Ether	ND	43.3	46.6	93		43.6	50.9	86		70 - 130	1	30
Ethyl tert-Butyl Ether	ND	44.9	46.6	96		45.5	50.9	90		70 - 130	2	30
Ethylbenzene	ND	34.0	46.6	73		34.3	50.9	67	*	70 - 130	1	30
Hexachlorobutadiene	ND	15.2	46.6	33	*	15.9	50.9	31	*	70 - 130	4	30
Isopropylbenzene (Cumene)	ND	31.5	46.6	68	*	32.6	50.9	64	*	70 - 130	4	30
Methyl tert-Butyl Ether	ND	42.1	46.6	90		43.1	50.9	85		70 - 130	2	30
Naphthalene	ND	25.4	46.6	54		29,4	50.9	58		50 - 150	15	30
Styrene	ND	32.1	46.6	69	*	32.9	50.9	65	*	70 - 130	2	30
Tetrachloroethene (PCE)	ND	35.6	46.6	76		36.3	50.9	71		70 - 130	2	30
Toluene	0.79	37.4	46.6	79		39.4	50.9	76		70 - 130	5	30
Trichloroethene (TCE)	ND	62.6	46.6	134	*	63.9	50.9	126		70 - 130	2	30
Trichlorofluoromethane (CFC 11)	ND	52.6	46.6	113		53.6	50.9	105		70 - 130	2	30
Vinyl Chloride	ND	43.6	46.6	94		48.1	50.9	95		70 - 130	10	30
cis-1,2-Dichloroethene	ND	40.3	46.6	87		41.2	50.9	81		70 - 130	2	30
cis-1,3-Dichloropropene	ND	37.9	46.6	81		36.2	50.9	71		70 - 130	5	30
m,p-Xylenes	ND	65.9	93.1	71		67.0	102	66	*	70 - 130	2	30
n-Butylbenzene	ND	20.2	46.6	43	*	20.8	50.9	41		70 - 130	3	30
n-Propylbenzene	ND	25.6	46.6	55	*	27.7	50.9	54		70 - 130	8	30
o-Xylene	ND	31.7	46.6	68	*	32.2	50.9	63		70 - 130	2	30
sec-Butylbenzene	ND	27.6	46.6	59	*	27.7	50.9	54	*	70 - 130	0	30
tert-Amyl Methyl Ether	ND	42,7	46.6	92		43.2	50.9	85		70 - 130	1	30
tert-Butylbenzene	ND	26.9	46.6	58	¥	28.1	50.9	55	*	70 - 130	4	30
trans-1,2-Dichloroethene	ND	41.5	46.6	89		43.7	50.9	86		70 - 130	5	30

Comments:

LDC #: 21495 F) SDG #: Su love

## VALIDATION FINDINGS WORKSHEET Field Duplicates

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

<u>Y</u>	N	N/A
$\mathbb{Z}$	N	N/A

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

	Concentration	19/kg)	
Compound	18	19	RPD
=	3.9	5.0	1.) (£210iH)
E	1,1	2.3	1,2 (45.20iff)
CC	0,69	1,2	0.59

	Concentration ( )	
Compound		RPD

	Concentration ( )	
Compound		RPD

	Concentration (	
Compound		RPD

## Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

**Collection Date:** 

June 19 through June 24, 2009

LDC Report Date:

September 23, 2009

Matrix:

Soil/Water

Parameters:

Volatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903443

## Sample Identification

SA197-0.5B

SA198-0.5B

SA64-0.5B

SA104-0.5B

SA129-0.5B

SA70-0.5B

TB061909-SO1

SA60-0.5B

SA150-0.5B

TB062209-SO1

RSAN5-0.5B

SA53-0.5B

TB062309-SO1

SA201-10B

SA201-28B

SA201009-28B

TB062409-SO2

SA43009-0.5B

SA40-0.5B

SA200-0.5B

RSAO6-0.5B

SA51-0.5B

SA43-0.5B

TB062409-SO1

SA150-0.5BMS

SA150-0.5BMSD

### Introduction

This data review covers 21 soil samples and 5 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

## I. Technical Holding Times

All technical holding time requirements were met.

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

## II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

## III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

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

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/18/09	2-Methyl-2-propanol	0.026 (≥0.05)	All water samples in SDG R0903443	J (all detects) UJ (all non-detects)	А

## IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

Date	Compound	%D	Associated Samples	Flag	A or P
6/23/09	Acetone	34.1	SA197-0.5B SA198-0.5B SA64-0.5B SA104-0.5B SA129-0.5B SA70-0.5B 158730MB	J+ (all detects)	Α
6/26/09	Dichlorodifluoromethane	26.6	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 SA150-0.5BMS SA150-0.5BMS SA150-0.5BMSD	J+ (all detects)	A
6/29/09	Dichlorodifluoromethane Acetone 2,2-Dichloropropane	27.5 25.2 26.7	SA51-0.5B SA43-0.5B 159618MB	J+ (all detects) J+ (all detects) J+ (all detects)	А

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/30/09	2-Methyl-2-propanol	0.025 (≥0.05)	All water samples in SDG R0903443	J (all detects) UJ (all non-detects)	А

## V. Blanks

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

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
158730MB	6/23/09	Acetone	2.0 ug/Kg	SA197-0.5B SA198-0.5B SA64-0.5B SA104-0.5B SA129-0.5B SA70-0.5B
159434MB	6/26/09	Acetone	3.5 ug/Kg	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 SA200-0.5B
159618MB	6/29/09	Acetone	2.8 ug/Kg	SA51-0.5B SA43-0.5B

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

Sample	Compound	Reported	Modified Final
	TIC (RT in minutes)	Concentration	Concentration
SA150-0.5B	Acetone	5.9 ug/Kg	5.9U ug/Kg

Samples TB061909-SO1, TB062209-SO1, TB062309-SO1, TB062409-SO2, and sample TB062409-SO1 were identified as trip blanks. No volatile contaminants were found in these blanks with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
TB061909-SO1	6/19/09	Dichloromethane	0.24 ug/L	SA197-0.5B SA198-0.5B SA64-0.5B SA104-0.5B SA129-0.5B SA70-0.5B
TB062309-SO1	6/23/09	Dichloromethane	0.38 ug/L	RSAN5-0.5B SA53-0.5B

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
TB062409-SO1	6/24/09	2-Methyl-2-propanol Acetone Chloroform Dichloromethane	1.3 ug/L 12 ug/L 0.30 ug/L 0.51 ug/L	SA43009-0.5B SA40-0.5B SA200-0.5B RSAO6-0.5B SA51-0.5B SA43-0.5B

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

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072109-SO	7/21/09	Acetone Bromoform	3.7 ug/L 0.28 ug/L	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 with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
SA43009-0.5B	Acetone	18 ug/Kg	18U ug/Kg
	Dichloromethane	0.54 ug/Kg	0.54U ug/Kg
SA40-0.5B	Acetone	24 ug/Kg	24U ug/Kg
SA200-0.5B	Acetone	11 ug/Kg	11U ug/Kg
	Dichloromethane	0.47 ug/Kg	0.47U ug/Kg
RSAO6-0.5B	Acetone	15 ug/Kg	15U ug/Kg
	Dichloromethane	0.40 ug/Kg	0.40U ug/Kg
SA51-0.5B	Acetone	11 ug/Kg	11U ug/Kg
	Chloroform	0.55 ug/Kg	0.55U ug/Kg
	Dichloromethane	0.54 ug/Kg	0.54U ug/Kg
SA43-0.5B	Acetone	16 ug/Kg	16U ug/Kg

## 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 or MSD percent recoveries (%R) were not within QC limits for several compounds, the LCS 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) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
158730LCS	Dichlorodifluoromethane	152 (75-125)	SA197-0.5B SA198-0.5B SA64-0.5B SA104-0.5B SA129-0.5B SA70-0.5B 158730MB	J+ (all detects)	Р
159618LCS	Hexachlorobutadiene	71 (75-125)	SA51-0.5B SA43-0.5B 159618MB	J- (all detects) UJ (all non-detects)	Р

## IX. Regional Quality Assurance and Quality Control

Not applicable.

### X. Internal Standards

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

## XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

## XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

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

Raw data were not reviewed for this SDG.

## XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

## XIV. System Performance

Raw data were not reviewed for this SDG.

## XV. Overall Assessment of Data

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 volatiles were detected in any of the samples with the following exceptions:

	Concentrat	tration (ug/Kg)		<b>D</b>		
Compound	SA201-28B	SA201009-28B	RPD (Limits)	Difference (Limits)	Flags	A or P
Acetone	18	12	-	6 (≤18)	-	-
Chloroform	0.67	1.1	-	0.43 (≤4.4)	-	-
Dichloromethane	2.2	3.5	-	1.3 (≤4.4)	-	-
Toluene	0.35	0.34	-	0.01 (≤4.4)	-	-

	Concentrati	ion (ug/Kg)		5.4		
Compound	SA43009-0.5B	SA43-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P
Acetone	18	16	-	2 (≤27)	-	-
Dichloromethane	0.54	6.7U	-	6.16 (≤6.7)	-	-
Toluene	6.0U	0.61	-	5.39 (≤6.0)	-	-

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

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903443	TB061909-SO1 TB062209-SO1 TB062309-SO1 TB062409-SO2 TB062409-SO1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Initial calibration (RRF) (c)
R0903443	SA197-0.5B SA198-0.5B SA64-0.5B SA104-0.5B SA129-0.5B SA70-0.5B	Acetone	J+ (all detects)	А	Continuing calibration (%D) (c)
R0903443	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	Dichlorodifluoromethane	J+ (all detects)	А	Continuing calibration (%D) (c)
R0903443	SA51-0.5B SA43-0.5B	Dichlorodifluoromethane Acetone 2,2-Dichloropropane	J+ (all detects) J+ (all detects) J+ (all detects)	А	Continuing calibration (%D) (c)
R0903443	TB061909-SO1 TB062209-SO1 TB062309-SO1 TB062409-SO2 TB062409-SO1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Continuing calibration (RRF) (c)
R0903443	SA197-0.5B SA198-0.5B SA64-0.5B SA104-0.5B SA129-0.5B SA70-0.5B	Dichlorodifluoromethane	J+ (all detects)	Р	Laboratory control samples (%R) (I)
R0903443	SA51-0.5B SA43-0.5B	Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903443	SA197-0.5B SA198-0.5B SA64-0.5B SA64-0.5B SA129-0.5B SA70-0.5B TB061909-SO1 SA60-0.5B SA150-0.5B TB062209-SO1 RSAN5-0.5B TB062309-SO1 SA201-10B SA201-10B SA201-28B SA201009-28B TB062409-SO2 SA43009-0.5B SA40-0.5B SA200-0.5B SA51-0.5B SA51-0.5B SA51-0.5B SA51-0.5B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (PQL) (sp)

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

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0903443	SA150-0.5B	Acetone	5.9U ug/Kg	А	bl

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

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0903443	SA43009-0.5B	Acetone Dichloromethane	18U ug/Kg 0.54U ug/Kg	А	bt
R0903443	SA40-0.5B	Acetone	24U ug/Kg	А	bt
R0903443	SA200-0,5B	Acetone Dichloromethane	11U ug/Kg 0.47U ug/Kg	А	bt
R0903443	RSAO6-0.5B	Acetone Dichloromethane	15U ug/Kg 0.40U ug/Kg	A	bt

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0903443	SA51-0.5B	Acetone Chloroform Dichloromethane	11U ug/Kg 0.55U ug/Kg 0.54U ug/Kg	А	bt
R0903443	SA43-0.5B	Acetone	16U ug/Kg	Α	bt

## **Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET**

LDC #: 21495G1 Stage 2B SDG #: R0903443

Page: 1 of Reviewer: 🍑 2nd Reviewer:

Laboratory: Columbia Analytical Services

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

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

	Validation Area		Comments
l.	Technical holding times	A	Sampling dates: 6/19 - 24/09
11.	GC/MS Instrument performance check	A	
111.	Initial calibration	SW)	on RSD rx
IV.	Continuing calibration/4eV	SW	
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	
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	$D_1 = 15,16$ $D_2 = 18,23$
XVII.	Field blanks	SW	TB = 7 10 13 17 24 FB = FB 072109-50 from R0904016
Note:	A = Acceptable ¥ND = No	compounds	s detected D = Duplicate 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: Water

1	SA197-0.5B	5	11 3	RSAN5-0.5B	٤	21 3	RSAO6-0.5B	5	31	158770	MB
2	SA198-0.5B		12 3	SA53-0.5B		22 4	SA51-0.5B	1	327	159793	1
3	SA64-0.5B		13 7	TB062309-SO1	W	23 4	SA43-0.5B	D	33 3	159434	
4 )	SA104-0.5B		14 3	SA201-10B	S	\$ 7	TB062409-SO1	W	34 y	159618	
5	SA129-0.5B		15 3	SA201-28B	$p_1$	25 <b>3</b>	SA150-0.5BMS	5	35		
6 1	SA70-0.5B	$\bigvee$	16 <sup>3</sup>	SA201009-28B	<b>b</b> ,	26 <b>3</b>	SA150-0.5BMSD		36		
ナン	TB061909-SO1	W	17 7	TB062409-SO2	Ŵ	27		•	37		
8 3	SA60-0.5B	۶	18 3	SA43009-0.5B	0/5	28			38		
9 <b>3</b>	SA150-0.5B	1	19 🦻	SA40-0.5B		29			39		
10 7	TB062209-SO1	W	<sub>20</sub> 3	SA200-0.5B		30			40		

(no IW)

# TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

A. Chloromethane*	U. 1,1,2-Trichloroethane	OO. 2,2-Dichloropropane	III. n-Butylbenzene	CCCC.1-Chlorohexane
B. Bromomethane	V. Benzene	PP. Bromochloromethane	JJJ. 1,2-Dichlorobenzene	DDDD. Isopropyl alcohol
C. Vinyl choride**	W. trans-1,3-Dichloropropene	QQ. 1,1-Dichloropropene	KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
D. Chloroethane	X. Bromoform*	RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF, Acrolein
E. Mathylana-chloride	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG. Acrylonitrile
F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN. 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
G. Carbon disuffide	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachloroethane	000. 1,3,5-Trichlorobenzene	IIII. Isobutyl alcohol
H. 1,1-Dichloroethene**	BB. 1,1,2,2-Tetrachloroethane*	VV. Isopropylbenzene	PPP, trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
I. 1,1-Dichloroethane*	CC. Toluene**	WW. Bromobenzene	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
J. 1,2-Dichloroethene, total	DD. Chlorobenzene*	XX. 1,2,3-Trichloropropane	RRR. m,p-Xylenes	LLLL. Ethyl ether
K. Chloroform**	EE. Ethylbenzene**	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
L. 1,2-Dichloroethane	FF. Styrene	ZZ. 2-Chiorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN. 2-Mcthyl-2-propanol
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	00000
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	dddd
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	9999.
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
Q. 1,2-Dichloropropane**	KK. Trichlorofluoromethane	EEE. sec-Butylbenzene	YYY. tert-Butanol	SSSS.
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohol	TTTT.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-Isopropyltoluene	AAAA. Ethyl tert-butyl ether	unuu.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	ww.

<sup>\* =</sup> System performance check compounds (SPCC) for RRF; \*\* = Calibration check compounds (CCC) for %RSD.

148261	See Gard
LDC #: 2	SDG #:

# VALIDATION FINDINGS WORKSHEET Initial Calibration

Page: 1 of Reviewer:\_\_ 2nd Reviewer.\_

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

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

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

Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation? Did the initial calibration meet the acceptance criteria?

			 	 	 	 		 	 	 	 	 	 	 _
Qualifications	MB J/NJ/A (C	, ,												
11 1	All Water + 159793MB													
Finding RRF (Limit: >0.05)	0.026													
Finding %RSD (Limit: <30.0%)														
Compound	NNN												,	
Standard ID Compound (Limit: <30.0%) (Limit: >0.05)	1041													
# Date	10/8/0	,												
*														

NAMA -

LDC #: 21 445 G/ SDG#:

# **VALIDATION FINDINGS WORKSHEET** Continuing Calibration

Reviewer:\_ 2nd Reviewer: Page:

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

N/N N/X

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 for each instrument? Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ? Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?

		(2)								<b>&gt;</b>				
	Qualifications	Starts/A						Y	/	B J/US/A				
Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ? Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?	Associated Samples	-6 158730MB	9	3,4 11,12 14-16,	74	22 23 159118MK				All WATER + 15 9/45MB				
within method criteria foo.05 RRF?	Finding RRF (Limit: 20.05)									6.625				
ponse factors (RRF) veria of ∠25 %D and ≥	Finding %D (Limit: <25.0%)	34.)	, , , c	١,٠٠٠		27.6	7.5%	26.7						
(%D) and relative resithin the validation crit	Compound	(+) #		(t)		(4) T.	(£)	(+) 00		NNNN				
Were percent differences (%D) and relative response factors (RRF) within metho Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?	Standard ID	M8955	1	560 h W		4,64,4	000			B 4114				
N N/A Wer	Date	40/42/9	, , ,	1/2/02		6. 120 Cm	7			6/30/04				
ZZ XX	#													

LDC #: 21 495 6,

# VALIDATION FINDINGS WORKSHEET Blanks

Page: Reviewer: 2nd Reviewer:

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

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

Was a method blank associated with every sample in this SDG?

Was a method blank analyzed at least once every 12 hours for each matrix and concentration? Was therecontamination in the method blanks? If yes, please see the qualifications below.

Blank analysis date: Conc. units:

Y/N N/A √ N N/A Associated Samples:

Compound	Blank ID				o,	Sample Identification	ation				
	1872 MB	-	٨	3	4	4	٥				
Methylene chloride	۵.۲	(7.1)		(6,8)	(9)	(hh)	8.8				
Acetone		J			У						
CROI											
Blank analysis date: 6/26/69 Conc. units: 49/Fc/	4		Ası	Associated Samples:		8,911,214.18.2	76.18-		(19)		
Compound	Blank ID				o,	Sample Identification	ation				
	159434 MB	8	6	=	×	19	15	91	1 8/	02 61	7
Methylene chloride 7	3.5	E	11/6.5	(8.6)	9	(S)	(81)	( <u>3</u>	$\vdash$	(F	(1)
Acetone			١,	)			)	j	1		
		-									
CROI											

7,0

(6) 1/40C (6)

# **VALIDATION FINDINGS WORKSHEET**

Page:

2nd Reviewer: Reviewer:

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

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

Y N N/A

Was a method blank associated with every sample in this SDG?

Was a method blank analyzed at least once every 12 hours for each matrix and concentration? Was there contamination in the method blanks? If yes, please see the qualifications below. Y N N/A V/N N/A

Blank analysis date: 6 Conc. units:

Associated Samples:

Compound	Blank ID	Sample Identification
	159618 MB	18 27 23
Methylene chloride	8,0	
Acetone		
CROI		

Blank analysis date:\_\_\_\_\_Conc. units:\_\_\_\_

Associated Samples:

		Associated Oditiples.	
Compound	Blank ID	Sample Identification	
Methylene chloride			
Acetone			
CROI			

VALIDATION FINDINGS WORKSHEET

Field Blanks

Reviewer: Ox 2nd Reviewer:

Page:

МЕТНОD: GC/MS VOA (EPA SW 846 Method 8260В)

LDC #: 21 415 6/ SDG #: \_ Su (m)

Were field blanks identified in this SDG? Y/N/N/A

Were target compounds detected in the field blanks?

Blank units: 19/L Associated sample units: 19/K5
Field blank type: (circle one) Field Blank / Rinsate / [frip Blank/ Other:

Associated Samples: 1 — (

Sample Identification Sample Identification Associated Samples: 0.84 Blank units: 49/L Associated sample units: 49/kg Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other. 6.79 4 <u>~</u> Blank ID Blank ID | S Blank ID Blank ID 7 6/23/69 6/4/9 0.38 0.24 Sampling Date Sampling Date Compound Ш Compound CRQL 0

CRQL

0.76

LDC# 21495 61 SDG #: 24 Com

# **VALIDATION FINDINGS WORKSHEET**

Field Blanks

Page: Lof Y Reviewer:\_

2nd Reviewer:

(bt)

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

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: 249 / Associated sample units: 245 / A

Associated Samples:

18/4 24/4 11/4 15/4 11/4 16/4  0.54/4 0.45/4 0.55/4  0.54/4 0.45/4 0.46/4 0.54/4	pariodado	_	PE III AUB	Rlank ID				ri olumes	ontification		
	1 /24 /69	1		1	8)	6-1	20	2 /	7.7	23	
	6-1 / NNN II	1.3		ll							
	12	12				24/4	11/4	n/51	11/11	16/4	
	k 0.30	0.30			8				n/55.0		
	E 0.51				0.54/y		10.47/y	6.40/y	1 25.0		
								•			

Blank units: 49 /L Associated sample units: 49 /C9 Field blank type: (circle one) Field Blank/ Rinsate / Trip Blank / Other.

14, 15 16 Associated Samples:

Sample Identification 4 20 00 Blank ID F 2672109-50 Blank ID 7/21/64 0.28 3.7 Sampling Date Compound

LUC#: 2/49561 SDG #:

# VALIDATION FINDINGS WORKSHEET

Matrix Spike/Matrix Spike Duplicates

Reviewer: Page: 2nd Reviewer:

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

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

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

	led Samples	No mee		2 31				,														GC Limits (Water) RPD (Water)				
RPD (I imite)		, ( )	( )		,	( )	( )	(				,	( )	( )	,		(	( )			Mps/ ups/		< 22% 61.	< 24% 71.	< 21% 76.	
MSD %R (Limits)		TO TO THE TOTAL TOTAL TO THE TO	(	)				(	( )	(				( )	( )	)		(	( )	( )	QC Limits (Soil)		29-172%	62-137%	66-142%	_
Compound %R (Limits)	4 /cas, 100 A			)	)		)	<b>-</b>		)	_				)	_					DOC FI		AC	62	99	=
MSD ID	25/26																				Compound	1,1-Dichloroethene	Trichloroethene	Benzene	Tokiena	200
# Date																						Ï	ú	>	SS	

QA/QC Report

Client:

Northgate Environmental

Project:

Tronox LLC Henderson/2027.001

Sample Matrix:

Soil

Service Request: R0903443

Date Collected: 6/22/09

Date Received: 6/23/09 Date Analyzed: 6/27/09

Matrix Spike Summary Volatile Organic Compounds by GC/MS

Sample Name:

SA150-0.5B

Lab Code:

R0903443-009

Units: μg/Kg Basis: Dry

Analytical Method: 8260B

	Sample		Iatrix Spike Q0905208-0			Duplic R	ate Matrix 1 Q0905208-0	4	% Rec	nnn	RPD Limit
Analyte Name	Result	Result	Amount	% Rec	:	Result	Amount	% Rec	Limits	RPD	
1,1,1,2-Tetrachloroethane	ND	33.2	48.4	69	*	31.4	48.9		* 70 - 130	5	30 30
1,1,1-Trichloroethane (TCA)	ND	42.7	48.4	88		42.7	48.9	87	70 - 130	0	30
1,1,2,2-Tetrachloroethane	ND	16.6	48.4	34	*	14.4	48.9	50	* 70 - 130	14	30
1,1,2-Trichloroethane	ND	34.1	48.4	71		33.3	48.9	• -	* 70 - 130	2 2	30
1,1-Dichloroethane (1,1-DCA)	ND	42.1	48.4	87		41.1	48.9	84	70 - 130	1	30
1.1-Dichloroethene (1,1-DCE)	ND	41.6	48.4	86		41.2	48.9	84	70 - 130	1	30
1,1-Dichloropropene	ND	39.7	48.4	82		39.4	48.9	81	70 - 130	5	30
1,2,3-Trichlorobenzene	ND	13.1	48.4	27	*	13.8	48.9	28	* 70 - 130	2	30
1,2,3-Trichloropropane	ND	31.8	48.4	66	*	31.3	48.9	64	* 70 - 130 * 70 - 130	4	30
1,2,4-Trichlorobenzene	ND	12.3	48.4	25	*	12.8	48.9	26	* 70 - 130 * 70 - 130	1	30
1,2,4-Trimethylbenzene	ND	20.8	48.4	43	*	20.5	48.9	42	50 - 150	6	30
1,2-Dibromo-3-chloropropane (DBG		26,6	48.4	55		28.3	48.9	58	* 70 - 130	2	30
1,2-Dibromoethane	ND	33.0	48.4	68	*	32.5	48.9	66	* 70 - 130 * 70 - 130	2	30
1,2-Dichlorobenzene	ND	20.5	48.4	42	*	₽0.0	48.9	41	70 - 130	0	30
1,2-Dichloroethane	ND	42.3	48.4	87		42.2	48.9	86	70 - 130	7	30
1,2-Dichloropropane	ND	37.6	48.4	78		35,0	48.9	72	* 70 - 130	4	30
1,3,5-Trimethylbenzene	ND	21.9	48.4	45	*		48.9	43 39	* 70 - 130	ì	30
1,3-Dichlorobenzene	ND	19.3	48.4	40	字	47.2	48.9	_	70 - 130	3	30
1,3-Dichloropropane	ND	33.5	48.4	69	*	5	48.9	71 38	* 70 - 130	2	30
1,4-Dichlorobenzene	ND	18.4	48.4	38	*	10,,	48.9	38 86	70 - 130	1	30
2,2-Dichloropropane	ND	42.7	48.4	88		42.2	48.9	80 79	50 - 150	8	30
2-Butanone (MEK)	ND	35.8	48.4	74		38.6	48.9	19 46	* 70 - 130	2	30
2-Chlorotoluene	ND	22.9	48.4	47	*		48.9	46 86	70 - 130	4	30
2-Hexanone	ND	40.3	48.4	83		42.0	48.9	92	50 - 150	4	30
2-Methyl-2-propanol	ND	867	967	90		903	977	92 44	* 70 - 130	2	30
4-Chlorotoluene	ND	21.8	48.4	45	*		48.9	39	* 70 - 130		30
4-Isopropyltoluene	ND	18.8	48.4	39	*	10.5	48.9	90	70 - 130		30
4-Methyl-2-pentanone	ND	43.0	48.4	89		44.0	48.9	192	* 50 - 150		30
Acetone	5.9	92.0	48.4	178	*		48.9	71	70 - 130		30
Benzene	ND	36.2	48.4	75		34.9	48.9	46	* 70 - 130		30
Bromobenzene	ND	24.4	48.4	50	*	22.0	48.9	46 78	70 - 130		30
Bromochloromethane	ND	36.3	48.4	75		38.0	48.9	78 79	70 - 130		30
Bromodichloromethane	ND	38.5	48.4	80		38.6	48.9	19	70 - 130	·	
TA DISIONIA STATE											

Comments:

QA/QC Report

Client:

Northgate Environmental

Project:

Tronox LLC Henderson/2027.001

Sample Matrix:

Soil

Service Request: R0903443

Date Collected: 6/22/09 Date Received: 6/23/09 Date Analyzed: 6/27/09

## Matrix Spike Summary Volatile Organic Compounds by GC/MS

Sample Name:

SA150-0.5B

Lab Code:

R0903443-009

Units: μg/Kg Basis: Dry

Analytical Method: 8260B

	Sample		Iatrix Spike 20905208-0:				cate Matrix (	-		% Rec		RPD
Analyte Name	Result	Result	Amount	% Rec	:	Result	Amount	% Rec		Limits	RPD	Limit
Bromoform	ND	30.3	48.4	63	*	30.6	48.9	63	*	70 - 130	1	30
Bromomethane	ND	35.4	48.4	73		36.9	48.9	75		50 - 150	4	30
Carbon Tetrachloride	ND	41.2	48.4	85		39.6	48.9	81		70 - 130	4	30
Chlorobenzene	ND	28.8	48.4	60	*	28.0	48.9	57	*	70 - 130	3	30
Chloroethane	ND	37.6	48.4	78		39.7	48.9	81		70 - 130	5	30
Chloroform	ND	39.4	48.4	81		39.7	48.9	81		70 - 130	1	30
Chloromethane	ND	38.4	48.4	79		35.3	48.9	72		70 - 130	8	30
Dibromochloromethane	ND	34.2	48.4	71		33.3	48.9	68	*	70 - 130	3	30
Dibromomethane	ND	37.6	48.4	78		36.4	48.9	74		70 - 130	3	30
Dichlorodifluoromethane (CFC 12)	ND	38.1	48.4	79		35.7	48.9	73		70 - 130	6	30
Dichloromethane	0.81	36.6	48.4	74		36.7	48.9	73		70 - 130	0	30
Diisopropyl Ether	ND	46.7	48.4	97		47.8	48.9	98		70 - 130	2	30
Ethyl tert-Butyl Ether	ND	48.4	48.4	100		51.6	48.9	106		70 - 130	6	30
Ethylbenzene	ND	30.7	48.4	63	*	28.0	48.9	57		70 - 130	9	30
Hexachlorobutadiene	ND	10.5	48.4	22	*	11.4	48.9	23		70 - 130	9	30
Isopropylbenzene (Cumene)	ND	27.5	48.4	57	*	27.3	48.9	56	*	70 - 130	1	30
Methyl tert-Butyl Ether	ND	40.9	48.4	85		42.5	48.9	87		70 - 130	4	30
Naphthalene	ND	17.4	48.4	36	*	19.5	48.9	40		50 - 150	11	30
Styrene	ND	28.1	48.4	58	*	27.4	48.9	56		70 - 130	3	30
Tetrachloroethene (PCE)	ND	32.2	48.4	67	*	30.7	48.9	63		70 - 130	5	30
Toluene	0.79	33.7	48.4	68	*	31.0	48.9	62	*	70 - 130	8	30
Trichloroethene (TCE)	ND	48.3	48.4	100		50.3	48.9	103		70 - 130	4	30
Trichlorofluoromethane (CFC 11)	ND	48.3	48.4	100		46.1	48.9	94		70 - 130	5	30
Vinyl Chloride	ND	39.5	48.4	82		41.5	48.9	85		70 - 130	5	30
cis-1,2-Dichloroethene	ND	37.1	48.4	77		37.7	48.9	77		70 - 130	2	30
cis-1,3-Dichloropropene	ND	34.1	48.4	71		33.3	48.9	68		70 - 130	2	30
m,p-Xylenes	ND	58.3	96.7	60	*	55.5	97.7	57		70 - 130	5	30
n-Butylbenzene	ND	15.3	48.4	32	*	15.4	48.9	32		70 - 130	1	30
n-Propylbenzene	ND	22.3	48.4	46	*	21.2	48.9	43		70 - 130	5	30
o-Xylene	ND	27.5	48.4	57	*	26.6	48.9	54		70 - 130	4	30
sec-Butylbenzene	ND	22.4	48.4	46	*	21.6	48.9	44	*	70 - 130	3	30
tert-Amyl Methyl Ether	ND	47.0	48.4	97		47.2	48.9	97		70 - 130	0	30
tert-Butylbenzene	ND	23.1	48.4	48	*	23.2	48.9	47	*	70 - 130	0	30
trans-1,2-Dichloroethene	ND	37.4	48.4	77		39.2	48.9	80		70 - 130	5	30

Comments:

QA/QC Report

Client:

Northgate Environmental

Project:

Tronox LLC Henderson/2027.001

Sample Matrix:

Soil

Service Request: R0903443

Date Collected: 6/22/09
Date Received: 6/23/09

Date Analyzed: 6/27/09

Matrix Spike Summary Volatile Organic Compounds by GC/MS

Sample Name:

SA150-0.5B

Lab Code:

R0903443-009

Units: µg/Kg

Basis: Dry

Analytical Method: 8260B

	Sample	N R		I	•	cate Matrix 3 Q0905208-0	% Rec		RPD		
Analyte Name	Result	Result	Amount	% Rec	Re	sult	Amount	% Rec	Limits	RPD	Limit
trans-1,3-Dichloropropene	ND	32.8	48.4	68 *	* 3	1.8	48.9	65	* 70 - 130	3	30

Comments:	

LDC#: 21495 G/

## VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

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

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

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

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

		<del>-</del>			٠ <u>.</u>						(	_			_			<del></del>		_	·	<del></del>		<del></del>
Qualifications	J+ 4015/f (L	-			No ruce (MS. MS. Din			>			5 J-1/15/2 1	, ,												
Associated Samples	GW 061851 9-1				91-41,21,11 6 8	18-21, 15 9434 MB		,			22, 23 15 96 18 MIS													
RPD (Limits)	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	)	)
LCSD %R (Limits)	( )	( )	( )	( )	( )	( )	( )	(	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	
LCS %R (Limits)	(241-22) 251	( )	( )		132 12-156)	137 ( )	140 (	139 ( 1)	( )	( )	(251-59) [1]	( )	( )	( )	( )	(	( )	( )	( )	( )	( )	( )	( )	( )
Compound	35			- 4	F	ن ت	K	0			777													
OI OSOTISOTI	SJ7 0 <b>8</b> (85)				129424 165			-			159618 165													
Date																								
*	П							П																

LDC #: 21 495 G/ SDG #: See Cores

## VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	of /
Reviewer:	2VC
2nd reviewer:	Ø

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

Y N N/A

Were field duplicate pairs identified in this SDG?

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

	Concentration	ing ug / ligg		
Compound		15	16	RPD
	F	18	2	6 (≠ 18 Diff)
	K	0,67	1.1	0.43 ( = + + DiH)
	E	2,2	3,5	1,3
	CC	0.35	0.34	0.01

	Concentratio	ng us lies	
Compound	18	23	RPD
F	18	16	2 (≤27 DiH)
ŧ	D. 54	6.7U	6.16 (£ 6.70iH)
cc	6.0U	0.61	6.16 (£ G.7 Diff) 5.39 (£ G.0 Diff)

	Concentration (	
Compound		RPD

	Concentration ( )	
Compound		RPD

## Laboratory Data Consultants, Inc. Data Validation Report

**Project/Site Name:** 

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

**Collection Date:** 

June 29 through June 30, 2009

LDC Report Date:

September 24, 2009

Matrix:

Soil/Water

Parameters:

Volatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903615

## Sample Identification

SA45-0.5B

SA452009-0.5B

TB062909-SO1

SA187-0.5

SA153-0.5B

SA186-0.5B

SA185-0.5B

RSAO5-0.5B

SA152-10B

SA152-20B

SA152-34B

TB062909-SO2

SA50-0.5B

SA54-0.5B

TB063009-SO1

SA106-0.5B

SA102-0.5B

SA109-0.5B

SA106-0.5BMS

SA106-0.5BMSD

### Introduction

This data review covers 17 soil samples and 3 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

## I. Technical Holding Times

All technical holding time requirements were met.

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

## II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

### III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r²) were greater than or equal to 0.990.

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

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/18/09	2-Methyl-2-propanol	0.026 (≥0.05)	All water samples in SDG R0903615	J (all detects) UJ (all non-detects)	А

## IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
7/7/09	2-Methyl-2-propanol	0.025 (≥0.05)	All water samples in SDG R0903615	J (all detects) UJ (all non-detects)	A

## V. Blanks

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

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
160052	7/2/09	Acetone	2.7 ug/Kg	SA45-0.5B SA452009-0.5B SA187-0.5 SA153-0.5B SA186-0.5B SA185-0.5B RSAO5-0.5B SA152-10B SA152-20B SA152-34B

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	
SA187-0.5	Acetone	4.6 ug/Kg	4.6U ug/Kg	
SA186-0.5B	Acetone	5.4 ug/Kg	5.4U ug/Kg	
SA152-20B	Acetone	4.5 ug/Kg	4.5U ug/Kg	

Samples TB062909-SO1, TB062909-SO2, and TB063009-SO1 were identified as trip blanks. No volatile contaminants were found in these blanks with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
TB062909-SO1	6/29/09	Dichloromethane	0.23 ug/L	SA45-0.5B SA452009-0.5B SA187-0.5 SA153-0.5B SA186-0.5B SA185-0.5B RSAO5-0.5B SA152-10B SA152-20B SA152-34B
TB062909-SO2	6/29/09	Dichloromethane 2-Methyl-2-propanol Toluene	0.26 ug/L 2.3 ug/L 0.24 ug/L	SA45-0.5B SA452009-0.5B SA187-0.5 SA153-0.5B SA186-0.5B SA185-0.5B RSAO5-0.5B SA152-10B SA152-20B SA152-34B
TB063009-SO1	6/30/09	Dichloromethane	0.45 ug/L	SA50-0.5B SA54-0.5B SA106-0.5B SA102-0.5B SA109-0.5B

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

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072109-SO	7/21/09	Acetone Bromoform	3.7 ug/L 0.28 ug/L	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 with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
SA452009-0.5B	Dichloromethane	0.42 ug/Kg	0.42U ug/Kg
SA187-0.5	Toluene	0.43 ug/Kg	0.43U ug/Kg
SA186-0.5B	Dichloromethane	0.48 ug/Kg	0.48U ug/Kg

Sample	Compound	Reported Concentration	Modified Final Concentration	
SA50-0.5B	Dichloromethane	0.53 ug/Kg	0.53U ug/Kg	
SA54-0.5B	Dichloromethane	0.46 ug/Kg	0.46U ug/Kg	
SA106-0.5B	Dichloromethane	0.61 ug/Kg	0.61U ug/Kg	
SA102-0.5B	Dichloromethane	0.70 ug/Kg	0.70U ug/Kg	
SA109-0.5B	Dichloromethane	0.75 ug/Kg	0.75U ug/Kg	
SA152-20B	Acetone	4.5 ug/Kg	4.5U ug/Kg	

## 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
SA106-0.5BMS/MSD (SA106-0.5B)	1,2,3-Trichlorobenzene p-Isopropyltoluene Hexachlorobutadiene n-Butylbenzene sec-Butylbenzene	24 (70-130) 47 (70-130) 33 (70-130) 41 (70-130) 48 (70-130)	24 (70-130) 46 (70-130) 34 (70-130) 41 (70-130) 48 (70-130)	- - - -	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) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
160052LCS	Vinyl chloride	130 (75-125)	SA45-0.5B SA452009-0.5B SA187-0.5 SA153-0.5B SA186-0.5B SA185-0.5B RSAO5-0.5B SA152-10B SA152-20B SA152-34B 160052MB	J+ (all detects)	Р
160281LCS	1,2,3-Trichlorobenzene p-Isopropyltoluene Hexachlorobutadiene n-Butylbenzene sec-Butylbenzene	74 (75-125) 73 (75-125) 59 (75-125) 71 (75-125) 73 (75-125)	SA50-0.5B SA54-0.5B SA106-0.5B SA102-0.5B SA109-0.5B 160281MB	J- (all detects) UJ (all non-detects)	Р
160447LCS	Hexachlorobutadiene Tetrachloroethene	73 (75-125) 72 (75-125)	TB062909-SO1 TB062909-SO2 TB063009-SO1 160447MB	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	Р

## IX. Regional Quality Assurance and Quality Control

Not applicable.

## X. Internal Standards

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

## XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

## XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

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

Raw data were not reviewed for this SDG.

#### XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

#### XIV. System Performance

Raw data were not reviewed for this SDG.

#### XV. Overall Assessment of Data

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 volatiles were detected in any of the samples with the following exceptions:

	Concentrat	ion (ug/Kg)				
Compound	SA45-0.5B	SA452009-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P
Acetone	6.0	7.0	-	1.0 (≤20)	-	-
Dichloromethane	5.0U	0.42	•	4.58 (≤5.0)	-	-

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

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903615	TB062909-SO1 TB062909-SO2 TB063009-SO1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Initial calibration (RRF) (c)
R0903615	TB062909-SO1 TB062909-SO2 TB063009-SO1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Continuing calibration (RRF) (c)
R0903615	SA106-0.5B	1,2,3-Trichlorobenzene p-Isopropyttoluene Hexachlorobutadiene n-Butylbenzene sec-Butylbenzene	J- (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)(m)
R0903615	SA45-0.5B SA452009-0.5B SA187-0.5 SA153-0.5B SA186-0.5B SA185-0.5B RSAO5-0.5B SA152-10B SA152-20B SA152-34B	Vinyl chloride	J+ (all detects)	Р	Laboratory control samples (%R) (I)
R0903615	SA50-0.5B SA54-0.5B SA106-0.5B SA102-0.5B SA109-0.5B	1,2,3-Trichlorobenzene p-Isopropyttoluene Hexachlorobutadiene n-Butylbenzene sec-Butylbenzene	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0903615	TB062909-SO1 TB062909-SO2 TB063009-SO1	Hexachlorobutadiene Tetrachloroethene	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (l)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903615	SA45-0.5B SA452009-0.5B TB062909-SO1 SA187-0.5 SA153-0.5B SA186-0.5B SA186-0.5B SA152-10B SA152-10B SA152-20B SA152-20B SA152-34B TB062909-SO2 SA50-0.5B SA54-0.5B TB063009-SO1 SA106-0.5B SA102-0.5B SA102-0.5B	All compounds reported below the PQL.	J (all detects)	Α	Project Quantitation Limit (PQL) (sp)

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

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0903615	SA187-0.5	Acetone	4.6U ug/Kg	А	bl
R0903615	SA186-0.5B	Acetone	5.4U ug/Kg	А	bl
R0903615	SA152-20B	Acetone	4.5U ug/Kg	А	bl

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

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0903615	SA452009-0.5B	Dichloromethane	0.42U ug/Kg	Α	bt
R0903615	SA187-0.5	Toluene	0.43U ug/Kg	Α	bt
R0903615	SA186-0.5B	Dichloromethane	0.48U ug/Kg	Α	bt
R0903615	SA50-0.5B	Dichloromethane	0.53U ug/Kg	Α	bt
R0903615	SA54-0.5B	Dichloromethane	0.46U ug/Kg	А	bt

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0903615	SA106-0.5B	Dichloromethane	0.61U ug/Kg	. А	bt
R0903615	SA102-0.5B	Dichloromethane	0.70U ug/Kg	А	bt
R0903615	SA109-0.5B	Dichloromethane	0.75U ug/Kg	- <b>A</b> .	bt
R0903615	SA152-20B	Acetone	4.5U ug/Kg	Α	bf

### Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

SDG #:\_\_\_R0903615

LDC #: 21495H1

Stage 2B

Laboratory: Columbia Analytical Services

Page: 1 of 1
Reviewer: 3/6
2nd Reviewer:

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

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 - 70 /0 9
<b>II</b> .	GC/MS Instrument performance check	A	
111.	Initial calibration	SW)	2 RSD r2
IV.	Continuing calibration/JEV	SW	cov = 25 Z
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	W2	
VIII.	Laboratory control samples	SW	us
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	Ą	
XVI.	Field duplicates	SW	D = 1,7
XVII.	Field blanks	(N2	TB=3, 12, 15 TB=FB672169-50 from R090401

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 + Water

r=====		1100	<u>T</u>	MA	icr				·	
1	SA45-0.5B	D	S	11	SA152-34B	S	<del>1</del> 21 /	160052 MB	31	
2 1	SA452009-0.5B	b		12 3	<u>T</u> B062909-SO2	W	22 )	/ 160281 MB	32	
3 -3	TB062909-SO1		W	13 <b>7</b>	SA50-0.5B	<u> </u>	23 3	160447 MB	33	
4 1	SA187-0.5		S	14 7	SA54-0.5B		24		34	
5 I	SA153-0.5B			15 <b>3</b>	TB063009-SO1	Ŵ	25		35	
6 \	SA186-0.5B			16 <b>7</b>	SA106-0.5B		26		36	
7	SA185-0.5B			17 7	SA102-0.5B		27		37	
8 1	RSAO5-0.5B			18 7	SA109-0.5B		28		38	
9 1	SA152-10B			19 ~	SA106-0.5BMS		29		39	
10	SA152-20B		$\downarrow$	20 🔏	SA106-0.5BMSD	$\downarrow$	30		40	

# TARGET COMPOUND WORKSHEET

# METHOD: VOA (EPA SW 846 Method 8260B)

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

<sup>\* =</sup> System performance check compounds (SPCC) for RRF; \*\* = Calibration check compounds (CCC) for %RSD.

SDG #: Cu Cur LDC# 21495 H/

# VALIDATION FINDINGS WORKSHEET Initial Calibration

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

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

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

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

Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's? Was a curve fit used for evaluation?  $\frac{r^2 \ge 6}{2}$  4 9

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

<u> </u>	Y N N	Weie all %RSDS alig RRTS Willill the Validation Circlia of 550 /81/5D and 25:50 11/1	אונווווו נווב אשונוש	וטון כיווכוומ טו ססס /טו			
*		Standard ID	Compound	Finding %RSD (Limit: <30.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	4/8/64	1941	NNN		0.026	All WCGW + 166 447 MB	J/h3,
L				•			
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<u>_</u>							
J							

SDG #: 24 Car LDC # 21 495 H/

# **VALIDATION FINDINGS WORKSHEET** Continuing Calibration

Page: 1\_of\_L 2nd Reviewer:\_\_\_ Reviewer:\_\_

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

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

Most below for all questions allowered. Not applicable questions are laterallicated by No. 1. Was a continuing calibration standard analyzed at least once every 12 hours for each instrument? Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's? Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF?	nding %D Finding RRF Associated Samples Qualifications	0,625 A												
Was a continuing calibration standard analyzed at least once every 12 hours for each Was a continuing calibration standard analyzed at least once every 12 hours for each Were percent differences (%D) and relative response factors (RRF) within method owere all %D and RRFs within the validation criteria of ∠25 %D and ≥0.05 RRF?	Finding %D Finding RRF Compound (Limit: <25.0%) (Limit: >0.05)													
Nas a continuing calibration standard analyzed NNA Were percent differences (%D) and relative restroy NNA Were all %D and RRFs within the validation critical NA		8 9270												
N N/A N/A N/A N/A N/A N/A N/A N/A N/A N/	# Date	767/09												

SDG#: 34 C2-1 LDC #: 21445 H

# **VALIDATION FINDINGS WORKSHEET** Blanks

Page: 1 of 1 Reviewer: ₹\f 2nd Reviewer:\_\_

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

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

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

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

Blank analysis date: 7/02/04

Associated Samples: 1. 2

(79)

Compound		_		Associated Gallpies.	-	Sample Identification	ation	€		9
	160052 M	-1	1	<b>+</b>	۷(ز	,		× (	5	2 7
Methylene chloride.	4.7	6:0	7.6	4.6 /4	9	5.4 /11		(5,9)	(6,6)	4,5/1
Blank analysis date:Conc. units:			S armet Ass	Associated Samples:						
Compound	Blank ID					Sample Identification	ation			
	160052 MB	11								
Methylene chloride	2,7	_(9 <i>l</i> )								
		)								
										:

SDG #: Sed Const LDC#: 21495 #1

# **VALIDATION FINDINGS WORKSHEET** Field Blanks

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

(pt)

4-1

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

Were field blanks identified in this SDG?

Y N N/A

Were target compounds detected in the field blanks?

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

250

9/4

(xx)

9

0,90 Associated Samples: 1, 2 (0, 57) Sample Identification 0 10.00 PT 6.7 6.48/U 1/60,0 6.74 2 2 9,4 Blank ID /2 0.26 0. 24 4 Blank ID 3 6,23 2/3 Sampling Date フィスス Compound Oich luro me thane) Methylene chloride Chloroform CROL

13,14 16-18 Associated Samples: Field blank type: (circle one) Field Blank / Rinsate (Trip Blank) Other: 49 /L Associated sample units: 49 /kg Blank units:

(79)

	Compound	Blank ID   S   Blank ID	Blank ID				Sample Id	Sample Identification		
	Sampling Date 6/30/69	6/20/9		3	4	9-	17	18		
0,90	Victor Act	0.45		0,53/4	0,40/4	14 6.46 /4 0.61/4 0.70/4 0.75/4	0.70/U	0.75/U		
•	Acetone							,		
	Chloroform								-	
	CROL									

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

La Gres LDC#: 21495#/ SDG #:

# **VALIDATION FINDINGS WORKSHEET** Field Blanks

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

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)
Y N/N/A Were field blanks identified in this SDG? Y N/A

Which were target compounds detected in the field blanks?

Blank units: "9/L Associated sample units: "9/L Free Field blank) Rinsate / Trip Blank / Other:

11-6

( t a								
11-6	ntification							
Associated Samples: 9 - 1	Sample Identification							
Associa		//	<u>oi</u>	)				
er:		0)	4.5/u					
ip Blank / Oth		6	(9.6)	)				
Rinsate / Tr	Blank ID							
Field Blank	F8972169-50 Blank ID	7/21/09	3.7	6, 28				
Field blank type: (circle one) Field Blank) Rinsate / Trip Blank / Other:	Compound	Sampling Date	#	X				
Field b		(xz)	7.4	Z,	•	1		

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

_			 	 		 	
	iification						
Associated Samples:	Sample Identification						
Associa							
					_		
Blank / Other							
Rinsate / Trip	Blank ID						
Field Blank /	Blank ID						
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other:	Compound	Sampling Date					
Field							

LUC#: 21/4 ACH/

# VALIDATION FINDINGS WORKSHEET

Page: Reviewer:\_ 2nd Reviewer:

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

Matrix Spike/Matrix Spike Duplicates

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

YN 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

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?

			WS	437			
OI OSW/WSD ID	<u>e</u>	Compound	%R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samulas	
12/20		Se veral	composings	have 22 antrid	a		희
		*XCCS+	fort the )	ffg. ( )			No gase (105 m
		NNN	24 (20-120)	( CE1-02 ) FC			1, 7, 7,
		500		46 ( 1 )	<u> </u>		(m) W/ (m)
		777	& .	34 ( )	)		
		7.7.	4/	4) (			
		EEE	48 ( 1/ )	48 ( ) )	)		
						<i>y</i>	<b>→</b>
			)	( )			
			)	(	)		
			(	)			
			( )	( )			
			( )	( )			
			( )	(	)		
			( )	)			
			( )				
			^ )	)			
			( )	( )			
	Compound	pun	OCI Imite (Scrip	(Soll)			
1,1-Dichloroethene	hene			2 (2011)	RPD (Soil)	QC Limits (Water)	RPD (Water)
Trichloroethene	ē		%7/1-60	7.70	< 22%	61-145%	< 14%
Benzene			62-13/%	%/	< 24%	71-120%	< 14%
Toluene			06-142%	2%	< 21%	76-127%	< 11%
Chlorobenzene	9		29-139%	%6	< 21%	76-125%	/ 129/
	,		F0-133%	707			%27

< 13%

75-130%

LDC #: 21495#)
SDG #: 514 Crost 2149541

## VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page:

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

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

Y N N/A

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

	(T)	l			(I)			П	5			(1) d	,											ľ
Mcations	J+dets/p				J-105/P			H	<b></b> >			J-145/P	1											
Quel	+											ヮ			`									
	2 MB			_	16028/MB							160447 MB												
Associated Samples	160052 MB				16-18, 16	-			/			16040												
sociated	4-11.				14 16-							12 15	,											
¥	1.2				13,							2	,											
( <b>t</b>	(	(	^	^	(	(	^	1	(	(	(	(	(	(					^					
RPD (Limits)	)	)	-	-	<i>~</i>	~	_		)	J	_	)	J	_	_	_	~	_	_	_	_	_	_	
				_																				
<u> </u>			<b> </b> ^		(					(	(	(	(											
LCSD %R (Limits)	J	)	_	_	J	~	~	J	<u> </u>	)	)	)	)	)	<u> </u>		<b>-</b>	_	_	_	<u> </u>	)	<u> </u>	
						<u> </u>			_	) (	)	)	)	<u> </u>		)	<u> </u>	_		_		(	_	
LCS %R (Limits)	15-125				12-125)							(T5-1X	1											
LCS %R (LIn	30 ( )	)	J	<u> </u>	74 (7	73 (	) 65	7 1/	73 (	J	)	73 (7		~	J	)	)	)	~	)	~	)	<u> </u>	,
	۵.,		3					Ц		i.s.	-	7	7											_
Compound	১				N N N	699	711	144	EFE			777	AA											
ð								H					-											-
30 ID	527 -				SM							, 175												
TCS/FCSD ID	160052				180001							60447 VCS												
	16		_		9							7												
Date																								
**																								

LDC #: 21495 H) SDG #: Ju Gner

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

Page:_	of
Reviewer:	.57%
2nd reviewer:	<i>\Phi</i>

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

1	$\widehat{\Upsilon}$	N	N/A
	Y	N	N/A

	Concentratio	n 1 49/ kgr	
Compound	1	2	RPD
F	6.0	7,0	1,0 (= 20 Diff)
E	5.0U	0.42	4,58 (= 5.00iH)
		<u> </u>	
	Concentratio	n()	
Compound			RPD
	Concentratio	n( )	
Compound			RPD
	Concentratio	p ( )	
Compound			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 23, 2009

Matrix:

Soil/Water

Parameters:

Volatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903678

#### Sample Identification

EB070109-SO1 TB0070109-W1 SA114-0.5B SA114009-0.5B RSAN6-0.5B TB070109-SO1 SA82-0.5B SA82-10B SA82-29B

SA82-29B SA82-29BDL RSAL3-10B RSAL3-30B

RSAL3-30BDL TB070109-SO2

SA134-10B SA134-20B SA134-31B

SA134009-31B TB070209-S1

TB070209-S2

SA88-10B SA88-20B

SA88-20BDL

SA88-32B RSAK3-0.5B

RSAK3-10B

RSAK3-20B

RSAK3-20BRE

RSAK3-31B RSAK3-31BDL

SA82-0.5BMS

SA82-0.5BMSD

RSAK3-31BMS

RSAK3-31BMSD

#### Introduction

This data review covers 28 soil samples and 6 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

#### I. Technical Holding Times

All technical holding time requirements were met.

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

#### II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

#### III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

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

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/18/09	2-Methyl-2-propanol	0.026 (≥0.05)	EB070109-SO1 TB0070109-W1 TB070109-SO1 SA82-29BDL RSAL3-30BDL TB070109-SO2 TB070209-S1 TB070209-S2 SA88-20BDL SA134-20B RSAK3-31BMS RSAK3-31BMS RSAK3-31BMSD 160447MB 161113MB 161553MB	J (all detects) UJ (all non-detects)	А

#### IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

Date	Compound	%D	Associated Samples	Flag	A or P
7/10/09	Dichlorodifluoromethane	25.3	SA82-29BDL RSAL3-30BDL 161113MB	J+ (all detects)	А
7/15/09	Acetone	26.7	SA88-20BDL RSAK3-31BDL RSAK3-31BMS RSAK3-31BMSD 161553MB	J- (all detects) UJ (all non-detects)	А

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
7/7/09	2-Methyl-2-propanol	0.025 (≥0.05)	All water samples in SDG R0903678	J (all detects) UJ (all non-detects)	А
7/10/09	2-Methyl-2-propanol	0.023 (≥0.05)	SA82-29BDL RSAL3-30BDL 161113MB	J (all detects) UJ (all non-detects)	А
7/15/09	2-Methyl-2-propanol	0.024 (≥0.05)	SA88-20BDL RSAK3-31BDL RSAK3-31BMS RSAK3-31BMSD 161553MB	J (all detects) UJ (all non-detects)	А

#### V. Blanks

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

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
161113MB	7/10/09	2-Butanone Acetone	110 ug/Kg 49 ug/Kg	SA82-29BDL RSAL3-30BDL
161394MB	7/14/09	Acetone	3.2 ug/Kg	RSAL3-10B SA134-10B SA134009-31B SA88-10B SA88-32B RSAK3-0.5B RSAK3-10B RSAK3-20B RSAK3-31B
161553	7/15/09	2-Butanone	120 ug/Kg	SA88-20BDL
161557	7/15/09	1,3,5-Trimethylbenzene 4-Methyl-2-pentanone Acetone	0.34 ug/Kg 0.87 ug/Kg 4.3 ug/Kg	RSAK3-20BRE

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
SA82-29BDL (67.5x)	Acetone	150 ug/Kg	150U ug/Kg
RSAL3-30BDL (53.5x)	2-Butanone Acetone	120 ug/Kg 180 ug/Kg	120U ug/Kg 180U ug/Kg
RSAL3-10B	Acetone	3.1 ug/Kg	3.1U ug/Kg
RSAK3-0.5B	Acetone	3.7 ug/Kg	3.7U ug/Kg
RSAK3-10B	Acetone	6.4 ug/Kg	6.4U ug/Kg
SA88-20BDL (70x)	2-Butanone	150 ug/Kg	150U ug/Kg

Samples TB0070109-W1, TB070109-SO1, TB070109-SO2, TB070209-S1, and TB070209-S2 were identified as trip blanks. No volatile contaminants were found in these blanks with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
TB0070109-W1	7/1/09	Dichloromethane	0.52 ug/L	EB070109-SO1
TB070109-SO1	7/1/09	Dichloromethane 2-Methyl-2-propanol	0.35 ug/L 1.7 ug/L	SA114-0.5B SA114009-0.5B RSAN6-0.5B SA82-0.5B SA82-10B SA82-29B SA82-29BDL RSAL3-10B RSAL3-30B RSAL3-30BDL
TB070109-SO2	7/1/09	Dichloromethane	0.33 ug/L	SA114-0.5B SA114009-0.5B RSAN6-0.5B SA82-0.5B SA82-10B SA82-29B SA82-29BDL RSAL3-10B RSAL3-30B RSAL3-30BDL
TB070209-S1	7/2/09	2-Methyl-2-propanol Dichloromethane	1.5 ug/L 0.25 ug/L	SA134-10B SA134-20B SA134-31B SA134009-31B SA88-10B SA88-20B SA88-20BDL SA88-32B RSAK3-0.5B RSAK3-10B RSAK3-20B RSAK3-20B RSAK3-31B RSAK3-31B
TB070209-S2	7/2/09	Dichloromethane Chloroform Toluene	0.35 ug/L 0.21 ug/L 0.26 ug/L	SA134-10B SA134-20B SA134-31B SA134009-31B SA88-10B SA88-20B SA88-20BDL SA88-32B RSAK3-0.5B RSAK3-10B RSAK3-20B RSAK3-20B RSAK3-31B RSAK3-31B

Sample EB070109-SO1 was identified as an equipment blank. No volatile contaminants were found in this blank.

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

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072109-SO	7/21/09	Acetone Bromoform	3.7 ug/L 0.28 ug/L	SA82-0.5B SA82-10B SA82-29B SA82-29BDL RSAL3-10B RSAL3-30B RSAL3-30BDL SA134-10B SA134-20B SA134-21B SA134-31B SA134-09-31B SA88-10B SA88-20B SA88-20BDL SA88-20BDL SA88-32B RSAK3-0.5B RSAK3-10B RSAK3-10B RSAK3-10B RSAK3-10B RSAK3-10B RSAK3-10B RSAK3-10B RSAK3-10B RSAK3-10B RSAK3-10B RSAK3-10B RSAK3-10B RSAK3-10B RSAK3-10B RSAK3-10B

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

Sample	Compound	Reported Concentration	Modified Final Concentration
SA114-0.5B (1.09x)	Dichloromethane	0.71 ug/Kg	0.71U ug/Kg
SA114009-0.5B (1.23x)	Dichloromethane	0.86 ug/Kg	0.86U ug/Kg
RSAN6-0.5B	Dichloromethane	0.66 ug/Kg	0.66U ug/Kg
RSAL3-10B	Dichloromethane Acetone	0.30 ug/Kg 3.1 ug/Kg	0.30U ug/Kg 3.1U ug/Kg
RSAL3-30B	Dichloromethane Acetone	0.46 ug/Kg 2.9 ug/Kg	0.46U ug/Kg 2.9U ug/Kg
SA134-10B	Dichloromethane Toluene	0.69 ug/Kg 0.32 ug/Kg	0.69U ug/Kg 0.32U ug/Kg
SA134009-31B (1.67x)	Dichloromethane	1.0 ug/Kg	1.0U ug/Kg
SA88-32B	Dichloromethane	0.57 ug/Kg	0.57U ug/Kg

Sample	Compound	Reported Concentration	Modified Final Concentration
RSAK3-0.5B	Dichloromethane	0.28 ug/Kg	0.28U ug/Kg
	Chloroform	1.2 ug/Kg	1.2U ug/Kg
	Acetone	3.7 ug/Kg	3.7U ug/Kg
RSAK3-10B	Dichloromethane	0.25 ug/Kg	0.25U ug/Kg
	Acetone	6.4 ug/Kg	6.4U ug/Kg
RSAK3-20B	Dichloromethane	0.64 ug/Kg	0.64U ug/Kg
	Toluene	0.32 ug/Kg	0.32U ug/Kg
RSAK3-20BRE	Toluene	0.52 ug/Kg	0.52U ug/Kg
SA134-31B	Acetone	6.6 ug/Kg	6.6U ug/Kg

#### 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
RSAK3-20B	Bromofluorobenzene	42 (70-130)	All TCL compounds	J- (all detects) UJ (all non-detects)	А

#### 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 or MSD percent recoveries (%R) and relative percent differences (RPD) were not within QC limits for several compounds, the MS/MSD or LCS 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
160281LCS (SA114-0.5B SA114009-0.5B RSAN6-0.5B SA82-10B 160281MB)	Hexachlorobutadiene n-Butylbenzene sec-Butylbenzene	59 (75-125) 71 (75-125) 73 (75-125)	<u>-</u> -	<u>-</u> -	J- (all detects) UJ (all non-detects)	P
160447LCS (EB070109-SO1 TB0070109-W1 TB070109-SO1 TB070109-SO2 TB070209-S1 TB070209-S2 160447MB)	Hexachlorobutadiene Tetrachloroethene	73 (75-125) 72 (75-125)	- - -	<u>-</u>	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	P
161113LCS (SA82-29BDL RSAL3-30BDL 161113MB)	1,2-Dibromo-3-chloropropane	73 (75-125)	•	<b>-</b>	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
SA88-20B	Pentafluorobenzene	226550 (229238-916952)	Chloromethane Bromomethane Vinyl chloride Chloroethane Dichloromethane Acetone 1,1-Dichloroethene 1,1-Dichloroethane Chloroform 2-Butanone 1,1,1-Trichloroethane Dichlorodifluoromethane Trichlorofluoromethane Methyl-tert-butyl ether 2,2-Dichloropropane Bromochloromethane trans-1,2-Dichloroethene cis-1,2-Dichloroethene Di-isopropyl ether Ethyl-tert-butyl ether tert-Amyl-methyl ether 2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
RSAK3-20B	Pentafluorobenzene 1,4-Dichlorobenzene-d4	Area (Limits)  164612 (229238-916952) 143664 (161120-644478)	Chloromethane Bromomethane Vinyl chloride Chloroethane Dichloromethane Acetone 1,1-Dichloroethene 1,1-Dichloroethane Chloroform 2-Butanone 1,1,1-Trichloroethane Dichlorodifluoromethane Trichlorofluoromethane Methyl-tert-butyl ether 2,2-Dichloropropane Bromochloromethane trans-1,2-Dichloroethene cis-1,2-Dichloroethene Di-isopropyl ether tert-Amyl-methyl ether 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene 1,2,4-Trimethylbenzene 1,2-Dichlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene 1,4-Dichlorobenzene 1,2-Dichlorobenzene 1,2-Dichlorobenzene 1,2-Dichlorobenzene 1,2-Dichlorobenzene 1,2-Dichlorobenzene 1,2-Dichlorobenzene 1,2-Dichlorobenzene	J (all detects) UJ (all non-detects)	A or P
			Hexachlorobetizerie Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobetizene 2-Methyl-2-propanol		
RSAK3-20BRE	Pentafluorobenzene 1,4-Difluorobenzene Chlorobenzene-d5 1,4-Dichlorobenzene-d4	35657 (215453-861810) 71906 (349214-1396854) 46888 (284607-1138426) 10845 (156782-627128)	All TCL compounds	J (all detects) R (all non-detects)	А

#### XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

#### XII. Project Quantitation Limit

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

Sample	Compound	Finding	Criteria	Flag	A or P
SA82-29B RSAL3-30B SA88-20B RSAK3-31B	Chloroform	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	А

All compounds reported below the PQL were qualified as follows:

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

Raw data were not reviewed for this SDG.

#### XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

#### XIV. System Performance

Raw data were not reviewed for this SDG.

#### XV. Overall Assessment of Data

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
SA82-29B RSAL3-30B SA88-20B RSAK3-31B	Chloroform	X	А
SA82-29BDL RSAL3-30BDL SA88-20BDL RSAK3-31BDL	All TCL compounds except Chloroform	×	A '
RSAK3-20BRE	All TCL compounds	х	А

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

#### XVI. Field Duplicates

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

	Concentration (ug/Kg)			<b></b>		
Compound	SA114-0.5B	SA114009-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P
Acetone	6.2	7.5	-	1.3 (≤27)	•	-
Chloroform	2.36	2.1		0.2 (≤6.7)	-	-
Dichloromethane	0.71	0.86	<b>.</b>	0.15 (≤6.7)	<del>-</del>	-

	Concentrat	ion (ug/Kg)		5:4		
Compound	SA134-31B	SA134009-31B	RPD (Limits)	Difference (Limits)	Flags	A or P
1,1-Dichloroethane	- 1.0	1.3	-	0.3 (≤13)	-	-
1,2-Dichlorobenzene	9.7U	1.3	-	8.4 (≤9.7)	-	-
1,2-Dichloroethane	1.0	1.3	-	0.3 (≤13)	-	-
Acetone	6.6	39	-	32.4 (≤51)	-	-
Chloroform	170	270	45 (≤50)	-	-	<u>-</u>
Dichloromethane	9.7U	1.0	· <u>-</u>	8.7 (≤9.7)	-	_

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

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903678	EB070109-SO1 TB0070109-W1 TB070109-SO1 SA82-29BDL RSAL3-30BDL TB070109-SO2 TB070209-S1 TB070209-S2 SA88-20BDL SA134-20B	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Initial calibration (RRF) (c)
R0903678	SA82-29BDL RSAL3-30BDL	Dichlorodifluoromethane	J+ (all detects)	А	Continuing calibration (%D) (c)
R0903678	SA88-20BDL RSAK3-31BDL	Acetone	J- (all detects) UJ (all non-detects)	Α	Continuing calibration (%D) (c)
R0903678	EB070109-SO1 TB0070109-W1 TB070109-SO1 TB070109-SO2 TB070209-S1 TB070209-S2 SA82-29BDL RSAL3-30BDL SA88-20BDL RSAK3-31BDL	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Continuing calibration (RRF) (c)
R0903678	RSAK3-20B	All TCL compounds	J- (all detects) UJ (all non-detects)	А	Surrogate spikes (%R) (s)
R0903678	SA114-0.5B SA114009-0.5B RSAN6-0.5B SA82-10B	Hexachlorobutadiene n-Butylbenzene sec-Butylbenzene	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0903678	EB070109-SO1 TB0070109-W1 TB070109-SO1 TB070109-SO2 TB070209-S1 TB070209-S2	Hexachlorobutadiene Tetrachloroethene	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0903678	SA82-29BDL RSAL3-30BDL	1,2-Dibromo-3-chloropropane	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903678	SA88-20B	Chloromethane Bromomethane Vinyl chloride Chloroethane Dichloromethane Acetone 1,1-Dichloroethane Chloroform 2-Butanone 1,1,1-Trichloroethane Dichlorodifluoromethane Trichlorofluoromethane Methyl-tert-butyl ether 2,2-Dichloropropane Bromochloromethane trans-1,2-Dichloroethene cis-1,2-Dichloroethene Di-isopropyl ether Ethyl-tert-butyl ether tert-Amyl-methyl ether 2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Internal standards (area) (i)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903678	RSAK3-20B	Chloromethane Bromomethane Vinyl chloride Chloroethane Dichloromethane Acetone 1,1-Dichloroethene 1,1-Dichloroethane Chloroform 2-Butanone 1,1,1-Trichloroethane Dichlorodifluoromethane Trichlorofluoromethane Methyl-tert-butyl ether 2,2-Dichloropropane Bromochloromethane trans-1,2-Dichloroethene cis-1,2-Dichloroethene Di-isopropyl ether tert-Amyl-methyl ether 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene n-Butylbenzene 1,2-Trichlorobenzene n-Butylbenzene 1,2-Trichlorobenzene hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene 1,2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Internal standards (area) (i)
R0903678	RSAK3-20BRE	All TCL compounds	J (all detects) R (all non-detects)	A	Internal standards (area) (i)
R0903678	SA82-29B RSAL3-30B SA88-20B RSAK3-31B	Chloroform	J (all detects)	A	Project Quantitation Limit (e)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
		- Compound	ı iay	AUIP	neason (Code)
R0903678	EB070109-SO1 TB0070109-W1 SA114-0.5B SA114009-0.5B RSAN6-0.5B TB070109-SO1 SA82-0.5B SA82-10B SA82-29B SA82-29B SA82-29BDL RSAL3-10B RSAL3-30BDL TB070109-SO2 SA134-10B SA134-20B SA134-20B SA134-31B SA134009-31B TB070209-S1 TB070209-S2 SA88-10B SA88-20B SA88-20BDL SA88-20B SA88-20BDL SA88-32B RSAK3-0.5B RSAK3-10B RSAK3-10B RSAK3-10B RSAK3-10B RSAK3-20BRE RSAK3-31B RSAK3-31B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (PQL) (sp)
R0903678	SA82-29B RSAL3-30B SA88-20B RSAK3-31B	Chloroform	Х	А	Overall assessment of data (o)
R0903678	SA82-29BDL RSAL3-30BDL SA88-20BDL RSAK3-31BDL	All TCL compounds except Chloroform	x	А	Overall assessment of data (o)
R0903678	RSAK3-20BRE	All TCL compounds	х	А	Overall assessment of data (o)

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

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0903678	SA82-29BDL (67.5x)	Acetone	150U ug/Kg	А	bl
R0903678	RSAL3-30BDL (53.5x)	2-Butanone Acetone	120U ug/Kg 180U ug/Kg	А	bl

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0903678	RSAL3-10B	Acetone	3.1U ug/Kg	А	bl
R0903678	RSAK3-0.5B	Acetone	3.7U ug/Kg	Α	bl
R0903678	RSAK3-10B	Acetone	6.4U ug/Kg	А	bl
R0903678	SA88-20BDL (70x)	2-Butanone	150U ug/Kg	А	bl

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

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0903678	SA114-0.5B (1.09x)	Dichloromethane	0.71U ug/Kg	А	bt
R0903678	SA114009-0.5B (1.23x)	Dichloromethane	0.86U ug/Kg	А	bt
R0903678	RSAN6-0.5B	Dichloromethane	0.66U ug/Kg	А	bt
R0903678	RSAL3-10B	Dichloromethane	0.30U ug/Kg	А	bt
R0903678	RSAL3-10B	Acetone	3.1U ug/Kg	A	bf
R0903678	RSAL3-30B	Dichloromethane	0.46U ug/Kg	А	bt
R0903678	RSAL3-30B	Acetone	2.9U ug/Kg	А	bf
R0903678	SA134-10B	Dichloromethane Toluene	0.69U ug/Kg 0.32U ug/Kg	A	bt
R0903678	SA134009-31B (1.67x)	Dichloromethane	1.0U ug/Kg	А	bt
R0903678	SA88-32B	Dichloromethane 0.57U ug/Kg		А	bt
R0903678	RSAK3-0.5B	Dichloromethane Chloroform	0.28U ug/Kg 1.2U ug/Kg	А	bt
R0903678	RSAK3-0.5B	Acetone 3.7U ug/Kg		A	bf
R0903678	RSAK3-10B	Dichloromethane	0.25U ug/Kg	А	bt

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0903678	RSAK3-10B	Acetone	6.4U ug/Kg	А	bf
R0903678	RSAK3-20B	Dichloromethane Toluene	0.64U ug/Kg 0.32U ug/Kg	Α	bt
R0903678	RSAK3-20BRE	Toluene 0.52U ug/Kg		А	bt
R0903678	SA134-31B	Acetone	6.6U ug/Kg	Α	bf

#### **Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET**

LDC #: 21495I1 SDG #: R0903678

Stage 2B

Pa	age:
Revie	wer:
	-

2nd Reviewer:

Laboratory: Columbia Analytical Services

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

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

	Validation Area		Comments
1.	Technical holding times	A	Sampling dates: 7/61-0-/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	WZ	7, Rsb r~
IV.	Continuing calibration/IEV	<b>LN</b>	
V.	Blanks	SN)	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	WZ	
VIII.	Laboratory control samples	LW	KS/D
IX.	Regional Quality Assurance and Quality Control	N	
Х.	Internal standards	SW	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	w2	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SH	
XVI.	Field duplicates	SN)	$b = 3, 4$ $D_2 = 17, 18$
XVII.	Field blanks	SM5	FB = 1 TB = 2, 6, 14, 19, 20 FB = FB072109-S0 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 + water

1	EB070109-SO1	ν	V 11 5	RSAL3-10B	S	21 5	SA88-10B	S	31 🗦	SA82-0.5BMS	S
2	TB0070109-W1	V	12	RSAL3-30B		22 6	SA88-20B		32 3	SA82-0.5BMSD	
3 <b>)</b>	SA114-0.5B	0, 5	13 4	RSAL3-30BDL		23 7	SA88-20BDL		33 7	RSAK3-31BMS	
4 7	SA114009-0.5B	<i>b</i> ,	14 1	TB070109-SO2	W	24 5	SA88-32B		34 7	RSAK3-31BMSD	
5	RSAN6-0.5B	<u> </u>	15	SA134-10B		25 5	RSAK3-0.5B		35	16 0447 A	1,13
6	TB070109-SO1	ľ	/ 16 3	SA134-20B		26 ¢	RSAK3-10B		36	16 0281	M B
7 3	SA82-0.5B	2	17	SA134-31B	Do	27 6	RSAK3-20B		37 <b>3</b>	160561	MB
8 2	SA82-10B		18	SA134009-31B	$\nu_{\gamma}$ $V$	28	RSAK3-20BRE		# 38 <b>4</b>	161113	ทห
9 3	SA82-29B		19	TB070209-S1	W	29 5	RSAK3-31B		395	161394	MB
10	SA82-29BDL		20 1	TB070209-S2		30 7	RSAK3-31BDL	$\overline{V}$	40 6	161557	MB

IW)

# TARGET COMPOUND WORKSHEET

# METHOD: VOA (EPA SW 846 Method 8260B)

A. Chloromethane*	U. 1,1,2-Trichloroethane	(OO. 2, 2-Dichloropropane	) / n-Butylbenzene	CCCC.1-Chlorohexane
B Bromomethane	V. Benzene	PP. Bromochloromethane	)文 1,2-Dichlorobenzene	DDDD. Isopropyl alcohol
C. Vinyl choride**	W. trans-1,3-Dichloropropene	QQ. 1,1-Dichloropropene	K. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
D Chloroethane	X. Bromoform*	RR. Dibromomethane	N.K. Hexachlorobutadiene	FFFF. Acrolein
E) Methylana chlorida	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MAM. Naphthalene	GGGG. Acrylonitrile
E Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NAM. 1,2,3-Trichlorobenzene	нннн. 1,4-Dioxane
G. Carbon disulfide	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachloroethane	OOO. 1,3,5-Trichlorobenzene	IIII. Isobutyl alcohol
H.)1,1-Dichloroethene**	€. 1,1,2,2-Tetrachloroethane*	VV. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
L.), 1-Dichloroethane*	CC. Toluene**	WW. Bromobenzene	QQQ. bis-1,2-Dichloroethene	KKKK. Propionitrile
J. 1,2-Dichloroethene, total	DD. Chlorobenzene*	XX. 1,2,3-Trichloropropane	RRR. m,p-Xylenes	LLLL. Ethyl ether
K. Chloroform**	EE. Ethylbenzene**	X n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
L. 1,2-Dichloroethane	FF. Styrene	X 2-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	(NNNN.) 2-ME+Ay) -2-propare/
M.2-Butanone	GG. Xylenes, total	Ack. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	00000.
N,1,1-Trichloroethane	HH. Vinyi acetate	BR6. 4-Chlorotoluene	VVV. 4-Ethyltoluene	рррр.
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	Sec. tert-Butylbenzene	WWW. Ethanol	0000.
P. Bromodichloromethane	(JJ)Dichlorodifluoromethane	Doc. 1,2,4-Trimethylbenzene	XXX) Di-isopropyl ether	RRRR.
Q. 1,2-Dichloropropane**	KK.) Trichlorofluoromethane	医氏. sec-Butylbenzene	YYY. tert-Butanol	SSSS.
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	所 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohol	TTTT.
S. Trichloroethene	M. 1,2-Dibromo-3-chloropropane	Goo€, p-Isopropyltoluene	AAAA_Ethyl tert-butyl ether	unuu.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HXH. 1,4-Dichlorobenzene	BBBB Jert-Amyl methyl ether	ww.
	4			

<sup>\* =</sup> System performance check compounds (SPCC) for RRF; \*\* = Calibration check compounds (CCC) for %RSD.

PFB - 0 40cb - X

SDG#: Su Conny LDC #: 21495 I

## **VALIDATION FINDINGS WORKSHEET** Initial Calibration

Page: Reviewer: 2nd Reviewer:

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

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

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

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

N N/A

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

Were all %RSDs and RREs within the validation criteria of <30 %RSD and >0.05 RRE?

		$\Box$		~													
	Qualifications	5/45 A (c												:			
	ซ			8													
	Associated Samples	AII WELL + 160447 MB	33, 33,	161553MB	_												
,	Associate	All water	10 13,23,33	16 1112mB													
กต ≥บ.บว หหา	Finding RRF (Limit: >0.05)	0,026									:						
0 %RSD a																	
on criteria or ≤o	Finding %RSD (Limit: <30.0%)													e de la companya de l			
ini ine vandan	Compound	NNN															
RKLS WI	ŭ																
Were all %KSDS and KKFS Within the Validation Chiefla of \$30 %KSD and 20.05 KKF?	Standard ID	ICAL											The state of the s				
Y/M M/A	Date	4/18/09				740 160	, ,										
	) #																

LDC #: 21 495 I

## VALIDATION FINDINGS WORKSHEET **Continuing Calibration**

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

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

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

N/N/N/					**************************************			
	Date	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications	
1 12 1	60/10	B9270	NNNN		0.025	All WATH + 160447 MB	5/45 /A	(3)
1 1 1 1	60/01	Bq347	JJ P)	25,3	0.023	10, 13, 16 1113 MB	J+ Arts/A J/NJ/A	
	60/ 51/2	B9448	NAND (-5)	26.7	0.024	23, 20, 25, 24, 16,1552Mp	D J-105/A J/N5/A	
1 1 1								
1 I I								

LDC# 2/495 I

# VALIDATION FINDINGS WORKSHEET

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Reviewer: JV6 Page:

2nd Reviewer:\_

Blanks

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

Was a method blank associated with every sample in this SDG?

Was a method blank analyzed at least once every 12 hours for each matrix and concentration?

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

Blank analysis date: 7/10/09 Conc. units:

Ø Associated Samples:

() ()	Punodwo2	Blank ID				<i>3</i> ,	Sample Identification	ation				
(XX)		161113 MB	[@(67.5x) 13	(४५:६५) ह। (	(×							
3	Methylene chloride M	110	,	150/4				:				
8	Acetone	49	N/051	180/4								
2			,									
	CROI											
	Blank analysis date: 7/14 /09 Conc. units: 145 /5/			As	Associated Samples:		11.15 18 21.24-27.29	1.24-27	29	(b L)		
	Compound	Blank ID					Sample Identification	ation				
		16 [344 MB	11	15	18 (1.67)	12	22	24	52	27	27	29
٠ و	Methylene chloride F	3.7	3.) /u	(q.1)	(34)	(69)	(k)	(7)	3.7/4	6.4 /4	(22)	9
-	Acetone				)	j		}				

LDC #: 21 495 I SDG#:\_\_

# **VALIDATION FINDINGS WORKSHEET**

Page: Yof X Reviewer:\_ 2nd Reviewer:

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

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

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

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

Blank analysis date: 7/ऽ /७१ 

(79)Sample Identification 23 Associated Samples: 23 (20x) 8 161553MB Blank ID 3 ٤ Conc. units: 44 /kg Compound Methylene chloride Acetone CBO

Associated Samples: Blank analysis date: 7/15/64 Conc. units:\_

Sample Identification 28 7 ان ان 161557 MB Blank ID 6.34 0.87 4,2 AAA Compound Methylene chiodde **Aeetone** 

SDG#: Ly Cores LDC # 21 415 1 /

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

Y N/N/A

# **VALIDATION FINDINGS WORKSHEET**

Field Blanks

Page: 3 of 3 Reviewer: 37/6
Reviewer:

2nd Reviewer:

( <del>/ 9</del>)

terra

7-13 15-18, 21-30

V 75 Sample Identification Associated Samples: ٢ ND either others 7 7 FB 07 2/04-Sp Blank ID 7/21/09 0.38 3,7 Compound 9.55 (XX)

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

Associated Samples:

•			_	 _	 		 
	ntification						
	Sample Identification						
						,	
	Blank ID						
	Blank ID						
	Compound	Sampling Date					
	Com						

1156612 LDC #: SDG #:

# VALIDATION FINDINGS WORKSHEET

Reviewer: WC

2nd Reviewer:

Field Blanks

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

Were field blanks identified in this SDG?

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

Blank units: 49 / Associated sample units: 49 / Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other:

( UN)							
-	Sample Identification						
Associated Samples:	Sample Ide						
Assoc							
ner:							
rip Blank / Other:							
Blank / Rinsate (T	Blank ID						
e) Field Blank	Blank ID 2	7/61/69	75.0				
Field blank type: (circle one) Field Blank / Rinsate / Trip Blan	Compound	Samiling Pate 7/61/69	Ħ				
Field b							

	Blank units: 49/k Associated sample units: 49/kg	ciated samp	le units: V	19/Kg							
	Field blank type: (circle one) Field Blank / Rinsate / Trip Blan	) Field Blank	/ Rinsate/Tri	p Blank / Other:	Y:	Assoc	Associated Samples:		3-5 7-13	M	(pf)
	Compound	Blank ID 6	Blank ID 6 Blank ID 14				Sample Identification	ntification			
	Samiling Date	7/01/69-	<b>\</b>	3 (1.09x	3 (1.09x) 4 (1.23x)	5	7 (i. 52x	(x501) 8 (x55.1) 7	6	11	12
_	ıπ	E 0.35 0.33 0.71	66.0	h/12.a	W 28.0 W 28.0	W 29.0	(1,2)	(25 g	6.89	6.30 / 0.4c/4	0.40/4
4	NNNN	1.7						)			
_											
_											

6.7

LDC# 21495 I SDG# SDG#

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

Y N /N/A Were field blanks identified in this SDG?

# **VALIDATION FINDINGS WORKSHEET**

Reviewer: 376 2nd Reviewer: 4

Page:\_\_

Field Blanks

W/15.0 (6t) 061) 45 85 (i.egx 21-30  $\tilde{\mathcal{G}}$ (2) 15-18 Sample Identification 7,4 Associated Samples: 8(1.67% 1.0/4 270 170 4.7 N N/A Were target compounds detected in the field blanks?

Blank units: V9 / Associated sample units: V9 / K5

Field blank type: (circle one) Field Blank / Rinsate /(Trip Blank) / Other: 0.69/4 0 32/11 Blank ID 20 0,26 0,35 0.2 Blank ID 19 NNNN Ÿ 4 دالا Compound √ N N/A 0.57

0,47

0.7

ъ 0

SSO	Associated sample units:	le units:		Same 25	3	so me			
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank	뙨	insate / Kri	p Blank/ Other:	er:	Assoc	Associated Samples:		18-18 21-30	( 64)
Blank ID B	<u> </u>	Blank ID				Sample Identification	ntification		
1.9		ጽ	St.	72	37	28	29	30	
5.1									
0.25	0	0,35	N/80.0	0.25/4 0.64/W	0.64 /u		(i)		
0	0	12.0	1.2	(1,3)	(36)	(59)	(226)	(02)	
0.	ó	0.26			0.32/u	0.52/H			

LDC#: 71495 I SDG #:

## VALIDATION FINDINGS WORKSHEET Surrogate Spikes

Page: Reviewer 2nd Reviewer:

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

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

YNANA Were all surrogate %R within QC limits?

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

37 BFB 42 (7-17a) Dualifications (1 miles) 3. (n.5.14) (1 miles) (	Date Sample ID			
	27	BFB	Weacovery (Limits)	Oualifications
			(%)-0/	
			( )	
			( )	
			( )	
			(	
			(	
			( )	
			( )	
			( )	

QC Limits (Water)

QC Limits (Soil)

81-117

88-110 86-115 80-120 86-118

74-121 80-120 80-120

SMC1 (TOL) = Toluene-48 SMC2 (BFB) = Bromofluorobenzene SMC3 (DCE) = 1,2-Dichloroethane-44 SMC4 (DFM) = Dibromofluoromethane

SDG #: See Lany LDC #: 214957

## VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

2nd Reviewer:\_ Reviewer:

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

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

Were 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 Y N N/A

MS/MSD. Soil / Water.

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

#				ν Σ	CVN			
_	Date	MS/MSD ID	Compound	%R (Limits)	%R (Limits)	RPD (Limits)	Associated Samples	Qualifications
-		31/32	A11 con	compounds have	RPI	7	7	No sware leither Asher
		/	Several	( Surganies	<del>                                     </del>	7,	>	STUD
				(su' anta	7	) ( )		
				)		( )		
		•		)	) (	( ) (		
H		33/34	æ	(051-05) 01	(05/~05)	) (	29 20	No grad (LCS in
			4	(26/-02) (8	3	( ) (		
$\left  \cdot \right $				)	) (			
				)	) (	) (		
				)	) (	( ) (		
				)	)			
				)	) (	) (		
				)	) (	( ) (		
				)	) (	( ) (		
				)	) (	( ) (		-
				)	) (	( ) (		
				)	) (	( ) (		
				)	) (			
		Compound	pun	ac L	QC Limits (Soll)	RPD (Soil)	QC Limits (Water)	RPD (Water)
	Ŧ	1,1-Dichloroethene		žÝ.	59-172%	< 22%	61-145%	< 14%
	S.	Trichloroethene		3	62-137%	< 24%	71-120%	< 14%
	>	Benzene		ÿ	66-142%	< 21%	76-127%	< 11%
	CC.	Toluene		Ϋ́	59-139%	< 21%	76-125%	< 13%
נ	DD.	Chlorobenzene		<b>3</b> 6	60-133%	< 21%	75-130%	< 13%

### COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:

Northgate Environmental

Project:

Tronox LLC Henderson/2027.001

Sample Matrix:

Soil

Service Request: R0903678

Date Collected: 7/1/09 Date Received: 7/2/09

Date Analyzed: 7/8/09

**Matrix Spike Summary** Volatile Organic Compounds by GC/MS

Sample Name:

SA82-0.5B

Lab Code:

R0903678-007

Units: µg/Kg Basis: Dry

Analytical Method: 8260B

	Sample		Iatrix Spike Q0905542-0			ate Matrix Q0905542-0		% Rec	RPD
Analyte Name	Result	Result	Amount	% Rec	Result	Amount	% Rec	Limits	RPD Limit
1,1,1,2-Tetrachloroethane	ND	90.7	107	85	51.8	67.8	76	70 - 130	55 * 30
1,1,1-Trichloroethane (TCA)	ND	99.5	107	93	58.9	67.8	87	70 - 130	51 * 30
1,1,2,2-Tetrachloroethane	ND	2.71	107	3 *	35.7	67.8	53	* 70 - 130	172 * 30
1,1,2-Trichloroethane	ND	83.2	107	78	53.8	67.8	79	70 - 130	43 * 30
1,1-Dichloroethane (1,1-DCA)	ND	101	107	95	55.3	67.8	81	70 - 130	59 * 30
1,1-Dichloroethene (1,1-DCE)	ND	112	107	105	53.1	67.8	78	70 - 130	71 * 30
1,1-Dichloropropene	ND	94.0	107	88	57.8	67.8	85	70 - 130	48 * 30
1,2,3-Trichlorobenzene	ND	63.0	107	59 *	35.5	67.8	52	* 70 - 130	56 * 30
1,2,3-Trichloropropane	ND	92.6	107	87	58.0	67.8	86	70 - 130	46 * 30
1,2,4-Trichlorobenzene	ND	63.9	107	60 *	J J . E	67.8	52	* 70 - 130	58 * 30
1,2,4-Trimethylbenzene	ND	83.9	107	79	47.8	67.8	70	70 - 130	55 * 30
1,2-Dibromo-3-chloropropane (DBC	ND	71.8	107	67	50.8	67.8	75	50 - 150	34 * 30
1,2-Dibromoethane	ND	95.2	107	89	54,3	67.8	80	70 - 130	55 * 30
1,2-Dichlorobenzene	ND	82.8	107	77	48.1	67.8	71	70 - 130	53 * 30
1,2-Dichloroethane	ND	103	107	96	59.7	67.8	88	70 - 130	53 * 30
1,2-Dichloropropane	ND	94.3	107	88	56.0	67.8	83	70 - 130	51 * 30
1,3,5-Trimethylbenzene	ND	84.0	107	79	48.7	67.8	72	70 - 130	53 * 30
1,3-Dichlorobenzene	ND	81.5	107	76	45.9	67.8	68	* 70 - 130	56 * 30
1,3-Dichloropropane	ND	92.6	107	87	53.4	67.8	79	70 - 130	54 * 30
1,4-Dichlorobenzene	ND	79.1	107	74	44.7	67.8	66	* 70 - 130	56 * 30
2,2-Dichloropropane	ND	96.0	107	90	55.2	67.8	81	70 - 130	54 * 30
2-Butanone (MEK)	1.8	105	107	97	59.7	67.8	85	50 - 150	55 * 30
2-Chlorotoluene	ND	84.3	107	79	53.9	67.8	80	70 - 130	44 * 30
2-Hexanone	ND	92.3	107	86	52.9	67.8	78	70 - 130	54 * 30
2-Methyl-2-propanol	ND	2070	2140	97	1280	1360	95	50 - 150	47 * 30
4-Chlorotoluene	ND	86.9	107	81	49.6	67.8	73	70 - 130	55 * 30
4-Isopropyltoluene	ND	85.3	107	80	49.4	67.8	73	70 - 130	53 * 30
4-Methyl-2-pentanone	ND	96.9	107	91	58.8	67.8	87	70 - 130	49 * 30
Acetone	30	141	107	104	90.2	67.8	89	50 - 150	44 * 30
Benzene	ND	88.6	107	83	54.1	67.8	80	70 - 130	48 * 30
Bromobenzene	ND	85.5	107	80	49.1	67.8	72	70 - 130	54 * 30
Bromochloromethane	ND	93.9	107	88	54.3	67.8	80	70 - 130	54 * 30
Bromodichloromethane	ND	88.2	107	83	55.0	67.8	81	70 - 130	46 * 30

Comments:

### COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Project: Northgate Environmental

Sample Matrix:

Soil

Tronox LLC Henderson/2027.001

Service Request: R0903678 Date Collected: 7/1/09 Date Received: 7/2/09 Date Analyzed: 7/8/09

### **Matrix Spike Summary** Volatile Organic Compounds by GC/MS

Sample Name: Lab Code:

SA82-0.5B R0903678-007 Units: µg/Kg Basis: Dry

Analytical Method: 8260B

			1atrix Spike			ate Matrix			222
	Sample		Q0905542-0			Q0905542 <b>-</b> 0		% Rec	RPD
Analyte Name	Result	Result	Amount	% Rec	Result	Amount	% Rec	Limits	RPD Limit
Bromoform	ND	85.9	107	80	49.8	67.8	73	70 - 130	53 * 30
Bromomethane	ND	82.5	107	77	48.7	67.8	72	50 - 150	52 * 30
Carbon Tetrachloride	ND	98.0	107	92	58.3	67.8	86	70 - 130	51 * 30
Chlorobenzene	ND	87.7	107	82	52.9	67.8	78	70 - 130	50 * 30
Chloroethane	ND	91.9	107	86	51.1	67.8	75	70 - 130	57 * 30
Chloroform	0.56	96.4	107	90	55.4	67.8	81	70 - 130	54 * 30
Chloromethane	ND	88.1	107	82	53,2	67.8	78	70 - 130	49 * 30
Dibromochloromethane	ND	92.4	107	86	55.2	67.8	81	70 - 130	50 * 30
Dibromomethane	ND	94.6	107	88	54.6	67.8	81	70 - 130	54 * 30
Dichlorodifluoromethane (CFC 12)	ND	68.6	107	64 *	27.1	67.8	58	* 70 - 130	54 * 30
Dichloromethane	1.2	91.8	107	85	52.0	67.8	75	70 - 130	55 * 30
Diisopropyl Ether	ND	97.9	107	92	54.1	67.8	80	70 - 130	58 * 30
Ethyl tert-Butyl Ether	ND	96.0	107	90	52.1	67.8	77	70 - 130	59 * 30
Ethylbenzene	ND	91.8	107	86	52.9	67.8	78	70 - 130	54 * 30
Hexachlorobutadiene	ND	65.4	107	61 *	40.8	67.8	60	* 70 - 130	46 * 30
Isopropylbenzene (Cumene)	ND	94.9	107	89	54.7	67.8	81	70 - 130	54 * 30
Methyl tert-Butyl Ether	ND	98.8	107	92	51.7	67.8	76	70 - 130	63 * 30
Naphthalene	ND	69.0	107	65	42.2	67.8	62	50 - 150	48 * 30
Styrene	ND	91.4	107	86	53.4	67.8	79	70 - 130	53 * 30
Tetrachloroethene (PCE)	ND	91.3	107	85	55.8	67.8	82	70 - 130	48 * 30
Toluene	0.62	92.6	107	86	51.3	67.8	75	70 - 130	57 * 30
Trichloroethene (TCE)	ND	159	107	149 *	70.2	67.8	104	70 - 130	78 * 30
Trichlorofluoromethane (CFC 11)	ND	98.1	107	92	57.8	67.8	85	70 - 130	52 * 30
Vinyl Chloride	ND	91.2	107	85	54.7	67.8	81	70 - 130	50 * 30
cis-1,2-Dichloroethene	ND	97.5	107	91	55.8	67.8	82	70 - 130	54 * 30
cis-1,3-Dichloropropene	ND	87.3	107	82	51.2	67.8	75	70 - 130	52 * 30
m,p-Xylenes	ND	169	214	79	103	136	76	70 - 130	48 * 30
n-Butylbenzene	ND	76.9	107	72	46.9	67.8	69	* 70 - 130	49 * 30
n-Propylbenzene	ND	82.8	107	77	49.5	67.8	73	70 - 130	50 * 30
o-Xylene	ND	91.0	107	85	53.5	67.8	79	70 - 130	52 * 30
sec-Butylbenzene	ND	84.7	107	79	51.2	67.8	75	70 - 130	49 * 30
tert-Amyl Methyl Ether	ND	95.5	107	89	52.6	67.8	78	70 - 130	58 * 30
tert-Butylbenzene	ND	86.0	107	80	50.0	67.8	74	70 - 130	53 * 30
trans-1,2-Dichloroethene	ND	91.3	107	85	51.5	67.8	76	70 - 130	56 * 30

Comments:

### COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:

Northgate Environmental

Project:

Sample Matrix:

Tronox LLC Henderson/2027.001 Soil

Service Request: R0903678 Date Collected: 7/1/09

Date Received: 7/2/09 Date Analyzed: 7/8/09

**Matrix Spike Summary** Volatile Organic Compounds by GC/MS

Sample Name:

SA82-0.5B

Lab Code:

R0903678-007

Units: µg/Kg

Basis: Dry

Analytical Method: 8260B

	Sample		latrix Spike Q0905542-0			ate Matrix   20905542-0		% Rec		RPD
Analyte Name	Result	Result	Amount	% Rec	Result	Amount	% Rec	Limits	RPD	Limit
trans-1,3-Dichloropropene	ND	92.5	107	86	51.6	67.8	76	70 - 130	57	* 30

Comments:

LDC #: 21 4951 / SDG #: Su Gran

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

Page: 1\_of\_

Reviewer: C

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

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

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

										V			_{					r -	ľ	Γ	Ī	Γ		I
Qualifications	J-/45/P (1					MIS				'			Nogur LLSD	1 1										
Associated Samples	3-5 8 160281 MB				•	1,26,4 19,20 160447MB				10 13 161113 MB			11 15 18 21, 22 24-27	39	_									
RPD (Limits)	( )	( )	( )	( )	( )	( )	( )		( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )
LCSD %R (Limits)	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )
LCS %R (Limits)	59 (7K-1K)		(1) ST	( )	( )	73 (75-(25)	72 ( ) 27		( )	(521-32) &1	( )	( )	127 (75-125)	131 ( )	( ) ,	( )	( )	( )	( )	( )	( )	( )	( )	( )
Compound	777	TIT	FEE			117	AA			ba m			KKK	В										
TCS/FCSD ID	527 (8209)					160447 45				527 8/1191			871 758191											
# Date																								

LDC # 21495 II

SDG #:

## VALIDATION FINDINGS WORKSHEET Internal Standards

Page: Of Reviewer:\_ 2nd Reviewer:

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

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

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

N/A

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

Date		Sample ID	Internal Standard	a (Limits)	RT (Limits)	Qualifications
22	22		PFB	226 450 ( 229 238 -916 952	6952)	5/W5/A (i)
27	27		PFB 4 bcg	164617 161120 - 644478	-4 478 )	(1)
		11	name of the state			
28	28	1	PFB	35657 (215 453-	861810)	5/R/A (911,702) G)
			8±4	)	139 6854)	
			787	46888 (284607	(284 607 + 113 842C)	
			4 DCB	10845 (156782-	627 128)	<b>-</b>
		ட				
		_ 1				
		_				
		_				
						According to the second
		-				
		1				

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

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

(FBZ) = Fluorobenzene (# 23 ansugzed at 70x DL)

LDC # 21495 I) SDG #: 54 Cars

## VALIDATION FINDINGS WORKSHEET Compound Quantitation and CRQLs

Page: Reviewer: 2nd Reviewer:

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

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

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

		 	 			 _	 		 	
Qualifications	JAUB/A (e)									
Associated Samples										
Finding	K > cal range									
Sample ID	9, 12, 22, 29									
Date										
*					<u> </u>					

Comments: See sample calculation verification worksheet for recalculations

LDC#: 21495 I) SDG#: 24 (my)

## VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page: [ of ]
Reviewer: 30/2
2nd Reviewer:

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

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

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

*	Date	Semple ID	Finding	Associated Samples	Qualifications	
		9 12 22 29	K > al ray		(e) X/X	
		0 62 51 01	All except to ail			
		28	All TCL (IS outside limits)	binits)		
						T
						Ī
						Ī
						Γ
						T
Comments:	nents:					

LDC #: 21 495 I) SDG #: Sq Com

### VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	of	
Reviewer:	JVC	
2nd reviewer:	W	

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

YN N/A YN N/A Were field duplicate pairs identified in this SDG? Were target compounds detected in the field duplicate pairs?

	Concentrati	ion ( ug/Ey	
Compound	3	4	RPD
E	6.2	7.5	13 (= 27 Diff) 0.2 (= 6.7 Diff)
K	2.3	2.1	0.2 (=6.7 Diff)
	0.71	0.86	0.15

		Concentratio	n(45/58)	
Compound		17	18	RPD
I		.0	1-0-1.3	0.3 (= 13 Diff)
JJ	5 0	1.7 U	1.3	8.4 (= 9.7 Diff)
L	1	1.0	1.3	0,3 (£ 13 Diff)
F		6.6	39	32.4 (= 51 D)H)
k		170	270	45 (= 502 RPD)
E		9.7 U	1-0	8.7 (= 9.70iff)
		Concentratio	04	
Compound				RPD.
8				

	Concentration ( )	
Compound		RPD

Recutts U at MDL: # 17 JJJ = 0.664 E = 0.740

### 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 1, 2009

LDC Report Date:

October 2, 2009

Matrix:

Water

Parameters:

Volatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

M-12ABMS

M-12ABMSD

Sample Delivery Group (SDG): R0903561

### Sample Identification

M-75B

M-75BDL

TB062509-GW1

M-13AB

M-13009AB

M-64B

M-64BDI

TB062609-GW1

TB062609-W1

M-111AB

TB062909-GW1

EB062909-GW

M-25B

M-25BDL

TB063009-GW1

M-12AB

M-12ABDL

M-110B

TB070109-GW1

I-ARB

1

### Introduction

This data review covers 22 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

### I. Technical Holding Times

All technical holding time requirements were met.

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

### II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

### III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r²) were greater than or equal to 0.990.

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

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/18/09	2-Methyl-2-propanol	0.026 (≥0.05)	M-75BDL M-64BDL M-111AB TB062909-GW1 EB062909-GW M-25B M-25BDL TB063009-GW1 M-12AB M-12ABDL M-110B TB070109-GW1 I-ARB M-12ABMS M-12ABMS M-12ABMSD 160676MB 161065MB 16113MB	J (all detects) UJ (all non-detects)	А

### IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

Date	Compound	%D	Associated Samples	Flag	A or P
7/7/09	2,2-Dichloropropane Carbon tetrachloride trans-1,3-Dichloropropene	45.3 28.1 25.3	M-75B TB062509-GW1 M-13AB M-13009AB M-64B TB062609-GW1 TB062609-W1 160416MB	J+ (all detects) J+ (all detects) J+ (all detects)	А
7/10/09	Dichlorodifluoromethane	25.3	M-25BDL M-12ABDL M-12ABMS M-12ABMSD 161113MB	J+ (all detects)	А

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
7/8/09	2-Methyl-2-propanol	0.025 (≥0.05)	M-64BDL M-111AB TB062909-GW1 EB062909-GW 160676MB	J (all detects) UJ (all non-detects)	Α
7/9/09	2-Methyl-2-propanol	0.023 (≥0.05)	M-75BDL M-25B TB063009-GW1 M-12AB M-110B TB070109-GW1 I-ARB 161065MB	J (all detects) UJ (all non-detects)	А
7/10/09	2-Methyl-2-propanol	0.023 (≥0.05)	M-25BDL M-12ABDL M-12ABMS M-12ABMSD 161113MB	J (all detects) UJ (all non-detects)	А

### V. Blanks

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

Samples TB062509-GW1, TB062609-GW1, TB062609-W1, TB062909-GW1, TB063009-GW1, and TB070109-GW1 were identified as trip blanks. No volatile contaminants were found in these blanks with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
TB062509-GW1	6/25/09	Chloromethane Dichloromethane Toluene	0.25 ug/L 0.40 ug/L 0.27 ug/L	M-75B M-13AB M-13009AB
TB062609-GW1	6/26/09	Dichloromethane Toluene	0.26 ug/L 0.39 ug/L	M-64B M-64BDL
TB062909-GW1	6/29/09	Chloroform Dichloromethane Toluene	0.25 ug/L 0.36 ug/L 0.33 ug/L	M-111AB EB062909-GW
TB063009-GW1	6/30/09	Chloroform Dichloromethane Toluene	0.21 ug/L 0.43 ug/L 0.39 ug/L	M-25B M-25BDL M-12AB M-12ABDL

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
TB070109-GW1	7/1/09	Acetone Dichloromethane	2.1 ug/L 0.50 ug/L	M-110B I-ARB

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

Equipment Blank ID	Sampling Date	Compound	Concentration	Associated Samples
EB062909-GW	6/29/09	1,2-Dichloroethane Acetone Chlorobenzene Chloromethane Dichloromethane Tetrachloroethene Toluene	0.22 ug/L 4.9 ug/L 0.33 ug/L 0.25 ug/L 17 ug/L 1.2 ug/L 0.65 ug/L	No associated samples in this SDG

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

Sample	Compound	Reported Concentration	Modified Final Concentration
M-75B	Toluene	0.21 ug/L	0.21U ug/L
M-64B	Dichloromethane Toluene	0.24 ug/L 0.30 ug/L	0.24U ug/L 0.30U ug/L
EB062909-GW	Toluene	0.65 ug/L	0.65U ug/L
M-25B	Dichloromethane	0.45 ug/L	0.45U ug/L
M-12AB	Dichloromethane	0.21 ug/L	0.21U ug/L
I-ARB	Dichloromethane	0.45 ug/L	0.45U ug/L

### 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 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. Percent recoveries (%R) 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
160416LCS (M-75B TB062509-GW1 M-13AB M-13009AB M-64B TB062609-GW1 TB062609-W1 160416MB)	2,2-Dichloropropane Bromoform Carbon tetrachloride Chloromethane	153 (75-125) 127 (75-125) 131 (75-125) 126 (75-125)	-	- - -	J+ (all detects) J+ (all detects) J+ (all detects) J+ (all 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 project quantitation limits were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
M-75B M-64B M-25B M-12AB	Chloroform	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	А

All compounds reported below the PQL were qualified as follows:

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

Raw data were not reviewed for this SDG.

### XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

### XIV. System Performance

Raw data were not reviewed for this SDG.

### XV. Overall Assessment of Data

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-75B M-64B M-25B M-12AB	Chloroform	x	А
M-75BDL M-64BDL M-25BDL M-12ABDL	All TCL compounds except Chloroform	х	А

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

### XVI. Field Duplicates

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

Compound	Concentration (ug/L)					
	M-13AB	M-13009AB	RPD (Limits)	Difference (Limits)	Flags	A or P
1,1-Dichloroethane	2.9	2.9	-	0 (≤1.0)	-	-

	Concentra	tion (ug/L)		D:#			
Compound	M-13AB	M-13009AB	RPD (Limits)	Difference (Limits)	Flags	A or P	
1,1-Dichloroethene	1.4	1.3		0.1 (≤1.0)	-		
1,2-Dichloroethane	1.0U	0.20	-	0.8 (≤1.0)	-	-	
Acetone	2.0	2.4	-	0.4 (≤1.0)	-	-	
Chloroform	35	36	3 (≤30)	-	-	-	
Trichloroethene	23	25	8 (≤30)	-	-	-	

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

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903561	M-75BDL M-64BDL M-111AB TB062909-GW1 EB062909-GW M-25B M-25BDL TB063009-GW1 M-12AB M-12ABDL M-110B TB070109-GW1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Initial calibration (RRF) (c)
R0903561	M-75B TB062509-GW1 M-13AB M-13009AB M-64B TB062609-GW1 TB062609-W1	2,2-Dichloropropane Carbon tetrachloride trans-1,3-Dichloropropene	J+ (all detects) J+ (all detects) J+ (all detects)	A	Continuing calibration (%D) (c)
R0903561	M-25BDL M-12ABDL	Dichlorodifluoromethane	J+ (all detects)	A	Continuing calibration (%D) (c)
R0903561	M-64BDL M-111AB TB062909-GW1 EB062909-GW M-75BDL M-25B TB063009-GW1 M-12AB M-110B TB070109-GW1 I-ARB M-25BDL M-25BDL	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Continuing calibration (RRF) (c)
R0903561	M-75B TB062509-GW1 M-13AB M-13009AB M-64B TB062609-GW1 TB062609-W1	2,2-Dichloropropane Bromoform Carbon tetrachloride Chloromethane	J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects)	P	Laboratory control samples (%R) (l)
R0903561	M-75B M-64B M-25B M-12AB	Chloroform	J (all detects)	A	Project Quantitation Limit (PQL) (e)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903561	M-75B M-75BDL TB062509-GW1 M-13AB M-13009AB M-64B M-64BDL TB062609-GW1 TB062609-W1 M-111AB TB062909-GW1 EB062909-GW M-25B M-25BDL TB063009-GW1 M-12AB M-12ABDL M-110B TB070109-GW1 I-ARB	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (PQL) (sp)
R0903561	M-75B M-64B M-25B M-12AB	Chloroform	х	Α	Overall assessment of data (o)
R0903561	M-75BDL M-64BDL M-25BDL M-12ABDL	All TCL compounds except Chloroform	х	A	Overall assessment of data (o)

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

### No Sample Data Qualified in this SDG

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

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0903561	M-75B	Toluene	0.21U ug/L	А	bt
R0903561	M-64B	Dichloromethane Toluene	0.24U ug/L 0.30U ug/L	А	bt
R0903561	EB062909-GW	Toluene	0.65U ug/L	А	bt
R0903561	M-25B	Dichloromethane	0.45U ug/L	A	bt

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0903561	M-12AB	Dichloromethane	0.21U ug/L	Α	bt
R0903561	I-ARB	Dichloromethane	0.45U ug/L	A.	bt

### **Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET**

LDC #: 21495J1 SDG #: R0903561 Stage 2B

Laboratory: Columbia Analytical Services

Reviewer: 2nd Reviewer:

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

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: 6/25 _ 7/61/69
11,	GC/MS Instrument performance check	`A	,
III.	Initial calibration	W2	70 KSD 12
IV.	Continuing calibration/ICV	SW	COV = 25 3
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW)	
VIII.	Laboratory control samples	SW	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	Ä	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	SM	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	SW	D = 4,5
XVII.	Field blanks	SW	TB = 3,8 9 11 15 19 EB = 12 +B=

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

	000(10)						
1 1	M-75B	11 7	/ TB062909-GW1	21 4	M-12ABMS	31	160416 MB
2 3	M-75BDL	12 7	EB062909-GW <b>/</b>	22 4	M-12ABMSD	ر 32 ك	160676
<del>*</del> 1	TB062509-GW1	13	M-25B	23		_ 33 う	161005
4	M-13AB <i>b</i>	14 4	M-25BDL	24		34 4	161113
5 \	м-13009AB <i>b</i>	15 <b>}</b>	TB063009-GW1	25		35	
6 1	M-64B	16 <b>3</b>	M-12AB	26		36	
1	M-64BDL	17 4	M-12ABDL	27		37	
8 1	TB062609-GW1	18 🕏	M-110B	28		38	
9 1	TB062609-W1	19 3	TB070109-GW1	29		39	
10	M-111AB	20 3	I-ARB	30		40	

## **TARGET COMPOUND WORKSHEET**

METHOD: VOA (EPA SW 846 Method 8260B)

CCCC.1-Chlorohexane	DDDD. Isopropyl alcohol	EEEE. Aœtonitrile	FFFF. Acrolein	GGGG. Acrylonitrile	HHHH. 1,4-Dioxane	IIII. Isobutyl alcohol	JJJJ. Methacrylonitrile	KKKK. Propionitrile	LLLL. Ethyl ether	MMMM. Benzyl chloride	NNNN. 2-Thethyl-2-propanol	0000	, дерер.	2000.	RRRR.	SSSS.	TTTT.	uuuu.	ww.
III. n-Butylbenzene	JJJ. 1,2-Dichlorobenzene	KKK. 1,2,4-Trichlorobenzene	LLL. Hexachlorobutadiene	MMM. Naphthalene	NNN. 1,2,3-Trichlorobenzene	OOO. 1,3,5-Trichlorobenzene	PPP. trans-1,2-Dichloroethene	QQQ. cis-1,2-Dichloroethene	RRR. m,p-Xylenes	SSS. o-Xylene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	UUU. 1,2-Dichlorotetrafluoroethane	VVV. 4-Ethyltoluene	WWW. Ethanol	XXX. Di-isopropyl ether	YYY. tert-Butanol	ZZZ. tert-Butyl alcohol	AAAA. Ethyl tert-butyl ether	BBBB. tert-Amyl methyl ether
OO. 2,2-Dichloropropane	PP. Bromochloromethane	QQ. 1,1-Dichloropropene	RR. Dibromomethane	SS. 1,3-Dichloropropane	TT. 1,2-Dibromoethane	UU. 1,1,1,2-Tetrachloroethane	VV. Isopropylbenzene	WW. Bromobenzene	XX. 1,2,3-Trichloropropane	YY. n-Propyłbenzene	ZZ. 2-Chlorotoluene	AAA. 1,3,5-Trimethylbenzene	BBB. 4-Chlorotoluene	CCC. tert-Butylbenzene	DDD. 1,2,4-Trimethylbenzene	EEE. sec-Butylbenzene	FFF. 1,3-Dichlorobenzene	GGG. p-Isopropyltoluene	HHH. 1,4-Dichlorobenzene
U. 1,1,2-Trichloroethane	V. Benzene	W. trans-1,3-Dichloropropene	X. Bromoform⁴	Y. 4-Methyl-2-pentanone	Z. 2-Hexanone	AA. Tetrachloroethene	BB. 1,1,2,2-Tetrachloroethane*	CC. Toluene**	DD. Chlorobenzene*	EE. Ethylbenzene**	FF. Styrene	GG. Xylenes, total	HH. Vinyl acetate	II. 2-Chloroethylvinyl ether	JJ. Dichlorodifluoromethane	KK. Trichlorofluoromethane	LL. Methyl-tert-butyl ether	MM. 1,2-Dibromo-3-chloropropane	NN. Methyl ethyl ketone
A. Chloromethane*	B. Bromomethane	C. Vinyl choride**	D. Chloroethane	E. Mothylene-chloride	F. Acetone	G. Carbon disulfide	H. 1,1-Dichloroethene**	1. 1,1-Dichloroethane*	J. 1,2-Dichloroethene, total	K. Chloroform**	L. 1,2-Dichloroethane	M. 2-Butanone	N. 1,1,1-Trichloroethane	O. Carbon tetrachloride	P. Bromodichloromethane	Q. 1,2-Dichloropropane**	R. cis-1,3-Dichloropropene	S. Trichloroethene	T. Dibromochloromethane

<sup>\* =</sup> System performance check compounds (SPCC) for RRF; \*\* = Calibration check compounds (CCC) for %RSD.

21495 51	Se Grey
_DC #:_	SDG#:

## VALIDATION FINDINGS WORKSHEET Initial Calibration

Page: 1 of Reviewer: 2nd Reviewer:

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

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

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

Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's? Was a curve fit used for evaluation?  $\frac{1}{2}$ 

SDG #: 50 Cont LDC #: 2149[] )

## **VALIDATION FINDINGS WORKSHEET** Continuing Calibration

Page: of 1 Reviewer: 2nd Reviewer:

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

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

LDC #: 21495 J ) SDG #: See Com

VALIDATION FINDINGS WORKSHEET

Page: of 3 Reviewer: 36

2nd Reviewer:\_\_

Field Blanks

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

Y N /N/A Were field blanks identified in this SUC ?

Were target compounds detected in the field blanks?

Blank units: UO/L Associated sample units: UO/L As

Sample Identification Associated Samples: 0,21 Blank ID 0,25 Blank ID 3 0,27 0,40 Sampling Date 1/25/09  $^{\circ}$ ш Compound

6,54

Blank units: 49/L Associated sample units: 49/L Field blank (Trip Blank) Other.

Associated Samples: 6,7

Sample Identification 0, 24 /4 p/ oc '0 Blank ID Blank ID 8 6/26/69 0,39 0.26 Sampling Date  $\mathcal{I}$ 111 Compound

**VALIDATION FINDINGS WORKSHEET** 

Field Blanks

Page: Lof ? Reviewer: TVC 2nd Reviewer:

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

SDG #: Sy Comy LDC#: 21495J

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: 49 /L Associated sample units: 45 /L Associated Sample uni

ntification								
Sample Identification								
							-	
				<i>y</i>				
	12		(Z)	n/59.0				
	٥	(te	)					
D						<b></b>		
Blank ID								
Blank ID	6/29/09	0.25	0.36	0.33				
	Sampling Date	X	m	3				
Compound								

FB Blank units: 49/L Associated sample units: 45/L Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other.

Associated Samples:

						-			
ntification	i.								
Sample Identification									
	<i>L</i> 04		n/4/3						
Blank ID									
 Blank ID 12 Blank ID	Sampling Date 6/21/09	0, 22	4.9	66.0	0,25	17	1,2	59'0	
punc	Sampling Date	٦	4	aq	#	Œ	AA	25	
Compound									

LDC#: 21495 J / SDG#: 3cc (max)

## **VALIDATION FINDINGS WORKSHEET** Field Blanks

Page: 3 of 3

Reviewer: 27/2 2nd Reviewer: 9

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

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: 49 /L Associated sample units: 46 /L
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other:

Sample Identification Associated Samples: (80 (80) 0.21/4 (%) (%) 590 0.45/y  $\bar{v}$ 200 Blank ID Blank ID (S 6/30/04 0.39 0,43 0.2/ Sampling Date m  $\beta$ Compound

Associated Samples: Blank units: 49 /L Associated sample units: 45 /L Field blank type: (circle one) Field Blank / Rinsate / (frip Blank) Other: 45 M

20

								-	
}	_								
S	ntification								
Associated Samples:	Sample Identification								
ASSOCI									
or:									
o blarigy Orne		20	( <del>4</del> )	n/s+0	/				
/ Kilisate / (Liti	Blank ID								
) Fleid bialik	Blank ID 19	7/01/69	2,1	0, 50					
Field brank type: (circle one) Field brank / Kinsale /(Trip brank) Other.	Compound	Sampling Date 7/61 /69	#	Ŧ					
Jei									

LDC#: 21495 J / SDG#: Sec Gray

## VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Reviewer:

2nd Reviewer:\_

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

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

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

MS/MSD. Soil / Water.

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

L								
#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		21/12	スス	( )	134 (76-120)		16,17	No good (Msin
		,	J	)	(1) 581	_		
				( )	(	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	)	( )		
				( )		( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		Compound	puni	QC Lim	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
	Ŧ	1,1-Dichloroethene		-65	59-172%	< 22%	61-145%	<u>&lt;</u> 14%
	S.	Trichloroethene		-65-	62-137%	< 24%	71-120%	< 14%
	>	Benzene		-99	66-142%	< 21%	76-127%	< 11%
	S S	Toluene		-65	59-139%	< 21%	76-125%	< 13%
	DD.	Chlorobenzene		-09	60-133%	< 21%	75-130%	< 13%

LDC#: 21495 J/ SDG#: 24 Cons

## VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: 1 of 1 Reviewer: 3VC 2nd Reviewer:

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

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

X N N/A

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

*	Date	CCS/LCSD ID	Compound	LCS %R (Umits)	nits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		160416 LCS	00	153 (75-125)	5-125	( )	(	1.3-689	3+dets/P (2)
			×	127 (	( '	( )	(	+ 160416 MB	
			0	131 (	_	( )	)		
			<b>∀</b>	126 (		(			
				<i>\</i>	_				
,				_	^	( )			
		161113 168	MM	73 (.	<u></u>	( )		14 17 16 1113 MB	No serval (MS /MS)
أنيا				,	_	,	( )		0
				)		( )	( )		
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LDC #: 2/495 J1 SDG#:

## VALIDATION FINDINGS WORKSHEET Compound Quantitation and CRQLs

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

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

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

Y N MA

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

*	Date	Sample ID	Finding	Associated Samples	Qualifications	
		01 8 10	K > cu range		Joots 1A	(e)
		1		5		

Comments: See sample calculation verification worksheet for recalculations

LDC# 21495 J/

# VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page: of L

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

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

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?

*	Deta	Sample ID	Finding	Associated Samples	Qualifications	dons
		91 ' 61 ' 9 ' 1	24 1	anze	X/A	(a)
		7				
		\(\frac{1}{4}\)\'\\	All except K di	7.7	<b>→</b>	+
]						
						•
S	Comments:					

LDC #: <u>21415</u> ]| SDG #: <u>200</u> Comer

#### VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:	of
Reviewer:	346
2nd reviewer:	<del>***</del>

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

Y	Ν	N/A
$\mathbf{\nabla}$	N	N/A

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

	Concentration	on 49/L,	
Compound	4	5	RPD
I	2.9	2.9	0 (\le 1.0 Diff)
Н	1.4	1.3	0.1
L	1.04	0, 20	0,8
F	2,0	2.4	0,4 V
. k	35	36	3 (= 30 3 RPD)
S	23	25	8
	Concentration	on (	
Compound			RPD

	Concentration ( )	
Compound		RPD

	Concentration ( )	
Compound		RPD

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

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

**Collection Date:** 

June 25 through June 30, 2009

LDC Report Date:

September 28, 2009

Matrix:

Soil/Water

Parameters:

Volatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903584

#### Sample Identification

SA202-28B

TB062509-SQ1

TB062509-SO1RE

RSAI3-10B

RSAI3-20B

RSAI3-32B

SA188-0.5B

SA172-0.5B

TB062609-SO1

TB062609-SO1RE

SA41-0.5B

SA44-0.5B

SA42-0.5B

RSAI2-10B

RSAI2009-10B

TB062609-SO2

TB062609-SO2RE

RSAI2-20B

RSAI2-31B

RSAJ2-10B

RSAJ2-20B

RSAJ2-33B

RSAJ2009-33B

EB062609-SO

EB062609-SORE

TB063009-SO2

TB063009-SO2RE

SA202-10B

#### Introduction

This data review covers 18 soil samples and 10 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

- J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.
- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- B The analytical result may be a false positive totally attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.
- JB The analytical result may be biased high and partially attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.
- JK The analytical result is an estimated maximum possible concentration (EMPC).
- X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.
- J-TDS The analytical result is estimated based on failure of the Total Dissolved Solids (TDS) correctness check performed in accordance with the Standard Method 1030E.
- J-CAB The analytical result is estimated based on failure of the cation-anion balance correctness check performed in accordance with Standard Method 1030E.
- J-TDS & CAB The analytical result is unreliable based on the failure of the cation-anion balance and TDS correctness check performed in accordance with standard Method 1030F.
- 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 Analysis	Required Holding Time (in Days) From Sample Collection Until Analysis	Flag	A or P
TB062509-SO1 TB062609-SO1RE	All aromatic compounds	12	7	J- (all detects) UJ (all non-detects)	Р
TB062609-SO1 TB062609-SO2 EB062609-SO	All aromatic compounds	11	7	J- (all detects) UJ (all non-detects)	Р
TB062509-SO1RE	All TCL compounds	26	14	J- (all detects) UJ (all non-detects)	Р
TB062609-SO2RE EB062609-SORE	All TCL compounds	25	14	J- (all detects) UJ (all non-detects)	Р
TB063009-SO2RE	All TCL compounds	21	14	J- (all detects) UJ (all non-detects)	Р

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

#### II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

#### III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

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

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/18/09	2-Methyl-2-propanol	0.026 (≥0.05)	TB062509-SO1RE TB062609-SO1RE TB062609-SO2RE EB062609-SORE TB063009-SO2RE 160676MB 162407MB	J (all detects) UJ (all non-detects)	А

#### IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

Date	Compound	%D	Associated Samples	Flag	A or P
6/29/09	Dichlorodifluoromethane Trichlorofluoromethane Acetone 2,2-Dichloropropane	27.5 33.0 25.2 26.7	SA202-28B RSAI3-10B RSAI3-20B RSAI3-32B SA188-0.5B SA172-0.5B SA41-0.5B SA44-0.5B SA42-0.5B RSAI2-10B 159618MB	J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects)	
7/7/09	2,2-Dichloropropane Carbon tetrachloride trans-1,3-Dichloropropene	45.3 28.1 25.3	TB062509-SO1 TB062609-SO1 TB062609-SO2 EB062609-SO TB063009-SO2 160416MB	J+ (all detects) J+ (all detects) J+ (all detects)	А

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
7/8/09	2-Methyl-2-propanol	0.025 (≥0.05)	TB062609-SO1RE 160676MB	J (all detects) UJ (all non-detects)	А
7/21/09	2-Methyl-2-propanol	0.023 (≥0.05)	TB062509-SO1RE TB062609-SO2RE EB062609-SORE TB063009-SO2RE 162407MB	J (all detects) UJ (all non-detects)	А

#### V. Blanks

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

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
159618MB	6/29/09	Acetone	2.8 ug/Kg	SA202-28B RSAI3-10B RSAI3-20B RSAI3-32B SA188-0.5B SA172-0.5B SA41-0.5B SA44-0.5B SA42-0.5B RSAI2-10B
159999MB	7/1/09	Acetone	2.3 ug/Kg	RSAI2009-10B RSAI2-20B RSAI2-31B RSAJ2-10B RSAJ2-20B RSAJ2-33B RSAJ2009-33B
160052MB	7/2/09	Acetone	2.7 ug/kg	SA202-10B

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
SA188-0.5B	Acetone	3.6 ug/L	3.6U ug/L
SA41-0.5B	Acetone	3.2 ug/L	3.2U ug/L

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
SA44-0.5B	Acetone	2.4 ug/L	2.4U ug/L
RSAI2009-10B	Acetone	4.3 ug/L	4.3U ug/L

Samples TB062509-SO1, TB062509-SO1RE, TB062609-SO1, TB062609-SO1RE, TB062609-SO2, TB062609-SO2RE, TB063009-SO2, and TB063009-SO2RE were identified as trip blanks. No volatile contaminants were found in these blanks with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
TB062509-SO1	6/25/09	Methylene chloride Toluene	0.30 ug/L 0.58 ug/L	SA202-28B RSAI3-10B RSAI3-20B RSAI3-32B
TB062509-SO1RE	6/25/09	Methylene chloride 2-Methyl-2-propanol	0.26 ug/L 1.4 ug/L	SA202-28B RSAI3-10B RSAI3-20B RSAI3-32B
TB062609-SO1	6/26/09	Acetone Chloroform Methylene chloride Toluene	16 ug/L 0.53 ug/L 0.87 ug/L 0.26 ug/L	SA188-0.5B SA172-0.5B SA41-0.5B SA44-0.5B SA42-0.5B RSAI2-10B RSAI2-20B RSAI2-20B RSAI2-31B RSAJ2-10B RSAJ2-20B RSAJ2-33B RSAJ2-33B RSAJ2-33B
TB062609-SO1RE	6/26/09	Acetone Methylene chloride 2-Butanone	18 ug/L 2.8 ug/L 1.5 ug/L	SA188-0.5B SA172-0.5B SA41-0.5B SA44-0.5B SA42-0.5B RSA12-10B RSA12-20B RSA12-20B RSA12-31B RSAJ2-10B RSAJ2-10B RSAJ2-33B RSAJ2-33B RSAJ2009-33B

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
TB062609-SO2	6/26/09	Methylene chloride Toluene	0.23 ug/L 0.39 ug/L	SA188-0.5B SA172-0.5B SA41-0.5B SA44-0.5B SA42-0.5B RSA12-10B RSA12-10B RSA12-20B RSA12-20B RSA12-31B RSAJ2-10B RSAJ2-33B RSAJ2-33B RSAJ2-33B
TB062609-SO2RE	6/26/09	Methylene chloride Toluene	0.23 ug/L 0.26 ug/L	SA188-0.5B SA172-0.5B SA41-0.5B SA44-0.5B SA42-0.5B RSAI2-10B RSAI2-20B RSAI2-20B RSAI2-31B RSAJ2-10B RSAJ2-20B RSAJ2-33B RSAJ2-33B RSAJ2009-33B
TB063009-SO2	6/30/09	Methylene chloride Toluene	0.37 ug/L 0.46 ug/L	SA202-10B
TB063009-SO2RE	6/30/09	Methylene chloride Toluene 2-Methyl-2-propanol	0.29 ug/L 0.21 ug/L 1.4 ug/L	SA202-10B

Samples EB062609-SO and EB062609-SORE were identified as equipment blanks. No volatile contaminants were found in these blanks with the following exceptions:

Equipment Blank ID	Sampling Date	Compound	Concentration	Associated Samples
EB062609-SO	6/26/09	Acetone Toluene	1.6 ug/L 0.24 ug/L	RSAI2-10B RSAI2-009-10B RSAI2-20B RSAI2-31B RSAJ2-10B RSAJ2-20B RSAJ2-33B RSAJ2-33B

Equipment Blank ID	Sampling Date	Compound	Concentration	Associated Samples
EB062609-SORE	6/26/09	Acetone 2-Methyl-2-propanol	8.1 ug/L 1.2 ug/L	RSAI2-10B RSAI2009-10B 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 volatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072109-SO	7/21/09	Acetone Bromoform	3.7 ug/L 0.28 ug/L	SA202-28B RSAI3-10B RSAI3-20B RSAI3-32B RSAI2-10B RSAI2-20B RSAI2-20B RSAI2-31B RSAJ2-10B RSAJ2-10B RSAJ2-33B RSAJ2-33B RSAJ2-09-33B SA202-10B

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

Sample	Compound	Reported Concentration	Modified Final Concentration
RSAI3-10B	Toluene	0.71 ug/L	0.71U ug/L
RSAI3-20B	Toluene	0.54 ug/L	0.54U ug/L
RSAI3-32B	Toluene	0.63 ug/L	0.63U ug/L
	Acetone	7.2 ug/L	7.2U ug/L
SA188-0.5B	Acetone	3.6 ug/L	3.6U ug/L
	Methylene chloride	0.78 ug/L	0.78U ug/L
	Toluene	0.76 ug/L	0.76U ug/L
SA172-0.5B	Acetone	6.0 ug/L	6.0U ug/L
	Methylene chloride	1.4 ug/L	1.4U ug/L

Sample	Compound	Reported Concentration	Modified Final Concentration
SA41-0.5B	Acetone	3.2 ug/L	3.2U ug/L
	Methylene chloride	1.6 ug/L	1.6U ug/L
SA44-0.5B	Acetone	2.4 ug/L	2.4U ug/L
	Methylene chloride	1.0 ug/L	1.0U ug/L
SA42-0.5B	Acetone	5.8 ug/L	5.8U ug/L
	Methylene chloride	1.2 ug/L	1.2U ug/L
RSAI2-10B	Acetone Chloroform Methylene chloride Toluene	6.4 ug/L 0.68 ug/L 0.52 ug/L 0.51 ug/L	6.4U ug/L 0.68U ug/L 0.52U ug/L 0.51U ug/L
RSAI2009-10B	Acetone Chloroform Methylene chloride Toluene	4.3 ug/L 0.40 ug/L 0.33 ug/L 0.27 ug/L	4.3U ug/L 0.40U ug/L 0.33U ug/L 0.27U ug/L
RSAI2-20B	Acetone	9.1 ug/L	9.1U ug/L
	Methylene chloride	0.40 ug/L	0.40U ug/L
	Toluene	0.34 ug/L	0.34U ug/L
RSAI2-31B	Acetone	36 ug/L	36U ug/L
	Methylene chloride	0.90 ug/L	0.90U ug/L
RSAJ2-10B	Acetone	7.9 ug/L	7.9U ug/L
RSAJ2-20B	Acetone	24 ug/L	24U ug/L
	2-Butanone	2.6 ug/L	2.6U ug/L
RSAJ2-33B	Acetone	10 ug/L	10U ug/L
RSAJ2009-33B	Acetone	21 ug/L	21U ug/L
SA202-10B	Methylene chloride	0.65 ug/L	0.65U ug/L
	Toluene	0.35 ug/L	0.35U ug/L
	Acetone	7.4 ug/L	7.4U ug/L

#### VI. Surrogate Spikes

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

#### VII. Matrix Spike/Matrix Spike Duplicates

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

#### VIII. Laboratory Control Samples (LCS)

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

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
159618LCS	1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene 1,2-Dibromo-3-chloropropane Bromoform Hexachlorobutadiene	72 (75-125) 74 (75-125) 70 (75-125) 73 (75-125) 71 (75-125)	SA202-28B RSAI3-10B RSAI3-20B RSAI3-32B SA188-0.5B SA172-0.5B SA41-0.5B SA44-0.5B SA42-0.5B RSAI2-10B 159618MB	J- (all detects) UJ (all non-detects)	Р
159999LCS	Acetone	133 (75-125)	RSAI2009-10B RSAI2-20B RSAI2-31B RSAJ2-10B RSAJ2-20B RSAJ2-33B RSAJ2009-33B 159999MB	J+ (all detects)	Р
159999LCS	Hexachlorobutadiene	67 (75-125)	RSAI2009-10B RSAI2-20B RSAI2-31B RSAJ2-10B RSAJ2-20B RSAJ2-33B RSAJ2009-33B 159999MB	J- (all detects) UJ (all non-detects)	Р
160052LCS	Vinyl chloride	130 (75-125)	SA202-10B 160052MB	J+ (all detects)	Р
160416LCS	2,2-Dichloropropane Bromoform Carbon tetrachloride Chloromethane	153 (75-125) 127 (75-125) 131 (75-125) 126 (75-125)	TB062509-SO1 TB062609-SO1 TB062609-SO2 EB062609-SO 160416MB	J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects)	Р

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
162407LCS	2-Hexanone 4-Methyl-2-pentanone	70 (75-125) 70 (75-125)	TB062509-SO1RE TB062609-SO2RE EB062609-SORE 162407MB	J- (all detects) UJ (all non-detects)	Р

#### IX. Regional Quality Assurance and Quality Control

Not applicable.

#### X. Internal Standards

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

#### XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

#### XII. Project Quantitation Limit

All 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 R0903584	All compounds reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

#### XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

#### XIV. System Performance

Raw data were not reviewed for this SDG.

#### XV. Overall Assessment of Data

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
TB062509-SO1RE TB062609-SO1RE TB062609-SO2RE EB062609-SORE TB063009-SO2RE	All TCL compounds	x	А

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

#### XVI. Field Duplicates

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

	Concentra	ition (ug/Kg)				
Compound	RSAI2-10B	RSAI2009-10B	RPD (Limits)	Difference (Limits)	Flags	A or P
Acetone	6.4	4.3	-	2.1 (≤16)	-	<u>-</u>
Chloroform	0.68	0.40	-	0.28 (≤4.1)	-	-
Methylene chloride	0.52	0.33	<u>.</u>	0.19 (≤4.1)	+	-
Dimethylphthalate	0.51	0.27	-	0.24 (≤4.1)	-	-

	Concentrat	ion (ug/Kg)				
Compound	RSAJ2-33B	RSAJ2009-33B	RPD (Limits)	Difference (Limits)	Flags	A or P
1,1-Dichloroethane	2.2	2.2	-	0 (≤9.6)	-	-
1,2-Dichlorobenzene	9.7	1.5	-	8.2 (≤9.6)	-	-
1,2-Dichloroethane	1.2	1.4	-	0.2 (≤9.6)	-	-
1,4-Dichlorobenzene	10	1.6	-	8.4 (≤9.6)	-	-
Acetone	10	21	-	11 (≤38)	-	-
Benzene	0.70	9.6U	-	8.9 (≤9.6)	-	-
Chlorobenzene	210	2.8	-	207 (≤9.6)	J (all detects)	А

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

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903584	TB062509-SO1 TB062609-SO1RE TB062609-SO1 TB062609-SO2 EB062609-SO	Benzene Toluene Chlorobenzene Ethylbenzene Styrene Isopropylbenzene Bromobenzene n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,3-Trichlorobenzene 1,2,3-Trichlorobenzene m,p-Xylenes o-Xylene Naphthalene	J- (all detects) UJ (all non-detects)	Р	Technical holding times (h)
R0903584	TB062509-SO1RE TB062609-SO2RE EB062609-SORE TB063009-SO2RE	All TCL compounds	J- (all detects) UJ (all non-detects)	Р	Technical holding times (h)
R0903584	TB062509-SO1RE TB062609-SO1RE TB062609-SO2RE EB062609-SORE TB063009-SO2RE	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Initial calibration (RRF) (c)
R0903584	SA202-28B RSAI3-10B RSAI3-20B RSAI3-32B SA188-0.5B SA172-0.5B SA41-0.5B SA44-0.5B SA42-0.5B RSAI2-10B	Dichlorodifluoromethane Trichlorofluoromethane Acetone 2,2-Dichloropropane	J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects)	Α	Continuing calibration (%D) (c)
R0903584	TB062509-SO1 TB062609-SO1 TB062609-SO2 EB062609-SO TB063009-SO2	2,2-Dichloropropane Carbon tetrachloride trans-1,3-Dichloropropene	J+ (all detects) J+ (all detects) J+ (all detects)	А	Continuing calibration (%D) (c)

25.0					D (0.4)
SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903584	TB062509-SO1RE TB062609-SO1RE TB062609-SO2RE EB062609-SORE TB063009-SO2RE	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Continuing calibration (RRF) (c)
R0903584	SA202-28B RSAI3-10B RSAI3-20B RSAI3-32B SA188-0.5B SA172-0.5B SA41-0.5B SA44-0.5B SA42-0.5B RSAI2-10B	1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene 1,2-Dibromo-3-chloropropane Bromoform Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (I)
R0903584	RSAI2009-10B RSAI2-20B RSAI2-31B RSAJ2-10B RSAJ2-20B RSAJ2-33B RSAJ2009-33B	Acetone	J+ (all detects)	Р	Laboratory control samples (%R) (l)
R0903584	RSAI2009-10B RSAI2-20B RSAI2-31B RSAJ2-10B RSAJ2-20B RSAJ2-33B RSAJ2009-33B	Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (l)
R0903584	SA202-10B	Vinyl chloride	J+ (all detects)	Р	Laboratory control samples (%R) (I)
R0903584	TB062509-SO1 TB062609-SO1 TB062609-SO2 EB062609-SO	2,2-Dichloropropane Bromoform Carbon tetrachloride Chloromethane	J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects)	Р	Laboratory control samples (%R) (l)
R0903584	TB062509-SO1RE TB062609-SO2RE EB062609-SORE	2-Hexanone 4-Methyl-2-pentanone	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903584	SA202-28B TB062509-SO1 TB062509-SO1RE RSAI3-10B RSAI3-20B RSAI3-32B SA188-0.5B SA172-0.5B TB062609-SO1RE SA41-0.5B SA44-0.5B SA44-0.5B SA42-0.5B RSAI2-0.5B RSAI2-10B RSAI2-0.5B RSAI2-10B RSAI2-10B RSAI2-31B RSAI2-20B RSAI2-31B RSAJ2-33B RSAJ2-33B RSAJ2-33B RSAJ2-33B RSAJ2-33B RSAJ2-009-SO EB062609-SO EB062609-SO EB062609-SO EB063009-SO TB063009-SO TB063009-SO TB063009-SO SA202-10B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (PQL) (sp)
R0903584	TB062509-SO1RE TB062609-SO1RE TB062609-SO2RE EB062609-SORE TB063009-SO2RE	All TCL compounds	х	А	Overall assessment of data (o)
R0903584	RSAJ2-33B RSAJ2009-33B	Chlorobenzene	J (all detects)	A	Field duplicates (Difference) (fd)

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

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0903584	SA188-0.5B	Acetone	3.6U ug/L	А	bl
R0903584	SA41-0.5B	Acetone	3.2U ug/L	А	bl
R0903584	SA44-0.5B	Acetone	2.4U ug/L	А	bl
R0903584	RSAI2009-10B	Acetone	4.3U ug/L	А	bl

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

	Sample	Compound	Modified Final Concentration	Code
R0903584	RSAI3-10B	Toluene	0.71U ug/L	bt
R0903584	RSAI3-20B	Toluene	0.54U ug/L	bt
R0903584	RSAI3-32B	Toluene	0.63U ug/L	bt
R0903584	RSAI3-32B	Acetone	7.2U ug/L	bf
R0903584	SA188-0.5B	Acetone Methylene chloride Toluene	3.6U ug/L 0.78U ug/L 0.76U ug/L	bt
R0903584	SA172-0.5B	Acetone Methylene chloride	6.0U ug/L 1.4U ug/L	bt
R0903584	SA41-0.5B	Acetone Methylene chloride	3.2U ug/L 1.6U ug/L	bt
R0903584	SA44-0.5B	Acetone Methylene chloride	2.4U ug/L 1.0U ug/L	bt
R0903584	SA42-0.5B	Acetone Methylene chloride	5.8U ug/L 1.2U ug/L	bt
R0903584	RSAI2-10B	Acetone	6.4U ug/L	bt,be,bf
R0903584	RSAI2-10B	Chloroform Methylene chloride Toluene	0.68U ug/L 0.52U ug/L 0.51U ug/L	bt
R0903584	RSAI2009-10B	Acetone	4.3U ug/L	bt,be,bf
R0903584	RSAI2009-10B	Chloroform Methylene chloride	0.40U ug/L 0.33U ug/L	bt
R0903584	RSAI2009-10B	Toluene	0.27U ug/L	bt,be
R0903584	RSAI2-20B	Acetone Toluene	9.1U ug/L 0.34U ug/L	bt,be
R0903584	RSAI2-20B	Methylene chloride	0.40U ug/L	bt

	Sample	Compound	Modified Final Concentration	Code
R0903584	RSAI2-31B	Acetone Methylene chloride	36U ug/L 0.90U ug/L	bt
R0903584	RSAJ2-10B	Acetone	7.9U ug/L	bt,be
R0903584	RSAJ2-20B	Acetone 2-Butanone	24U ug/L 2.6U ug/L	bt
R0903584	RSAJ2-33B	Acetone	10U ug/L	bt,be
R0903584	RSAJ2009-33B	Acetone	21U ug/L	bt
R0903584	SA202-10B	Methylene chloride Toluene	0.65U ug/L 0.35U ug/L	bt
R0903584	SA202-10B	Acetone	7.4U ug/L	bf

#### **Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET**

LDC #: 21495K1 R0903584 SDG #:

Stage 2B

Page: \of Reviewer:

from R0904016

2nd Reviewer:

Laboratory: Columbia Analytical Services

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

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	SN)	Sampling dates: 6/25 - 30 /09
11.	GC/MS Instrument performance check	A	·
111.	Initial calibration	SN)	3 RSD IY
IV.	Continuing calibration4eV	SW	COV = 25 }
V.	Blanks	SW.	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	Client Spec
VIII.	Laboratory control samples	SW	Client spec LCS
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	SW)	
XVI.	Field duplicates	SW	$D_{r} = 14, 15$ $D_{r} = 22, 23$
XVII.	Field blanks	SW	7B = 2,3 9, 10 16, 17 26 27 EB = 24 25

Note:

A = Acceptable

N = Not provided/applicable SW = See worksheet

→ ND = No compounds detected

R = Rinsate

D = Duplicate TB = Trip blank

FB = Field blank EB = Equipment blank

Validated Samples:

	Soil	+	W	iter					
1 (	SA202-28B	S	11	SA41-0.5B <b>ζ</b>	2	21 5	RSAJ2-20B	31	1 15 9618 MB
įγ	TB062509-SO1	₩	12	SA44-0.5B	2	<sub>22</sub> S	RSAJ2-33B D7	32	7 16 0416
3 <b>3</b>	TB062509-SO1RE	l	13 \	SA42-0.5B	2	23 \$	RSAJ2009-33B D 🗸 🔍	33	3 162407
4 1	RSAI3-10B	Ś	14	RSAI2-10B $\mathcal{D}_1$	2	<sub>24</sub> 2	EB062609-SO h	34 /	4 160676
5 1	RSAI3-20B		<sub>15</sub> 5	RSAI2009-10B <i>D</i>	12	25 <b>3</b>	EB062609-SORE	35	15 9999
<sub>6</sub> 1	RSAI3-32B		16 <sup>2</sup>	TB062609-SO2 W	2	26 <b>2</b>	TB063009-SO2	36	6 160052
7	SA188-0.5B		173	TB062609-SO2RE	2	27 <b>3</b>	TB063009-SO2RE	37	
8	SA172-0.5B		185	RSAI2-20B	2	28 <b>£</b>	SA202-10B	38	
9 <b>7</b>	TB062609-SO1	W	19	RSAI2-31B	2	29		39	
10 <b>4</b>	TB062609-SO1RE	J	20 t	RSAJ2-10B	/ 3	30		40	

(no IW)

## TARGET COMPOUND WORKSHEET

# METHOD: VOA (EPA SW 846 Method 8260B)

A. Chloromethane*	U. 1,1,2-Trichloroethane	OO. 2,2-Dichloropropane	III. n-Butylbenzene	CCCC.1-Chlorohexane
B. Bromomethane	V. Benzene	PP. Bromochloromethane	JJJ. 1,2-Dichlorobenzene	DDDD. Isopropyl alcohol
C. Vinyl choride**	W. trans-1,3-Dichloropropene	QQ. 1,1-Dichloropropene	KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
D. Chloroethane	X. Bromoform*	RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF, Acrolein
E. Mathylone chlothde han e	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG. Acrylonitrile
F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN. 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
G. Carbon disulfide	AA. Tetrachioroethene	UU. 1,1,1,2-Tetrachloroethane	OOO. 1,3,5-Trichlorobenzene	IIII. Isobutyl alcohol
H. 1,1-Dichloroethene**	BB. 1,1,2,2-Tetrachloroethane*	VV. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
I. 1,1-Dichloroethane*	CC. Toluene**	WW. Bromobenzene	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
J. 1,2-Dichloroethene, total	DD. Chlorobenzene⁴	XX. 1,2,3-Trichloropropane	RRR. m,p-Xylenes	LLLL. Ethyl ether
K. Chloroform**	EE. Ethylbenzene**	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
L. 1,2-Dichloroethane	FF. Styrene	ZZ. 2-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN. 2-Methyl-2-propanol
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	dddd
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	9999.
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
Q. 1,2-Dichloropropane**	KK. Trichlorofluoromethane	EEE. sec-Butylbenzene	YYY. tert-Butanol	SSSS.
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohol	TTTT.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-Isopropyltoluene	AAAA. Ethyl tert-butyl ether	บบบบ.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	ww.

<sup>\* =</sup> System performance check compounds (SPCC) for RRF; \*\* = Calibration check compounds (CCC) for %RSD.



LDC #:_	2/40	15K1
SDG #:		

#### VALIDATION FINDINGS WORKSHEET Technical Holding Times

Page:_	of
Reviewer:_	Jyc
2nd Reviewer:	

All circled dates have exceeded the technical holding times.

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

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
<u> </u>	W	N	6/25/09	<b>—</b>	7/07/09	12	J-/4J/
1,16,24			6/26/69			11	7137
o					7/08/09	12	
						CA	ronatics
7, 25 7			6/25/09 6/26/09 6/20/09		7/21/09	26	J-/WJ/P
7,25			6/26/09			26 25	
7			6/20/09			21	
							(A1) tow
	<del></del>						
	•						

#### **TECHNICAL HOLDING TIME CRITERIA**

Water unpreserved:

Aromatic within 7 days, non-aromatic within 14 days of sample collection.

Water preserved: Soil:

Both within 14 days of sample collection. Both within 14 days of sample collection.

SDG #: Su Gard LDC # 21 495 KI

## **VALIDATION FINDINGS WORKSHEET Initial Calibration**

Page: \ of ) Reviewer:\_

2nd Reviewer:\_

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

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

Did the laboratory perform a 5 point calibration prior to sample analysis? Y) N/A

Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's? Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation?  $\frac{r^2 z_0}{r^3}$ ,  $\frac{q}{r^3}$ 

Did the initial calibration meet the acceptance criteria? 

Were all %RSDs and RRFs within the validation criteria of <30 %RSD and >0 05 RRF ?

					 _		 	 	 	 				 	 
Qualifications	J/45/A (C)	,										THE PROPERTY OF THE PROPERTY O			
Associated Samples	10 160676 MB.	3 17 25 27 162407MB	`												
Finding RRF (Limit: 20.05)	0,026														
Finding %RSD (Limit: <30.0%)											· · · · · · · · · · · · · · · · · · ·				
Compound	NNNN												 		
Standard ID Compound (Limit: <30.0%) (Limit: <0.05)	1CAL														
# Date	6/8//9	-													
#															

SDG# SPC Cover LDC#: 21 495 KJ

## VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page: 1 of Reviewer:\_

2nd Reviewer:

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

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

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

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

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

*	Date	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	50/67/2	M 9060	(+) JJ (+)	27.5		1, 4-8 11-14 159618MB	マナタ
	-		KK (+)	33.0		, , ,	
			(÷) #	25.2			
			(+) 00	7.92			
				,			
	7/07/09	X 26 77	(+) 00	45,3		2,9 16. 24 26, 160416MB	CMB STACE/A
			(+) 0	28.1			
			ĭ (+)	25.3			7
T							
	7/08/09	B9295	フィスス		٥, ٥٤٢	10 160676 MB	3 M3 A
	`						
	7/21/09	B 9651	NNNN		0,023	3, 17, 25, 27, 162407MB	B JANJA V
П							

**VALIDATION FINDINGS WORKSHEET** 

LDC # 21 4 9CK

SDG#:

Page: | of \(\foatsigma\)

Reviewer: No

2nd Reviewer:

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

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

Was a method blank associated with every sample in this SDG? AN NA

Was a method blank analyzed at least once every 12 hours for each matrix and concentration?

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

Blank analysis date: 6/24/64 Conc. units:

Associated Samples: 1, 4-8, 11-14

				001011111111111111111111111111111111111				
Compound	Blank ID				Sa	Sample Identification		
	159618 MB	+		1	<u>\lambda</u>			
<u>Methylene ehle</u> ride ≠	2.8	(F)	3.6/4	3,2/4	2,4 /4			
Acetone								
			CAII	thers	V MB)			
CRO								
Blank analysis date: 7/0) /09 Conc. units:	6		As	Associated Samples:	15 18 - 23	-23	00000 pp. 000000 pp. 00000 pp. 000000 pp. 00000 pp. 000000 pp. 00000 pp. 000000 pp. 00000 pp. 000000 pp. 00000 pp. 000000 pp. 00000 pp. 0000000 pp. 00000 pp. 00000 pp. 00000 pp. 00000 pp. 00000 pp. 00000 pp	
Compound	Blank ID				Sa	Sample Identification	1000000	
	159999 MB	72						
Methylene chloride	2,3	4.3/4						
Acetone			All other	others > MA)	(AM)			

LDC# >1 4G5 K1 SDG#:\_\_

# VALIDATION FINDINGS WORKSHEET

Blanks

Page: Yof Reviewer: JVC

2nd Reviewer:

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

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

Was a method blank associated with every sample in this SDG? Was a method blank analyzed at least once every 12 hours for each matrix and concentration? Was there contamination in the method blanks? If yes, please see the qualifications below.

Blank analysis date: 7 /02/04 Conc. units:

V N N/A M/N M/A Associated Samples:

Compound	Blank ID	Sample Identification
	160052 MB	(
Methylene chloride	7.ح	(> Mx)
Acetone		
CROI		

Blank analysis date: \_ Conc. units:

Compound         Blank ID         Sample Identification           Methylene chloride         Acetone         Image: CROIL Institute of the control of the chloride of the	Conc. units:		Associated Samples:
Vene chloride	Compound	Blank ID	
Metrlylene chloride         Acetone         CROJ.			
Acetone         Acetone         CRO!         CRO!         CRO         <	Methylene chloride		
CRO!	Acetone		
CRO!			
CROI			
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CROI			
	CROI		

VALIDATION FINDINGS WORKSHEET

Field Blanks

2 of\_ Reviewer: Page:

2nd Reviewer:

\* (pe)

NO # 15 12

14-15, 18-23

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

21 405 KI See Car

> LDC #:\_ SDG #:

Were field blanks identified in this SDG?

Y N/N/A

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

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

R

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0.4/2 4.3/4 0.27/4 4.0 0.12 Sample Identification Associated Samples: Blank ID 25 j ∞ \_\_\_ Blank ID 24 0.24 Sampling Date. NNNN Ŝ Compound

Associated Samples: \$ 56 Z Some Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: Associated sample units: Blank units:

(be)

16.7

ntification	23	(2)					
Sample Identification	22	h/01					
	2/	(77)	(2.6)				
	aze	7.9/4	,				
	, 61	(36)	(68.0)				
Blank ID X	60/ 20/	8,)		てリ			
Blank ID 24	/ 1	1.6	0,24				
punc	Sampling Date	1	22	NNNN			
Compound							

SDG #: 24 Corey LDC # 21 495 K)

**VALIDATION FINDINGS WORKSHEET** Field Blanks

Page: 4 of 4
Reviewer: 376

2nd Reviewer:

14 15 18-23

Associated Samples: 1, 28,

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)
Y N/N/A Were field blanks identified in this SDG

Were field blanks identified in this SDG?

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

_	7	1	T	T	T	T		Г	_	7			1	11	<del>T -</del>	<del>T -</del>	<del></del>	 <del>,</del>	<del>-</del>	_	_
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ification											*	ification									
Sample Identification	15	4,3/4		· > FB)							Associated Samples:	Sample Identification									<del></del>
	14	6.4 /4	-	N ND X							Associa										······································
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	18	7.4/4		CAII others						/kg	lank/ Other:		28	0,65/U	0.35 /4						
lank ID	;	7.								nits.	insate / (Trip E	Blank ID 27	100	0, 29 0	0.21 0	1.4					
FB 073109-S0 Blank ID Blank ID	7/21 69	3.7	0.28							ated sample	ield Blank / R	Blank ID 26 B	6/30 /00	0.57	0.46						
Compound	The Contract		×							S: 49 A Associ	Field blank type: (circle one) Field Blank / Rinsate / (Frig Blank) Other:	Compound	s samolini Date	4	3	とととと					:
		- <del>-</del>	0.56							Blank unit	Field blan	J	AND THE PROPERTY OF THE PROPER	74							
	<u>څ</u>	7.4	ဝ											0.74							

LDC#: 21495 K) SDG #:

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

Page: Reviewer: 2nd Reviewer:

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

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

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

NNW   72 (75-125)   (	*	Date	CCS/LCSD ID	Compound	LCS %R (Limits)		LCSD %R (Limits)	RPD (Limits)	Associated Samples	Quelifications	
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LCS C				777	)	_	( )	( )		J-/43	
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LCS : $06 \cdot 152$ ( ) ( ) ( ) $\frac{2}{10416}$ $\frac{34}{1045}$ $\frac{31}{10416}$ $\frac{1}{104}$ $\frac{34}{1045}$ $\frac{31}{10416}$ $\frac{3}{104}$ $\frac{3}{10416}$ $\frac{3}{104}$	$\exists$		1	ر ر	130 (		( )	( )		A CT3	
LCS $\begin{array}{cccccccccccccccccccccccccccccccccccc$	寸					^	( )	( )			
LCS $\begin{array}{cccccccccccccccccccccccccccccccccccc$					)	^	^ )	( )			
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$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	一			0	131 (	,	( )	( )			
LCS Z $70$ ( ) ( ) ( ) $356.73$ &S $70$ ( ) $162407$ Mb ( ) ( ) $1624$	$\exists$			A	126 (	(	( )	( )	<u> </u>	1	
LCS Z $70$ ( ) ( ) ( ) $3 \times 78 \times 17 \times S$ , ( ) $16 \times 40 \times 7 \times S$ , ( ) $16 \times 40 \times 7 \times S$ , ( ) $( )$ ( ) $( )$					)	)	( )	( )			
LCS Z $70$ ( ) ( ) $356.1745$ , $70$ ( ) $162407Mb$					)	,	( )	( )			
(				Z	) 01	<u> </u>	( )	( )	3741745.	J-/45/P	
	$\dashv$			χ	70 (	( /	( )	( )	162407MB	. 1	
	1	•			`	<u> </u>	( )	( )			
					)	_	( )	( )			Γ

SDG #: 54 Core

# VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page: 1 of 1
Reviewer: 3/2

Reviewer:

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

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

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 10 17 25 27	sun withmitus		(2)	
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Comments:	nents:					

LDC #: 21 495k1 SDG #: Sy Come

### VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:	of
Reviewer:	JVL
2nd reviewer:	

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

Y N N/A X N N/A Were field duplicate pairs identified in this SDG? Were target compounds detected in the field duplicate pairs?

	Concentration	4 45/kg,	
Compound	14	15	RPD
F	6,4	4.3	2.1 (£160iff)
k	0.68	0.40	0.28 (=4.1 Diff)
ŧ	0.52	0,33	0.19
CE	0.51	0,27	0.24

		Concentration	on (ug/kg)	Parent
Compound		22	23	RPD only
	Į l	2.2	2.2	0 (=9.6 Diff)
	JJJ	9.7	1,5	8.2
	L	1.2	1.4	0, 2
	HHH	10	1.6	8.4
	E l	10	21	11 (= 38 Diff)
	٧	0.70	9,6 U	8.9 (£9.6 DiH)
		Concentratio	n/	
Compound				RPD
	bb	210	2,8	207 (=9.6 Diff) Johnto
		-		

	Concentration ( )	
Compound		RPD

**VALIDATION FINDINGS WORKSHEET** 

Field Blanks

SDG #: See Conner LDC#21495 K)

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

(62)

Were field blanks identified in this SDG? METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

Were target compounds detected in the field blanks?

Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other Were field blanks identified in mis or NN N/A Were target compounds detected in Blank units: 49 /L Associated sample units:

contd

10/11/21/4 24/4 4 g 6.90/4 36/4 Sample Identification 1.3 0,89 Associated Samples: 4.1/4 0,34/4 0,40/4 <u>∞</u> 0.73/4 0.40/4 4.3/4 4 0.27 0.26 0.23 0.23 0.39 Blank ID 10 ה ה *1*, ∞ ∞ Blank ID 6,53 0.20 0.87 ىلا Z

(FF) Associated Samples: Field blank type: (circle one) Field Blank / Rinsate /(Trip Blank / Other Associated sample units: Blank units: 43

ntification							
Sample Identification							
	74		0.24/11				
Blank 4D							
Blank ID Blank ID	6/26/09	24.0	0,39				
pund	Sampling	ſΩ	B				
Compound							

LDC # 21495 K1 SDG #: Sed Corry

# **VALIDATION FINDINGS WORKSHEET** Field Blanks

Page: 1 of 2 Reviewer: WZ

2nd Reviewer:

(bt)

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

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

Y N/A

Blank units: 1/9/L Associated sample units: 1/9/kg Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: V N N/A Blank units:

Associated Samples: 1, 4 - 6, 38 28 July Sample Identification 0,63 6.7 古,0 0.67 0.71/4 0.98 t 0.26 Blank ID Blank ID Y 69/21/3 0,30 0.58 Samolini Dales NNNN M

Ļ Blank units: Wolf Associated sample units: Wolfey Field blank type: (circle one) Field Blank / Bingate Trin Blank

Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other:	e one) Field Blank / Rinsate	/ Rinsate/Tr	p Blank/ Oth	er:	Assoc	Associated Samples:		7 8 11-15 18-23 (6t)	18-23	(pt)
Compound	Blank ID 9	Blank ID 10	91	17		Sample to	Sample Identification			
Samuling	7	/ 3	20 /69		٦	8	-	12	12	4
44	9	×/			3.6 /4	6.0 /u	3.2/4		2 4 / 1 5 4 / 1 6 4 / 11	(4/11)
¥	0.53				5	5/2	6/-		7.0.7	5/1:
Tu	0.87	2,8	0.23	0.23	0.78/4	0.78/4 1.4 /4	7 7 7 1	1.7	- 2	0,68/4
33	0, 20		0.39	70. *		2	5/9:	701	1,0/4 1.4/4 0,52/4	4/25'0
3	,			0.26	2.16/1					n' 15'0
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# 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

SA69-10B

SA69-29B SA206-30BMS

**SA206-30BMSD** 

Matrix:

Soil/Water

Parameters:

Volatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903729

# Sample Identification

SA206-0.5B

SA206-10B

SA206-25B

SA206-25BDL

SA206-30B

RSAK4-10B

RSAK4-20B

RSAK4-31B

TB070609-SO

RSAL4-0.5B

RSAL4009-0.5B

RSAL4009-0.5BRE

TB070709-S1

RSAL4-10B

RSAL4-28B

RSAL4-28BDL

SA100-10B

SA100-30B

SA100-30BDL

SA69-0.5B

### Introduction

This data review covers 15 soil samples and 9 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

## I. Technical Holding Times

All technical holding time requirements were met.

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

## II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

### III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r²) were greater than or equal to 0.990.

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

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/18/09	2-Methyl-2-propanol	0.026 (≥0.05)	SA206-25BDL SA206-30B TB070609-SO TB070709-S1 RSAL4-28BDL SA100-30BDL SA69-29B	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 with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
7/10/09	Dichlorodifluoromethane	25.3	TB070609-SO TB070709-S1 161113MB	J+ (all detects)	А
7/15/09	Acetone	26.7	SA206-25BDL 161553MB	J- (all detects) UJ (all non-detects)	А
7/17/09	Acetone	30.2	SA206-30B RSAL4-28BDL SA100-30BDL SA69-29B SA206-30BMS SA206-30BMSD 161952MB	J- (all detects) UJ (all non-detects)	А

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
7/10/09	2-Methyl-2-propanol	0.023 (≥0.05)	TB070609-SO TB070709-S1 161113MB	J (all detects) UJ (all non-detects)	А
7/15/09	2-Methyl-2-propanol	0.024 (≥0.05)	SA206-25BDL 161553MB	J (all detects) UJ (all non-detects)	А
7/17/09	2-Methyl-2-propanol	0.023 (≥0.05)	SA206-30B RSAL4-28BDL SA100-30BDL SA69-29B SA206-30BMS SA206-30BMSD 161952MB	J (all detects) UJ (all non-detects)	A

### V. Blanks

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

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
161394MB	7/14/09	Acetone	3.2 ug/Kg	SA206-0.5B SA206-10B SA206-25B RSAK4-20B RSAK4-31B
161553MB	7/15/09	2-Butanone	120 ug/Kg	SA206-25BDL
161557MB	7/15/09	1,3,5-Trimethylbenzene 4-Methyl-2-pentanone Acetone	0.34 ug/Kg 0.87 ug/Kg 4.3 ug/Kg	RSAK4-10B RSAL4009-0.5B RSAL4-10B RSAL4-28B SA100-30B
161786MB	7/16/09	Acetone	4.0 ug/Kg	RSAL4-0.5B RSAL4009-0.5BRE SA100-10B SA69-0.5B SA69-10B
161952MB	7/17/09	2-Butanone	120 ug/Kg	SA206-30B RSAL4-28BDL SA100-30BDL 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
SA206-0.5B	Acetone	5.3 ug/Kg	5.3U ug/Kg
RSAK4-20B	Acetone	4.1 ug/Kg	4.1U ug/Kg
RSAK4-31B	Acetone	4.2 ug/Kg	4.2U ug/Kg
SA206-25BDL	2-Butanone	170 ug/Kg	170U ug/Kg
RSAL4009-0.5B	Acetone	6.0 ug/Kg	6.0U ug/Kg
RSAL4-0.5B	Acetone	6.8 ug/Kg	6.8U ug/Kg

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
SA69-0.5B	Acetone	6.4 ug/Kg	6.4U ug/Kg
SA206-30B	2-Butanone	140 ug/Kg	140U ug/Kg
RSAL4-28BDL	2-Butanone	150 ug/Kg	150U ug/Kg
SA100-30BDL	2-Butanone	99 ug/Kg	99U ug/Kg
SA69-29B	2-Butanone	150 ug/Kg	150U ug/Kg

Samples TB070609-SO and TB070709-S1 were identified as trip blanks. No volatile contaminants were found in these blanks with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
TB070609-SO	7/6/09	Acetone Dichloromethane Toluene Chloroform	2.9 ug/L 0.68 ug/L 0.45 ug/L 0.28 ug/L	SA206-0.5B SA206-10B SA206-25B SA206-25BDL SA206-30B RSAK4-10B RSAK4-20B RSAK4-31B
TB070709-S1	7/7/09	Chloroform Dichloromethane	0.22 ug/L 0.40 ug/L	RSAL4-0.5B RSAL4009-0.5B RSAL4009-0.5BRE RSAL4-10B RSAL4-28B RSAL4-28BDL SA100-10B SA100-30B SA100-30BDL SA69-0.5B SA69-10B SA69-29B

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

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072109-SO	7/21/09	Acetone Bromoform	3.7 ug/L 0.28 ug/L	All soil 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 with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
SA206-0.5B	Acetone	5.3 ug/Kg	5.3U ug/Kg
	Dichloromethane	0.48 ug/Kg	0.48U ug/Kg
	Toluene	0.28 ug/Kg	0.28U ug/Kg
SA206-10B	Dichloromethane	1.0 ug/Kg	1.0U ug/Kg
	Toluene	0.51 ug/Kg	0.51U ug/Kg
SA206-25B	Dichloromethane	1.0 ug/Kg	1.0U ug/Kg
RSAK4-10B	Dichloromethane	0.36 ug/Kg	0.36U ug/Kg
	Toluene	0.29 ug/Kg	0.29U ug/Kg
RSAK4-20B	Acetone	4.1 ug/Kg	4.1U ug/Kg
	Dichloromethane	0.30 ug/Kg	0.30U ug/Kg
	Toluene	0.26 ug/Kg	0.26U ug/Kg
RSAK4-31B	Acetone	4.2 ug/Kg	4.2U ug/Kg
	Dichloromethane	0.45 ug/Kg	0.45U ug/Kg
	Toluene	0.31 ug/Kg	0.31U ug/Kg
RSAL4-0.5B	Chloroform	0.23 ug/Kg	0.23U ug/Kg
	Dichloromethane	0.59 ug/Kg	0.59U ug/Kg
	Acetone	6.8 ug/Kg	6.8U ug/Kg
RSAL4009-0.5B	Dichloromethane	0.29 ug/Kg	0.29U ug/Kg
	Acetone	6.0 ug/Kg	6.0U ug/Kg
SA69-0.5B	Acetone	6.4 ug/Kg	6.4U ug/Kg

# 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
RSAL4009-0.5BRE	Dibromofluoromethane	141 (70-130)	All TCL compounds	J+ (all detects)	Α

## 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 or MSD percent recoveries (%R) were not within QC limits for several compounds, the LCS 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 <sub>.</sub> (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
161394LCS (SA206-0.5B SA206-10B SA206-25B RSAK4-20B RSAK4-31B 161394MB)	1,2,4-Trichlorobenzene Styrene Vinyl chloride	127 (75-125) 127 (75-125) 130 (75-125)	<u>-</u> -	- - -	J+ (all detects) J+ (all detects) J+ (all detects)	P
161786LCS (RSAL4-0.5B RSAL4-009-0.5BRE SA100-10B SA69-0.5B SA69-10B 161786MB)	Acetone	127 (75-125)	-	-	J+ (all detects)	Р

## IX. Regional Quality Assurance and Quality Control

Not applicable.

### X. Internal Standards

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

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
RSAL4009-0.5B	Pentafluorobenzene 1,4-Difluorobenzene	215002 (215453-861810) 347576 (349214-1396854)	Chloromethane Bromomethane Vinyl chloride Chloroethane Dichloromethane Acetone 1,1-Dichloroethane Chloroform 2-Butanone 1,1,1-Trichloroethane Dichlorodifluoromethane Trichlorofluoromethane Methyl-tert-butyl ether 2,2-Dichloropropane Bromochloromethane trans-1,2-Dichloroethene cis-1,2-Dichloroethene Di-isopropyl ether tert-Amyl-methyl ether 2-Methyl-tert-butyl ether 2-Methyl-2-propanol 1,2-Dichloroethane Carbon tetrachloride Bromodichloromethane 1,2-Dichloropropane cis-1,3-Dichloropropene Trichloroethene Benzene 1,1-Dichloropropene Dibromomethane	J (all detects) UJ (all non-detects)	A

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
RSAL4-28B	Pentafluorobenzene 1,4-Dichlorobenzene-d4	129619 (215453-861810) 138138 (156782-627128)	Chloromethane Bromomethane Vinyl chloride Chloroethane Dichloromethane Acetone 1,1-Dichloroethane 1,1-Dichloroethane Chloroform 2-Butanone 1,1,1-Trichloroethane Dichlorodifluoromethane Trichlorofluoromethane Trichlorofluoromethane Methyl-tert-butyl ether 2,2-Dichloropropane Bromochloromethane trans-1,2-Dichloroethene cis-1,2-Dichloroethene Di-isopropyl ether tert-Amyl-methyl ether 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene 1,2,4-Trimethylbenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2-Dichlorobenzene 1,2-Trichlorobenzene 1,2-Trichlorobenzene 1,2-Trichlorobenzene 1,2,3-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene 2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A
RSAL4009-0.5BRE	Pentafluorobenzene 1,4-Difluorobenzene Chlorobenzene-d5 1,4-Dichlorobenzene-d4	14752 (205089-820356) 24723 (333000-1332000) 23807 (272391-1089562) 12164 (149468-597872)	All TCL compounds	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 project quantitation limits were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
SA206-25B	Chlorobenzene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	А
RSAL4-28B SA100-30B	Chloroform	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 R0903729	All compounds reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

# XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

# XIV. System Performance

Raw data were not reviewed for this SDG.

### XV. Overall Assessment of Data

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
SA206-25B	Chlorobenzene	X	А
SA206-25BDL	All TCL compounds except Chlorobenzene	x	A
RSAL4-28B SA100-30B	Chloroform	х	А
RSAL4-28BDL SA100-30BDL	All TCL compounds except Chloroform	×	А
RSAL4009-0.5BRE	All TCL compounds	X	А

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 and samples RSAL4-0.5B and RSAL4009-0.5BRE were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concentration (ug/Kg)			-		
Compound	RSAL4-0.5B	RSAL4009-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P
1,2-Dichlorobenzene	0.26	0.25	-	0.01 (≤3.3)	-	-
Acetone	6.8	6.0	-	0.8 (≤13)	-	-
Chloroform	0.23	3.3U	-	3.07 (≤3.3)	-	_
Chlorobenzene	3.3U	0.64	-	2.66 (≤3.3)	-	-
Dichloromethane	0.59	0.29	-	0.3 (≤3.3)	-	-
Toluene	0.44	0.23	-	0.21 (≤3.3)	-	· _

	Concentration (ug/Kg)		222	DDD D''		
Compound	RSAL4-0.5B	RSAL4009-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P
1,2-Dichlorobenzene	0.26	3.7U	· <b>-</b>	3.44 (≤3.7)	-	-
Acetone	6.8	38	-	31.2 (≤15)	J (all detects)	Α
Chloroform	0.23	3.7U	-	3.47 (≤3.7)	-	-
Dichloromethane	0.59	3.7U	-	3.11 (≤3.7)	-	-
Toluene	0.44	3.7U	-	3.26 (≤3.7)	-	-
Naphthalene	3.3U	1.4	-	1.9 (≤3.3)	-	-

# Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Data Qualification Summary - SDG R0903729

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903729	SA206-25BDL SA206-30B TB070609-SO TB070709-S1 RSAL4-28BDL SA100-30BDL SA69-29B	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Initial calibration (RRF) (c)
R0903729	TB070609-SO TB070709-S1	Dichlorodifluoromethane	J+ (all detects)	А	Continuing calibration (%D) (c)
R0903729	SA206-25BDL SA206-30B RSAL4-28BDL SA100-30BDL SA69-29B	Acetone	J- (all detects) UJ (all non-detects)	А	Continuing calibration (%D) (c)
R0903729	TB070609-SO TB070709-S1 SA206-25BDL SA206-30B RSAL4-28BDL SA100-30BDL SA69-29B	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Continuing calibration (RRF) (c)
R0903729	RSAL4009-0.5BRE	All TCL compounds	J+ (all detects)	А	Surrogate spikes (%R) (s)
R0903729	SA206-0.5B SA206-10B SA206-25B RSAK4-20B RSAK4-31B	1,2,4-Trichlorobenzene Styrene Vinyl chloride	J+ (all detects) J+ (all detects) J+ (all detects)	Р	Laboratory control samples (%R) (I)
R0903729	RSAL4-0.5B RSAL4009-0.5BRE SA100-10B SA69-0.5B SA69-10B	Acetone	J+ (all detects)	Р	Laboratory control samples (%R) (I)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903729	RSAL4009-0.5B	Chloromethane Bromomethane Vinyl chloride Chloroethane Dichloromethane Acetone 1,1-Dichloroethane Chloroform 2-Butanone 1,1,1-Trichloroethane Dichlorodifluoromethane Trichlorofluoromethane Methyl-tert-butyl ether 2,2-Dichloropropane Bromochloromethane trans-1,2-Dichloroethene Di-isopropyl ether tert-Amyl-methyl ether 2-Methyl-2-propanol 1,2-Dichloroethane Carbon tetrachloride Bromodichloromethane 1,2-Dichloropropane cis-1,3-Dichloropropane cis-1,3-Dichloropropane cis-1,3-Dichloropropane Trichloroethene Benzene 1,1-Dichloropropene Dibromomethane	J (all detects) UJ (all non-detects)		Internal standards (area) (i)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903729	RSAL4-28B	Chloromethane Bromomethane Vinyl chloride Chloroethane Dichloromethane Acetone 1,1-Dichloroethane Chloroform 2-Butanone 1,1,1-Trichloroethane Dichlorodifluoromethane Trichlorofluoromethane Methyl-tert-butyl ether 2,2-Dichloropropane Bromochloromethane trans-1,2-Dichloroethene cis-1,2-Dichloroethene Di-isopropyl ether tert-Amyl-methyl ether 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene 1,2,4-Trimethylbenzene 1,2,4-Trimethylbenzene 1,2-Dichlorobenzene 1,2-Dichlorobenzene 1,4-Dichlorobenzene 1,2-Dichlorobenzene 1,2-Dichlorobenzene 1,2-Trichlorobenzene 1,2-Trichlorobenzene 1,2-Trichlorobenzene 1,2-Trichlorobenzene 1,2-Trichlorobenzene 1,2-Trichlorobenzene 1,2,3-Trichlorobenzene Naphthalene 1,2,3-Trichlorobenzene 2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A .	Internal standards (area) (i)
R0903729	RSAL4009-0.5BRE	All TCL compounds	J (all detects) R (all non-detects)	Α	Internal standards (area) (i)
R0903729	SA206-25B	Chlorobenzene	J (all detects)	Α	Project Quantitation Limit (e)
R0903729	RSAL4-28B SA100-30B	Chloroform	J (all detects)	Α	Project Quantitation Limit (e)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903729	SA206-0.5B SA206-10B SA206-25B SA206-25BDL SA206-30B RSAK4-10B RSAK4-20B RSAK4-31B TB070609-SO RSAL4-0.5B RSAL4-09-0.5B RSAL4009-0.5BRE TB070709-S1 RSAL4-10B RSAL4-28B RSAL4-28BDL SA100-10B SA100-30B SA100-30B SA100-30BDL SA69-0.5B SA69-10B SA69-29B	All compounds reported below the PQL.	J (all detects)	Α	Project Quantitation Limit (PQL) (sp)
R0903729	SA206-25B	Chlorobenzene	Х	A	Overall assessment of data (o)
R0903729	SA206-25BDL	All TCL compounds except Chlorobenzene	Х	А	Overall assessment of data (o)
R0903729	RSAL4-28B SA100-30B	Chloroform	Х	А	Overall assessment of data (o)
R0903729	RSAL4-28BDL SA100-30BDL	All TCL compounds except Chloroform	Х	Α	Overall assessment of data (o)
R0903729	RSAL4009-0.5BRE	All TCL compounds	Х	А	Overall assessment of data (o)
R0903729	RSAL4-0.5B RSAL4009-0.5BRE	Acetone	J (all detects)	A	Field duplicates (RPD) (fd)

# Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Laboratory Blank Data Qualification Summary - SDG R0903729

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0903729	SA206-0.5B	Acetone	5.3U ug/Kg	A	bl
R0903729	RSAK4-20B	Acetone	4.1U ug/Kg	А	bl

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0903729	RSAK4-31B	Acetone	4.2U ug/Kg	А	bl
R0903729	SA206-25BDL	2-Butanone	170U ug/Kg	А	bl
R0903729	RSAL4009-0.5B	Acetone	6.0U ug/Kg	А	bl
R0903729	RSAL4-0.5B	Acetone	6.8U ug/Kg	A	bl
R0903729	SA69-0.5B	Acetone	6.4U ug/Kg	А	bl
R0903729	SA206-30B	2-Butanone	140U ug/Kg	А	bl
R0903729	RSAL4-28BDL	2-Butanone	150U ug/Kg	А	bl
R0903729	SA100-30BDL	2-Butanone	99U ug/Kg	А	bl
R0903729	SA69-29B	2-Butanone	150U ug/Kg	А	bl

# Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Field Blank Data Qualification Summary - SDG R0903729

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0903729	SA206-0.5B	Acetone	5.3U ug/Kg	А	bt, bf
R0903729	SA206-0.5B	Dichloromethane Toluene	0.48U ug/Kg 0.28U ug/Kg	А	bt
R0903729	SA206-10B	Dichloromethane Toluene	1.0U ug/Kg 0.51U ug/Kg	Α	bt
R0903729	SA206-25B	Dichloromethane	1.0U ug/Kg	Α	bt
R0903729	RSAK4-10B	Dichloromethane Toluene	0.36U ug/Kg 0.29U ug/Kg	А	bt
R0903729	RSAK4-20B	Acetone	4.1U ug/Kg	А	bt, bf
R0903729	RSAK4-20B	Dichloromethane Toluene	0.30U ug/Kg 0.26U ug/Kg	А	bt

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0903729	RSAK4-31B	Acetone	4.2U ug/Kg	А	bt, bf
R0903729	RSAK4-31B	Dichloromethane Toluene	0.45U ug/Kg 0.31U ug/Kg	Α	bt
R0903729	RSAL4-0.5B	Chloroform Dichloromethane	0.23U ug/Kg 0.59U ug/Kg	Α	bt
R0903729	RSAL4-0.5B	Acetone	6.8U ug/Kg	А	bf
R0903729	RSAL4009-0.5B	Dichloromethane	0.29U ug/Kg	А	bt
R0903729	RSAL4009-0.5B	Acetone	6.0U ug/Kg	А	bf
R0903729	SA69-0.5B	Acetone	6.4U ug/Kg	А	bf

# Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #: 21495L1 SDG #: R0903729

Stage 2B

Page:\_\_lo
Reviewer:\_\_9
2nd Reviewer:\_\_4

Laboratory: Columbia Analytical Services

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

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	<u> </u>	Sampling dates: 7/66 — 07/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	SW	
IV.	Continuing calibration46V	SW	Ca 4 25 2
V.	Blanks	SW	
VI.	Surrogate spikes	Sn)	
VII.	Matrix spike/Matrix spike duplicates	SW	M-12AB from R0907561
VIII.	Laboratory control samples	SW	4C5/p
IX.	Regional Quality Assurance and Quality Control	N	, , , , , , , , , , , , , , , , , , ,
Χ.	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	SW	$D_1 = 10, 11$ $D_2 = 10, 12$ $TB = 9, 13$ $FB = Fb072109 -50$ from R0904016
XVII.	Field blanks	SW	TB = 9 13 FB = Fb072109 -50

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 + water

	1	7	SA206-0.5B	Ş	11 4	RSAL4009-0.5B <b>9</b> ,	ې	21 5	SA69-10B	5 31 1	161113	mb
2	2	7	SA206-10B		12 5	RSAL4009-0.5BRE <b>2</b>	<b>2</b>	22 6	SA69-29B	32 7	161394	
3	3	7	SA206-25B		13	TB070709-S1	'n	23 6	SA206-30BMS	33 3	161553	
4	ı	3	SA206-25BDL		14 4	RSAL4-10B		24 6	SA206-30BMSD	1344	161557	
٤	5	6	SA206-30B		15 <b>4</b>	RSAL4-28B		25		<del>1</del> 35 5	161786	
e	3 4	4	RSAK4-10B		166	RSAL4-28BDL		26		7 <sub>36</sub> 6	161952	· 1
7	7	7	RSAK4-20B		175	SA100-10B		27		37		
٤	3	7	RSAK4-31B	$\perp$	18	SA100-30B		28		38		
و	)	1	TB070609-SO	W	196	SA100-30BDL		29		39		
1	10	5	RSAL4-0.5B D D	٤,	20 5	SA69-0.5B	V	30		40		

# TARGET COMPOUND WORKSHEET

# METHOD: VOA (EPA SW 846 Method 8260B)

A. Chloromethane*	U. 1,1,2-Trichloroethane	OO. 2,2-Dichloropropane	III. n-Butylbenzene	CCCC.1-Chlorohexane
B. Bromomethane	V. Benzene	PP. Bromochloromethane	JJJ. 1,2-Dichlorobenzene	DDDD. Isopropyi alcohol
C. Vinyl choride**	W. trans-1,3-Dichloropropene	QQ_1,1-Dichloropropene	KKK. 1,2,4-Trichlorobenzene X	EEEE. Acetonitrile
D. Chloroethane	X. Bromoform*	RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF. Acrolein
E. Methylono chlorido	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG. Acrylonitrile
F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN. 1,2,3-Trichlorobenzene	НННН. 1,4-Dioxane
G. Carbon disulfide	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachloroethane	OOO. 1,3,5-Trichlorobenzene	IIII. Isobutyl alcohol
H. 1,1-Dichloroethene**	BB. 1,1,2,2-Tetrachloroethane* X	VV. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
I. 1,1-Dichloroethane*	CC. Toluene**	WW. Bromobenzene	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
J. 1,2-Dichloroethene, total	DD. Chlorobenzene*	XX. 1,2,3-Trichloropropane	RRR. m,p-Xylenes	LLLL. Ethyl ether
K. Chloroform**	EE. Ethylbenzene**	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
L. 1,2-Dichloroethane	FF. Styrene	ZZ. 2-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN. 2-Methyl-2- propand
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene 🗡	UUU. 1,2-Dichlorotetrafluoroethane	0000.
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	РРРР.
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	<u>aaaa.</u>
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene 🗡	XXX. Di-isopropyl ether	ARRR.
Q. 1,2-Dichloropropane**	KK. Trichlorofluoromethane	EEE. sec-Butylbenzene	YYY. tert-Butanol	SSSS.
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohol	TTTT.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-Isopropyltoluene	AAAA. Ethyl tert-butyl ether	unuu.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	ww.

<sup>\* =</sup> System performance check compounds (SPCC) for RRF; \*\* = Calibration check compounds (CCC) for %RSD. 785

PBF DFB

X- 4008

LDC #: 21495 LI SDG#:

# VALIDATION FINDINGS WORKSHEET Initial Calibration

Page: Reviewer:\_ 2nd Reviewer.\_

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

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

X N N/A

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

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

Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation?\_ X N N/A

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

_		Well all Michael and Michael a					
		<b>£1</b>	Compound	Finding %RSD (Limit: <30.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
<u> </u>	18/8/9		7777		0,026	45,913 16.19 27	5/113 A (C)
		7 10				16 1113 MB	
_						161553MB	
				-		161952 MB	
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SDG #: Se (m LDC #: 21495 L)

# **VALIDATION FINDINGS WORKSHEET** Continuing Calibration

Page: of Reviewer: 2nd Reviewer:

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

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

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

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

Y N N/A

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

*	Date	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications	
	4/10/69	b1347	JJ (+)	25.3		9 13 161113MB	JTHEFTA (C)	A
	,	,	7		0,023	~	J/MJ /A	T
								T
T			ı					T
	7/15/69	B9468	( <u>(</u> )	26.7		4 161553 MB	J-/NJ /A	T
			NNN	,	0.024		5/M5 /A	Ī
								T
	7/7/69	क्ष व इक्ट	( <del>-</del> )	20,2		5, 16, 19, 22-24	J-/hJ /A	
	,	-	ZZZZ		8.023	161952 MB	J. Mrs A	
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17 24	Core
214	20
DC#:	SDG #:_

# **VALIDATION FINDINGS WORKSHEET** Blanks

Page: 1 of 3 2nd Reviewer:\_ Reviewer:

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

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

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

Conc. units:

(XZ)

6.4

YN N/A Was a method blank analyzed at least once every 12 hours for each matrix and concentration?
YN N/A Was there contamination in the method blanks? If yes, please see the qualifications below. 1-3 Associated Samples:

	di di								
Compound	Blank ID				S	Sample Identification	ıtion		
	16 1394 MB	~	7	8					
Methylene chloride	3.2	5.3/U	4.1/4	4.2/4					
Acetone									
		CAIl others	< 5m	MB)					
CROI									
Blank analysis date: $7/15/69$ Conc. units: $49/160$			As	Associated Samples:	.ss. 4		<i>f</i> )	(19)	
Compound	Blank ID				Š	Sample Identification	tion		The state of the s
	16 1553 M	<i>†</i>							
Methylene-chloride- M	120	h/ 0L1							
Acetone									
CROL									

LDC # 21 495 L SDG#:

# **VALIDATION FINDINGS WORKSHEET**

Page: Yof 3	Reviewer: 177

2nd Reviewer:

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

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

X N N/A Was a method blank associated with every sample in this SDG?

Was a method blank analyzed at least once every 12 hours for each matrix and concentration?

Y N N/A Was there contamination in the method blanks? If yes, please see the qualifications below. Blank analysis date:  $\frac{7}{15}/69$ X/N N/X

	Conc. units: 49/64	60/51/		٩	ssociated Sa	mples: 6,	Associated Samples: 6, 11, 14, 15, 18		$\langle b l \rangle$	
	Compound	Blank ID					Sample Identification			
		161557 MB	9 8	11	4	51	18			
	Methylene chloride AAA	0.34			_					
	A <del>cetone.</del>	0.87								
9	~#	4.3	$(\alpha_{\!$	h/0.9	(18)	<u>(61)</u>	(ق)			
					•					
	CROI									
	Blank analysis date: 7/6/69 Conc. units: 45/69			A	Associated Samples:		10 12 18 20,	7	(19)	
	Compound	Blank ID					Sample Identification			
		1617 86 MB	10	- 2	2	a	12			
8	Mathylene chloride F	4.0	h/8.9	(38)	(4c)	6.4 /4	(32)			
	Acetone									
									-	
	CROI									

SDG#: STO Core LDC#: 21 495 LI

# **VALIDATION FINDINGS WORKSHEET**

Page: 3 of Reviewer: 2nd Reviewer:

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

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

Was a method blank associated with every sample in this SDG?

Was a method blank analyzed at least once every 12 hours for each matrix and concentration?

Was there contamination in the method blanks? If yes, please see the qualifications below. Blank analysis date: 7/17 69 y∕ n N/A

Conc. units:\_

Y/N N/A

4

Compound Methylene chloride M Acetone	Blank ID   6   952 M   2.6	140/4	150/4	49 /4   50	Sample Identification	2.2-		

Blank analysis date: Conc. units:

Associated Samples:

		Associated Salliples.
Compound	Blank ID	Sample Identification
Methylene chloride		
Acetone		
CROI		

SDG #: Sta Corey LDC #: 21445 L)

# **VALIDATION FINDINGS WORKSHEET**

Page: Yof Y Reviewer: 3/C 2nd Reviewer:\_

Field Blanks

Were field blanks identified in this SDG? METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

Y N/N/A

	(+a)								
	A11 50115		20	6.4 /4	The state of the s	±8)			
•		Sample Identification		6.0/4		8			
	Associated Samples:_	Sample Id	10	1.8.J		ND			
	Assoc		8	4.1/4 4.2/4		either			
~.	her:		7	4,1/4		(All others			
i field blanks?	ip Blank / Oth			h/ e's	•	(AII			
ere target compounds detected in the f	Rinsate / Tr	se Blank ID							
compounds c	Field Blank	F8.07.21 09 - \$0 Blank ID	+ 7/21/04	2,5	0.28				
Y N N/A Were target compounds detected in the field bla Blank units: μο / Associated sample units: νο /κς	Field blank type: (circle one) Field Blank Rinsate / Trip Blank / Other.	Compound	Sampling Date 7/21/69	4	۲,				
V N N/A Blank units:	Field blank t	Con							
			ř	7.4	25'0				

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

Associated Samples:

					A CONTRACTOR OF THE CONTRACTOR		
	tification			Production of the Control of the Con			
, recording Carriples.	Sample Identification						
, , ,							
	Blank ID						
	Blank ID						
	punc	Sampling Date					
	Compound						

**VALIDATION FINDINGS WORKSHEET** 

Page: 1 of 2

Reviewer: 1072

2nd Reviewer:\_

Field Blanks

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

Sa Corr

SDG #:

LDC #: 21495 LI

(bt)			TO A STATE OF THE							(bt)									
8-1		8	4.2/4	0.45/4	h/16.0	(36)	)			14-22				1 11 11 11 11 11 11 11 11 11 11 11 11 1					
	Sample Identification	7	4.1/4	0,30/4	W 26.0	(0, 60)	\ )			es: 16 - 12	Sample Identification	THE THE PARTY AND ADDRESS OF THE PARTY AND ADD							
Associated Samples:	Sample Ic	e	(%)	1/26,0	0,29/y	(0.0)	)			Associated Samples:	Sample Id				(81	\			
Assc		3	(22)	1.0/4						Assc					V x 0		,		
.s? Other:		2	(48)	).o.l	10,51/U	(०,धर				)ther:		1		0.29/4	eitaer No				
os) OG? The field blanks? Ng (cs)			15.2/U	0.48/4	0.28/y					us/kg		0)	0.23/4	p/65.0	others e				di di mananananan
ied in this SC detected in t ple units:	Blank ID									iple units:k k / Rinsate / (	Blank ID				C 4 1/				
Were field blanks identified in this SDG? Were target compounds detected in the field    Associated sample units:     Associated Blank   Rinsate   Trip Bla	Blank ID 9			89.0	0.45	0.26				Associated sample units: e one) Field Blank / Rinsate	Blank ID 13	3333333	0.22	6.40					
V   N   N   N   N   N   N   N   N   N	Compound	Sampling Date.	14	Ш	3	<b>Y</b>	and the state of t			Blank units: <sup>しら</sup> ん Associated sample units: <sup>しの作う</sup> Field blank type: (circle one) Field Blank / Rinsate / (Frip Blank / Other:	Compound	Sampling Date	$\mathcal{L}$	5.80 E					

17344CT

# VALIDATION FINDINGS WORKSHEET Surrogate Spikes

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

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

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

YAN N/A

Were all surrogate %R within QC limits?

N N/A

If the percent recovery (%R) for one or more surrogates was out of QC limits. was a reanalysis or

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

•				
E Data Sample ID	Surrogata	"ARecovery (Limits)		Qualifications
8	DFM	14) (70-13)	C C+ Acts	(3)
		)		
		)		
		)		
		)		
		)		
			, (	
		)		
		)		
		)		
		)		
		)		

SMC1 (TOL) = Toluene-48 SMC2 (BFB) = Bromofluorobenzene SMC3 (DCE) = 1,2-Dichloroethane-44 SMC4 (DFM) = Dibromofluoromethane

QC Limits (Soil) 74-121 80-120 80-120 81-117

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

SDG #: 524 (22-2) LDC# 21445 L/

# VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

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

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

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

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.

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?

	MS/MSD ID	Compound	%R (Limits)						
				10	%K (Limits)	RPD (Limits)	Associated Samples	Qualifications	tions
	23/24	જ	1-95) 61	(051	(as1-05) <del>1</del> 1		7	No mai	165 12
	, ,	٥	43 (20-1	(04)	(261-22) 96	)		0	\ ->
			)	(					
			)	(	( )	)			
		-	)	(	)	)			
			)	)	(				
			)	(	)				
			)	ì	( )	( )			
			)	)	( )				
			)	(	)	)			
			)	)	( )	( )			
			<u> </u>	<b>1</b>	(	( )			
			)	,	( )	)			
			)	)	(	( )			
			)	(	( )	( )			
-			)	(	( )	( )			
			)	(	)	( )		-	
			)	) (	( )	( )			
	Compound	nd			(Soll)	RPD (Soil)	QC Limits (Water)	RPD (Water)	ter)
Н. 1,1-	1,1-Dichloroethene			59-172%	%	< 22%	61-145%	< 14%	
S. Tric	Trichloroethene			62-137%	%	< 24%	71-120%	< 14%	
V. Ben	Benzene			66-142%	%	< 21%	76-127%	< 11%	
CC. Tolu	Toluene			59-139%	%	<u>&lt;</u> 21%	76-125%	< 13%	
	orobenzene			60-133	%	< 21%	75-130%	< 13%	
	Trichloroethene Benzene Toluene Chlorobenzene			62-137% 66-142% 59-139% 60-133%	% % %	< 24% < 21% < 21%		71-120% 76-127% 76-125% 75-130%	

LDC #: 21 415 L/ SDG #: 54 Cm-1

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: Reviewer: 2nd Reviewer:

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

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

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

MM   72 (75-125)	**	Date	CCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Aesociated Samples	Ouelffootone	
KKK		-	101113 105	MW			( )	9,13 161113MB	;	CM 5/40.
LCS KKK 127 (75-125) ( ) ( ) 8 1-3 78 16 1846 18 18 18 18 18 18 18 18 18 18 18 18 18					( )	· ·	( )		1	and the second
LCS KKK   127 (75-135)					( )		( )			
FF 127 ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) (	T		1	KKK	. 1	( )	(	1-378	18 Stacks/p (1)	
C 120 ( ) ( ) ( ) ( ) LCS ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) (	1			FF	1	( )	)			
LCS F (1) (1) (1) (1) (2) 14 (1) (2) 15 (1) (2) 15 (1) (2) 15 (1) (2) 15 (1) (2) 15 (1) (2) 15 (1) (2) 15 (1) (2) 15 (1) (2) (2) 15 (1) (2) (2) 15 (1) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2				0	( ) 0%/	( )	( )			
( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( )					( )	( )	)			
( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( )				L	Ţ	( )	( )	2	5+dets /P (1)	
					( )	( )	( )	1617 86 MB		
	T				( )	( )	)			
	T		-		( )	( )	(			
					( )	( )				
	T				( )	( )				
					( )	( )	( )			
	T			.,.	( )	( )	)			
		-			( )	( )				
					( )	( )	( )			
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					( )	( )	( )			
					( )	( )	( )			
					( )	( )	( )			
					( )	( )	)			
					( )	( )	( )			
					( )	· ·	)			

21495 11	Sagne
LDC #:	SDG#:

# VALIDATION FINDINGS WORKSHEET Internal Standards

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

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

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

Were 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 retention times of the associated calibration standard?

	Qualifications	(i) (1) X/ IV/T				T/0/4 /4/17/				***************************************							
	Area (Limits) RT (Limits)	(215453-861810)	347576 (349214-1396854)	129619 (215453- 861810)	- 782 251)	- 680502)	24 723 (333 000 + 1332 000)	(272391-	(149 4.x-								
Internal	Standard	PFB 2	DFB 3		4pcs 13	PFB			4208								
	Sample ID			5/		12					-						
	Date															,	
	#					362		4.3	4.2								

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

(FBZ) = Fluorobenzene

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

LDC # 21 495 L) SDG #: METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

# VALIDATION FINDINGS WORKSHEET

ð Page: 2nd Reviewer: \_ Reviewer:

Compound Quantitation and CRQLs

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

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

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

3  5 18  5 18	Some to the second	J 1045/A	(e)
18 K		+	<b>→</b>

Comments: See sample calculation verification worksheet for recalculations

LDC #: 21 495 L)
SDG #: 54 Cm

VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page:

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

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

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

(X) N/A

Was the overall quality and usability of the data acceptable?

*	Date	Sample ID	Finding	Associated Samples	Qualifications	tions
		2	DD > cy range		×	(6)
						-
		7	All except op di			
		15, 18	K > and rank	0.3		
		61' 5	Ay exert K dil			
		2	All TCL contirmed in	7 724	`	
			7	4)		<b>*</b>
			· ·			
			2			
Comments:	hents:					

LDC #: 21 495 L1 SDG #: Su Cover

# VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	of
Reviewer:	SVS
2nd reviewer:	Q _

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

YN N/A YN N/A Were field duplicate pairs identified in this SDG? Were target compounds detected in the field duplicate pairs?

		Concentratio	ng hg/kg,	
Compound		10	Ĭ	RPD
	777	0. 26	0.25	0,01 (= 3,30;ff)
	<u> </u>	6.8	6,0	0.8 (=13D;H) 3.07 (=3.3 Diff)
	<u> </u>	0.23	3,34	3.07 (= 3.3 Diff)
	DD	3.3 U	0.64	2.66
	E	0.59	0, 29	0.3
	cc	0.44	0.23	0, 21
		Concentration	19/Es	ь
Compound		10	1>	RPD ONLY
	TTT	0.26	3,7 U	3.44 (£ 3.7 Diff)
	F	6. 8	38	31.2 ( 15 Diff ) Jacob
	K	0.23	3.7U	3.47 (63.7 Diff)
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	E	0.59	1	3.11
	CC	0,44	<b>V</b>	3.26
	MMM	3. 3 U	1.4	1.9 ( \( \) 3.3 \( \) 1
		Concentration	ч .	
Compound				RPD

	Concentration ( )	
Compound		RPD