Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Data Validation Reports LDC #21991

Volatiles



Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

August 3 through August 4, 2009

LDC Report Date:

December 8, 2009

Matrix:

Water

Parameters:

Volatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0904290

Sample Identification

M-31AB

M-31ABDL

TB080309-GW1

M-50B

M-50BDL

M-21B

FB080409-GW

TB080409-GW1

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.

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

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

Average relative response factors (RRF) for all 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 R0904290	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
8/12/09	Styrene	25.4	M-31AB TB080309-GW1 M-50B FB080409-GW TB080409-GW1 165454-MB	J+ (all detects)	А
8/14/09	Hexachlorobutadiene	25.6	M-31ABDL M-50BDL M-21B 165930-MB	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
8/21/09	2-Methyl-2-propanol	0.024 (≥0.05)	M-31AB TB080309-GW1 M-50B FB080409-GW TB080409-GW1 165454-MB	J (all detects) UJ (all non-detects)	Α
8/14/09	2-Methyl-2-propanol	0.021 (≥0.05)	M-31ABDL M-50BDL M-21B 165930-MB	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 TB080309-GW1 and TB080409-GW1 were identified as trip blanks. No volatile contaminants were found in these blanks.

Sample FB080409-GW 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
FB080409-GW	8/4/09	Acetone Chloromethane Dichloromethane Toluene	12 ug/L 0.31 ug/L 0.28 ug/L 0.78 ug/L	M-21B

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-21B	Acetone	6.6 ug/L	6.6U 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-31AB M-50B	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 R0904290	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

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-31AB M-50B	Chloroform	×	A
M-31ABDL M-50BDL	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 R0904290

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0904290	M-31AB M-31ABDL TB080309-GW1 M-50B M-50BDL M-21B FB080409-GW TB080409-GW1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Initial calibration (RRF)
R0904290	M-31AB TB080309-GW1 M-50B FB080409-GW TB080409-GW1	Styrene	J+ (all detects)	A	Continuing calibration (%D) (c)
R0904290	M-31ABDL M-50BDL M-21B	Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	A	Continuing calibration (%D) (c)
R0904290	M-31AB M-31ABDL TB080309-GW1 M-50B M-50BDL M-21B FB080409-GW TB080409-GW1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Continuing calibration (RRF) (c)
R0904290	M-31AB M-50B	Chloroform	J (all detects)	A	Project Quantitation Limit
R0904290	M-31AB M-31ABDL TB080309-GW1 M-50B M-50BDL M-21B FB080409-GW TB080409-GW1	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0904290	M-31AB M-50B	Chloroform	х	Α	Overall assessment of data (o)
R0904290	M-31ABDL M-50BDL	All TCL compounds except Chloroform	×	А	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Laboratory Blank Data Qualification Summary - SDG R0904290

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Trip Blank Data Qualification Summary - SDG R0904290

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Field Blank Data Qualification Summary - SDG R0904290

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0904290	M-21B	Acetone	6.6U ug/L	Α	bf

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #:___21991A1 SDG #:___R0904290 Stage 2B

Reviewer:

Laboratory: Columbia Analytical Services

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
1.	Technical holding times	A	Sampling dates: 8/03-04/09
11.	GC/MS Instrument performance check	Ą	·
111.	Initial calibration	SW	2 KSD (10 rz)
IV.	Continuing calibration/ICV	SW	ca = 25 h
V.	Blanks	Å	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	chi ent spec
VIII.	Laboratory control samples	Α	Chi ent spec 1CS
IX.	Regional Quality Assurance and Quality Control	. 2	
Χ.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	SK	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SN	
XVI.	Field duplicates	7	
XVII.	Field blanks	s W	行B=3,8 FB=7

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

 γ_{ND} = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

WATER

		VAICE				
1 \	M-31AB	11 1	165454-MB	(7412) 21	31	
2 -	M-31ABDL	12 7	16 5930 }	(7243) 22	32	
3 1	TB080309-GW1	13		23	33	
4 1	M-50B	14		24	34	
5 >	M-50BDL	15		25	35	
6 Y	M-21B	16		26	36	
7 1	FB080409-GW	17		27	37	
8 1	TB080409-GW1	18		28	38	
9		19		29	39	
10		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. 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. Methyene chorde	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-Dkchloroethene**	BB. 1,1,2,2-Tetrachioroethane*	VV. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacrytonitrile
1. 1,1-Dichloroethane*	CC. Toluene**	WW. Bromobenzene	QQQ. ds-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. Chloraform**	EE. Ethylbenzene**	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
L. 1,2-Dkchloroethane	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 tetrachioride	II. 2-Chloroethytvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	9999.
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RARR.
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	TITE.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-isopropytoluene	AAAA. Ethyl tert-butyl ether	טטטט.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	ww.

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

S WORNSHEE!

rage: Reviewer: 2nd Reviewer:

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

3DG #: Six (m~ DC#: -1.41 m/

a for all CCC's and SPCC's?	
fications 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? Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF?	
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Did the laboratory perform a 5 point calibration prior to sample analysis? Nere percent relative standard deviations (%RSD) and relative response factors (RRF) within not the acceptance criteria used for evaluation? If yes, what was the acceptance criteria used for evaluation? If yes, what was the acceptance criteria used for evaluation. Nere all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF?	
ualifications below for all que Did the laboratory perform Were percent relative sta Was a curve fit used for e Did the initial calibration r Were all %RSDs and RR	
Sease see on NA	

<u> </u>			A WIGHT GIO VOICE	10/ 00 T 10 MINUTED TO				
*	# Date	Standard ID	Compound	Finding %RSD (Limit: <30.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications	
н	18/64	187	ANNA		0.026	A11 + B/ks	J/11/4	(S)
L								

7 100 12 SDG #: LDC #:

VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page: 1of 2nd Reviewer: Reviewer:_

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

Pigase 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? Y N NIA

	Finding %D	Finding RRF			
Compound	(Limit: <25.0%)	(Limit: >0.05)	Associated Samples		ttlons
NNNN		0.024	1201 87 48 1	16 syly-MB	1/43/A (C)
(せ ユー	25.4			' /	J+Mcts/A
ファスス		0,02	2 5 6, 165930-MB		J/W1 A
(一) コココ	9758			5	-/45 1
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.DC #:_	DG #

VALIDATION FINDINGS WORKSHEET Field Blanks

Page: of) Reviewer:__ 2nd Reviewer:__

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

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

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

Blank units: 1/2 / Associated sample Units:

Sample Identification Associated Samples: 2 Blank ID 8/04/69 Blank ID 7 0,28 0,3 N o. Sampling Date V $\boldsymbol{\mu}$ Compound

Associated sample units: Blank units:

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								,
	fication					·		
Associated Samples:	Sample Identification							
Associate								
ank / Other:								
rip Bla								
/ Rinsate / 7	Blank ID							
Field Blank	Blank ID							
cle one) F		Sampling Date						
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank /	Compound	Samplic						
He						 Ļ_		

LDC #: 21 991 A1 SDG # 77 CM

VALIDATION FINDINGS WORKSHEET Compound Quantitation and CRQLs

Page: of Reviewer: 2nd Reviewer:

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

X N N X

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 M/A)

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

Qualifications	INER A (e)										
Associated Samples											
Finding	k > ral range										
Sample ID	78 1	1 1 /									
Date											
*											

Comments: See sample calculation verification worksheet for recalculations

SDG #: 24 Cm

VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

101	2/5	
_ 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.

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

#	Date	Sample ID	Finding	Associated Samples	Qualifications	
		1. 24	X > ent range		(o) \\ \/ \	
		•	י			
		2.45	All except to dil			
		•				
Comments:	nents:					

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date: September 8, 2009

LDC Report Date: December 7, 2009

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905115

Sample Identification

EB090809-SO1 SA54-31BMSD

SA54-10B

SA54-20B

SA54-31B

SA50-12B

SA50009-12B

SA50-25B

SA50-36B

SA170-20B

SA170-31B

SA170-0.5B

SA170-10B

SA135-0.5B

SA135-10B

SA135009-10B

SA135-25B

SA135-37B

TB090809-SO1

TB090809-SO2

TB090809-SO3

Introduction

This data review covers 17 soil samples and 4 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.

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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:

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- 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.
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- 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
8/28/09	2-Methyl-2-propanol	0.027 (≤0.05)	EB090809-SO1 TB090809-SO1 TB090809-SO3 170003-MB	J (all detects) UJ (all non-detects)	А
7/17/09	2-Methyl-2-propanol	0.017 (≤0.05)	TB090809-SO2 170232-MB	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
9/11/09	Dibromochloromethane	30.1	EB090809-SO1 TB090809-SO1 TB090809-SO3 170003-MB	J+ (all detects)	A
9/14/09	Trichlorofluoromethane 2-Hexanone Hexachlorobutadiene	29.2 30.62 27.9	TB090809-SO2 170232-MB	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
9/11/09	2-Methyl-2-propanol	0.025 (≥0.05)	EB090809-SO1 TB090809-SO1 TB090809-SO3 170003-MB	J (all detects) UJ (all non-detects)	А
9/14/09	2-Methyl-2-propanol	0.013 (≥0.05)	TB090809-SO2 170232-MB	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
170003-MB	9/11/09	Hexachlorobutadiene	0.30 ug/L	EB090809-SO1 TB090809-SO1 TB090809-SO3
170232-MB	9/14/09	1,2,4-Trichlorobenzene 1,2,3-Trichlorobenzene	0.29 ug/L 0.35 ug/L	TB090809-SO2

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

Samples TB090809-SO1, TB090809-SO2, and TB090809-SO3 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
TB090809-SO2	9/8/09	Bromoform Chloromethane Dibromochloromethane	1.4 ug/L 0.25 ug/L 0.76 ug/L	SA170-20B SA170-31B SA170-0.5B SA170-10B SA135-0.5B SA135-10B SA135-10B SA135-25B SA135-25B SA135-37B

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

Sample EB090809-SO1 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
EB090809-SO1	9/8/09	Chloroform Dichloromethane	0.55 ug/L 0.49 ug/L	SA54-10B SA54-20B SA54-31B SA50-12B SA50009-12B SA50-25B SA50-36B SA170-20B SA170-31B SA170-0.5B SA170-10B

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

Sample	Compound	Reported Concentration	Modified Final Concentration
SA50009-12B	Chloroform	0.81 ug/Kg	0.81U ug/Kg
SA170-0.5B	Dichloromethane	0.57 ug/Kg	0.57U ug/Kg

Samples FB072909-SO (from SDG R0904226) and FB080309-SO (from SDG R0904279) were identified as field blanks. No volatile contaminants were found in these blanks with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072909-SO	7/29/09	Acetone Dichloromethane Toluene	3.5 ug/L 0.30 ug/L 0.44 ug/L	SA54-10B SA54-20B SA54-31B SA50-12B SA50009-12B SA50-25B SA50-36B SA170-20B SA170-31B SA170-0.5B SA170-10B
FB080309-SO	8/3/09	Acetone Toluene	2.1 ug/L 0.30 ug/L	SA135-0.5B SA135-10B SA135009-10B SA135-25B SA135-37B

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
SA54-20B	Acetone Toluene	5.0 ug/Kg 0.47 ug/Kg	5.0U ug/Kg 0.47U ug/Kg
SA50-12B	Toluene	0.60 ug/Kg	0.60U ug/Kg
SA50009-12B	Toluene	0.36 ug/Kg	0.36U ug/Kg
SA50-36B	Toluene	0.74 ug/Kg	0.74U ug/Kg
SA170-20B	Acetone	4.4 ug/Kg	4.4U ug/Kg
SA170-31B	Acetone	6.3 ug/Kg	6.3U ug/Kg
SA170-0.5B	Acetone Dichloromethane Toluene	2.4 ug/Kg 0.57 ug/Kg 0.51 ug/Kg	2.4U ug/Kg 0.57U ug/Kg 0.51U 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
SA54-31BMS/MSD (SA54-31B)	Chloromethane	57 (70-130)	54 (70-130)	-	J- (all detects) UJ (all non-detects)	А

VIII. Laboratory Control Samples (LCS)

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

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
170003-LCS	Bromomethane Dibromochloromethane	134 (75-125) 136 (75-125)	EB090809-SO1 TB090809-SO1 TB090809-SO3 170003-MB	J+ (all detects) J+ (all detects)	Р
170142-LCS	Chloromethane	65 (75-125)	SA54-31B 170142-MB	J- (all detects) UJ (all non-detects)	Р
170337-LCS	Carbon tetrachloride	74 (75-125)	SA54-10B SA54-20B SA50-12B SA50009-12B SA50-25B SA50-36B SA170-20B SA170-31B SA170-0.5B SA170-10B 170337-MB	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 R0905115	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 SA50-12B and SA50009-12B and samples SA135-10B and SA135009-10B were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concentration (ug/Kg)		nnn.	D.144	Flags	
Compound	SA50-12B SA50009-12		RPD (Limits)	Difference (Limits)		A or P
Acetone	8.1	18U	-	9.9 (≤18)	-	-
Chloroform	2.1	0.81	-	1.29 (≤5.2)	-	-
Toluene	0.60	0.36	-	0.24 (≤5.2)	+	-

	Concentration (ug/Kg)		200	D.//		
Compound	SA50-12B	SA50009-12B	RPD (Limits)	Difference (Limits)	Flags	A or P
2-Butanone	10U	1.2	-	8.8 (≤10)	-	-

	Concentra	tion (ug/Kg)			·	
Compound	SA135-10B	SA135009-10B	RPD (Limits)	Difference (Limits)	Flags	A or P
2-Butanone	2.8	13U	-	10.2 (≤13)	-	-
Acetone	6.1	27U	-	20.9 (≤27)	-	-
Toluene	4.0	2.4	-	1.6 (≤7.1)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Data Qualification Summary - SDG R0905115

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905115	EB090809-SO1 TB090809-SO1 TB090809-SO3 TB090809-SO2	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Initial calibration (RRF) (c)
R0905115	EB090809-SO1 TB090809-SO1 TB090809-SO3	Dibromochloromethane	J+ (all detects)	А	Continuing calibration (%D) (c)
R0905115	TB090809-SO2	Trichlorofluoromethane 2-Hexanone Hexachlorobutadiene	J+ (all detects) J+ (all detects) J+ (all detects)	А	Continuing calibration (%D) (c)
R0905115	EB090809-SO1 TB090809-SO1 TB090809-SO3 TB090809-SO2	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Continuing calibration (RRF) (c)
R0905115	SA54-31B	Chloromethane	J- (all detects) UJ (all non-detects)	Α	Matrix spike/Matrix spike duplicates (%R) (m)
R0905115	EB090809-SO1 TB090809-SO1 TB090809-SO3	Bromomethane Dibromochloromethane	J+ (all detects) J+ (all detects)	Р	Laboratory control samples (%R) (I)
R0905115	SA54-31B	Chloromethane	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0905115	SA54-10B SA54-20B SA50-12B SA50009-12B SA50-25B SA50-36B SA170-20B SA170-31B SA170-0.5B SA170-10B	Carbon tetrachloride	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905115	EB090809-SO1 SA54-10B SA54-20B SA54-20B SA54-31B SA50-12B SA5009-12B SA50-25B SA50-36B SA170-20B SA170-31B SA170-0.5B SA170-10B SA135-0.5B SA135-10B SA135-10B SA135-25B SA135-37B TB090809-SO1 TB090809-SO2 TB090809-SO3	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Laboratory Blank Data Qualification Summary - SDG R0905115

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Trip Blank Data Qualification Summary - SDG R0905115

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Equipment Blank Data Qualification Summary - SDG R0905115

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905115	SA50009-12B	Chloroform	0.81U ug/Kg	А	be
R0905115	SA170-0.5B	Dichloromethane	0.57U ug/Kg	А	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Field Blank Data Qualification Summary - SDG R0905115

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905115	SA54-20B	Acetone Toluene	5.0U ug/Kg 0.47U ug/Kg	A	bf

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905115	SA50-12B	Toluene	0.60U ug/Kg	А	bf
R0905115	SA50009-12B	Toluene	0.36U ug/Kg	А	bf
R0905115	SA50-36B	Toluene	0.74U ug/Kg	А	bf
R0905115	SA170-20B	Acetone	4.4U ug/Kg	Α	bf
R0905115	SA170-31B	Acetone	6.3U ug/Kg	А	bf
R0905115	SA170-0.5B	Acetone Dichloromethane Toluene	2.4U ug/Kg 0.57U ug/Kg 0.51U ug/Kg	А	bf

Tronox Northgate Henderson

LDC #::	21991B1	VALIDATION COMPLETENESS WORKSHEET
SDG #:	R0905115	Stage 2B

Laboratory: Columbia Analytical Services

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

Page: __of__ 2nd Reviewer:

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: 9 /6 8 /09
11.	GC/MS instrument performance check	A	
I II.	Initial calibration	SM	2 KSD +7
IV.	Continuing calibration/ /CV	SW	cw = 25 }
V	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	Wک	
VIII.	Laboratory control samples	W2	us
IX.	Regional Quality Assurance and Quality Control	N	
Χ.	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	$D_1 = 5.6$ $D_2 = 14.15$
XVII.	Field blanks	SW	EB=1 TB=18,19,20 FB=FB072909-SO (frm Ro

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

⊀ND = No compounds detected D = Duplicate

R = Rinsate

TB = Trip blank

FB = Field blank

EB = Equipment blank

Validated Samples:

Water + Soil

	•V~1€1		<i></i>			· · · · · · · · · · · · · · · · · · ·		
1 1	EB090809-SO1	11	SA170-0.5B		₂₁	SA54-31BMSD	31	170003 - MB (85
2 >	SA54-10B	12	SA170-10B		₂₂ 3	SA 54-31BMS	32	170337 -
3	SA54-20B	13	SA135-0.5B		23		33	7 170142 - (85
4	SA54-31B	14	SA135-10B D ₂		24		34	170485 - 186081
5 5	SA50-12B D /	15	SA135009-10B DY		25		35 5	170232 - 185
6	SA50009-12B b	16	SA135-25B	П	26		36	
7	SA50-25B	17	SA135-37B		27		37	
8	SA50-36B	18 1	TB090809-SO1	V	28		38	
9	SA170-20B	19	TB090809-SO2		29		39	
10	SA170-31B	20	TB090809-SO3		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
E. Methylene chonde	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG. Actyonitrile
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-Tetrachlomethane	000. 1,3,5-Trichlorobenzene	IIII. Isobutyl alcohol
H. 1,1-Dichloroethene**	BB. 1,1,2,2-Tetrachioroethane*	VV. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacylonitrile
I. 1,1-Dichloroethane*	CC. Toluene™	WW. Bromobenzene	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
J. 1,2-Dichloroethene, total	DD. Chlorobenzane*	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. Vinyt acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	рррр.
O. Carbon tetrachloride	II. 2-Chloroethytvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	0000.
P. Bromodichioromethane	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. cls-1,3-Dkchloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Buty/ alcohoi	TTT.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-Isopropyttoluene	AAAA. Ethyl tert-butyl ether	תחחת.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	ww.

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

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VALIDATION FINDINGS WORKSHEE! **Initial Calibration**

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

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 = 30.99

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

| N | N/A | N/A | N/A | Were percent relative standard deviations (%RSD) and relative response factors (RRF) within not the initial calibration meet the acceptance criteria?

| N | N/A | N/A

8/28/61 CAL 9/7/7/60 CAL	CAL CAL	nimodilioo	Lamint: 530:3/8)			7 hr 1/2	
60/L)		7 7 7 7		720 0	8 30 -10002-NE	トミスラフ	(c)
50		N A		1			
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		ママス		0 . 017	19, 170 2 32. MB	->	4
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219918 SDG #: LDC #:

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? Y N N/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?

	7							1										
Qualifications	3+ 1 m /k (a	I/NJ A			C+ detita	7 47 4	T+ dets 4											
Associated Samples	1, 18, 20 170003-MB				19, 170232-MB													
Finding RRF (Limit: >0.05)		0, 025				0.013												
Finding %D (⊔mit: <25.0%)	30.1			- 1	29,2		そり.0そ	27.9							:			
Compound	(4)	NNNN			KK (+)	NNN	(+) Z	(+) 111										
Standard ID	10201				F2540													
Date					9/4/69				,									
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to Carr LDC #: 2/ 99/ B/ SDG#:

VALIDATION FINDINGS WORKSHEET Blanks

Page: Reviewer:_ 2nd Reviewer:

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

lease see qu N N/A	ualifications 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?
$\alpha > 1$	ease see	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?

Sample Identification YN N/A Was there contamination in the method blanks? If yes, please see the qualifications below. Brank analysis date: 4/11/04 Associated Samples: 1, 18, 20 170005-MB Blank ID 0,30 Conc. units: หฐ Compound Y N N/A

64 44 6			
Sonc. units: Mg/L		Associated Samples:	
Compound	Blank ID	Sample Identification	
	170232-11B		
スト大	2.29		
NNN	NNN 0.35		
			T

VALIDATION FINDINGS WORKSHEET

21991 BJ

LDC #: SDG #:

Page: 1of >

Reviewer: W6

2nd Reviewer:_

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2-12

Field Blanks

FB Sample Identification Associated Samples: ٤ dither 4 0.57/ others 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?

Bfank units: MS /L Associated sample units: MS /L ST (41 0.81 Blank ID 60/80/8 Blank ID 0.49 0. SZ Sampling Date m Compound

82

(MD) 6-17 Associated Samples: Field blank type: (circle one) Field Blank / Rinsate / (frip Blank) Other.

Blank units: 4 / L Associated sample units: 4 / kg

_	_					 	- 	
ntification								
Sample Identification								:
Blank ID								
Blank ID 19		1.4	0.25	0.76				
Compound	Sampling Date 9 /68 /09	×	Ą	-				
Сот								

Ed Cores LDC #: 21 191 8/ SDG #:

VALIDATION FINDINGS WORKSHEET

Field Blanks

Page: 2 of Reviewer: T 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?
Blank units: NO/A Associated sample units: NO/A F
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other.

8

Associated Samples:

Associated		7/27/69 3 5 6 8 9 10 11	5.0/4		0.47/4 0.60/4 036/4 0.74/4	(AU others either ND or > FB)			Blank units: \(\sigma \lambda \lambda \lambda \lambda \lambda \lambda \lambda \lambda \lambda \rangle \text{sigld blank} \text{Rinsate} \text{ Irip Blank} \text{ Other:} \text{Associated Samples:} \(\lambda \lambda - 17 \)		65/69	3.1 (Ail risults either ND M > FB)					
ון נ				0,30					Associated sample units: 45 /kg e one Field Blank Rinsate / Trip Blank /	F9 + 80 309 - 50 Blank ID Blank ID	8/02/69	2.1 (A1)	0, 30				
	Compound	Sampling Date		صا	3				Blank units: ^{IN} /L Associ	Compound	Sampling Date	11	3				

3 λ

Ed Cores LDC #: 21 191 8/ SDG #:

VALIDATION FINDINGS WORKSHEET

Field Blanks

Page: 2 of Reviewer: T 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?
Blank units: NO/A Associated sample units: NO/A F
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other.

8

Associated Samples:

Associated		7/27/69 3 5 6 8 9 10 11	5.0/4		0.47/4 0.60/4 036/4 0.74/4	(AU others either ND or > FB)			Blank units: \(\sigma \lambda \lambda \lambda \lambda \lambda \lambda \lambda \lambda \lambda \rangle \text{sigld blank} \text{Rinsate} \text{ Irip Blank} \text{ Other:} \text{Associated Samples:} \(\lambda \lambda - 17 \)		65/69	3.1 (Ail risults either ND M > FB)					
ון נ				0,30					Associated sample units: 45 /kg e one Field Blank Rinsate / Trip Blank /	F9 + 80 309 - 50 Blank ID Blank ID	8/02/69	2.1 (A1)	0, 30				
	Compound	Sampling Date		صا	3				Blank units: ^{IN} /L Associ	Compound	Sampling Date	11	3				

3 λ

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

JC#: 2/491B/

DG #:

Reviewer:

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

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

Was a LCS required?

Were the LCS percen

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

		\ \		· · · · ·	<u>ک</u>	\	3.			\overline{a}		1	_					<u> </u>					ī	_
Qualifications	J+ d(tx/p (1)				No gual (MS/MSSin	J-/45/6 (m)	Noqual (MS/MSDin	,		J-/MJ/P (1)														
Associated Samples	1, 18, 20 170005MB	\			4, 170142-MB		\ \			21-3 6-12	17337 MS													
RPD (Limits)	()	()	()	()	()	()	()	,	()	(()	()	()	()	()	()	()	()	()	()	()	()	()	()
LCSD %R (Limits)		()	()	()	()	()	()	()	()		()	()	()	()	()	()	()	()	()	()	()	()	()	()
LCS %R (Limits)	136 (75-125)	(1) tel	()	()	(3c (75-125)	()) 59	(1) 921	, ,	()	74 (75-125)	()	()	()	()	()	()	()	()	()	()	()	()	()	()
Compound	<u> </u>	જ			11	A	MMM			C					***									
LCS/LCSD ID	527 800021				170142 LCS					527 266921														
Date																								

LDC #:_	2100	11 B/
		Come

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:	lof	1
Reviewer:	2/1	,
2nd reviewer:	A	

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

Y N N/A Y N N/A

Were field duplicate pairs identified in this SDG?

Were target compounds detected in the field duplicate pairs?

		Concentration	in (49 /kgg	Parent
Compound		5	6	RPD My
	F	8.1	18 U	9,9 (4180) -
	K	2,1	0, 81	1,29 (\$5.20) -
	cc	0.60	0.36	0.24
	M	lou	1. 2	8.8 (=100) -

	Concentra		Parent	
Compound	14	15	RPD	my
M	2.8	13 VI	10,2 (£ 13 D)	
F	6.1	27 U	20,9 (£27 D)	`
CC	4.0	2,4	1.6 (47.11)	-

	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: September 3, 2009

LDC Report Date: December 6, 2009

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905072

Sample Identification

SA58-0.5BSA204-45BSA58-10BEB090309-SO2SA58009-28BTB090309-SO1SA58-28BTB090309-SO2SA53-10BTB090309-SO3SA53-25BTB090309-SO4

SA53-32B SA106-12B SA106-20B SA106-35B RSAU7-0.5B RSAU7009-0.5B RSAU7-10B

RSAU7-25B RSAU7-40B RSAU7-54B

SA204-0.5B SA204-10B

SA204009-10B SA204-30B

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
8/28/09	2-Methyl-2-propanol	0.027 (≤0.05)	EB090309-SO2 TB090309-SO1 TB090309-SO3 TB090309-SO4 170003-MB	J (all detects) UJ (all non-detects)	А
7/17/09	2-Methyl-2-propanol	0.017 (≤0.05)	TB090309-SO2 170232-MB	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
9/11/09 (H0701)	2-Chlorotoluene	25.5	SA58-0.5B SA58-10B SA58009-28B SA58-28B SA53-10B SA53-25B SA53-32B SA106-12B SA106-20B SA106-35B RSAU7-0.5B RSAU7-0.5B RSAU7-10B 169909-MB	J+ (all detects)	A
9/11/09 (C0701)	Dibromochloromethane	30.1	EB090309-SO2 TB090309-SO1 TB090309-SO3 TB090309-SO4 17003-MB	J+ (all detects)	A
9/14/09	Trichlorofluoromethane Hexachlorobutadiene 2-Hexanone	29.2 27.9 30.62	TB090309-SO2 170232-MB	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
9/11/09 (C0701)	2-Methyl-2-propanol	0.025 (≥0.05)	EB090309-SO2 TB090309-SO1 TB090309-SO3 TB090309-SO4 17003-MB	J (all detects) UJ (all non-detects)	A
9/14/09	2-Methyl-2-propanol	0.013 (≥0.05)	TB090309-SO2 170232-MB	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
170003-MB	9/11/09	Hexachlorobutadiene	0.30 ug/L	EB090309-SO2 TB090309-SO1 TB090309-SO3 TB090309-SO4
170232-MB	9/14/09	1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene	0.35 ug/L 0.29 ug/L	TB090309-SO2

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

Samples TB090309-SO1, TB090309-SO2, TB090309-SO3, and TB090309-SO4 were identified as trip blanks. No volatile contaminants were found in these blanks.

Sample EB090309-SO2 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
EB090309-SO2	9/3/09	Acetone Dichloromethane	12 ug/L 0.27 ug/L	RSAU7-0.5B RSAU7-009-0.5B RSAU7-10B RSAU7-25B RSAU7-40B RSAU7-54B SA204-0.5B SA204-10B SA204009-10B SA204-30B SA204-45B

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

Sample	Compound	Reported Concentration	Modified Final Concentration
RSAU7-0.5B	Acetone	12 ug/Kg	12U ug/Kg
RSAU7009-0.5B	Acetone	11 ug/Kg	11U ug/Kg

Sample	Compound	Reported Concentration	Modified Final Concentration
RSAU7-10B	Acetone	23 ug/Kg	23U ug/Kg
RSAU7-54B	Acetone	3.1 ug/Kg	3.1U ug/Kg
SA204-30B	Acetone	14 ug/Kg	14U ug/Kg

Samples FB072909-SO (from SDG R0904226) and FB080309-SO (from SDG R0904279) were identified as field blanks. No volatile contaminants were found in these blanks with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072909-SO	7/29/09	Acetone Dichloromethane Toluene	3.5 ug/L 0.30 ug/L 0.44 ug/L	SA58-0.5B SA58-10B SA58009-28B SA58-28B SA53-10B SA53-25B SA53-32B SA106-12B SA106-20B SA106-35B
FB080309-SO	8/3/09	Acetone Toluene	2.1 ug/L 0.30 ug/L	RSAU7-0.5B RSAU7-09-0.5B RSAU7-10B RSAU7-25B RSAU7-40B RSAU7-54B SA204-0.5B SA204-10B SA20409-10B SA204-30B SA204-35B

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
SA58-0.5B	Toluene	0.54 ug/Kg	0.54U ug/Kg
SA58009-28B	Acetone	3.4 ug/Kg	3.4U ug/Kg
SA58-28B	Acetone	6.6 ug/Kg	6.6U ug/Kg

Sample	Compound	Reported Concentration	Modified Final Concentration
SA53-10B	Acetone	6.5 ug/Kg	6.5U ug/Kg
SA106-12B	Toluene	0.65 ug/Kg	0.65U ug/Kg
RSAU7-54B	Acetone	3.1 ug/Kg	3.1U 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 not within QC limits. Since there were no associated samples, 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
169909-LCS	Acetone Vinyl chloride	129 (75-125) 127 (75-125)	SA58-0.5B SA58-10B SA58009-28B SA58-28B SA53-10B SA53-25B SA53-32B SA106-12B SA106-20B SA106-35B RSAU7-0.5B RSAU7-0.5B RSAU7-10B 169909-MB	J+ (all detects) J+ (all detects)	Р
170003-LCS	Bromomethane Dibromochloromethane	134 (75-125) 136 (75-125)	EB090309-SO2 TB090309-SO1 TB090309-SO3 TB090309-SO4 170003-MB	J+ (all detects) J+ (all detects)	Р

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
170142-LCS	Chloromethane	65 (75-125)	RSAU7-25B RSAU7-40B RSAU7-54B SA204-0.5B SA204-10B SA204009-10B SA204-30B SA204-45B 170142-MB	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 R0905072	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 SA58009-28B and SA58-28B, samples RSAU7-0.5B and RSAU7009-0.5B, and samples SA204-10B and SA204009-10B were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concentrati	on (ug/Kg)	555			
Compound	SA58009-28B	SA58-28B	RPD (Limits)	Difference (Limits)	Flags	A or P
Acetone	3.4	6.6	-	3.2 (≤30)	-	-
Chloroform	3.4	3.8	-	0.4 (≤7.6)	-	-
Dichloromethane	7.6U	1.2	-	6.4 (≤7.6)	-	-
Toluene	1.8	6.7U	-	4.9 (≤6.7)	-	-

	Concentration (ug/Kg)				222	D'44		
Compound	RSAU7-0.5B	RSAU7009-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P		
2-Butanone	1.8	0.92	-	0.88 (≤14)	-	-		
Acetone	1.2	11	-	1.0 (≤27)	-	-		
Toluene	2.8	1.6	-	1.2 (≤6.8)	-	-		

	Concentrat	ion (ug/Kg)	222	Diff.		
Compound	SA204-10B	SA204009-10B	RPD (Limits)	Difference (Limits)	Flags	A or P
2-Butanone	3.4	13U	-	9.6 (≤13)	-	-
Toluene	1.0	6.4U	-	5.4 (≤6.4)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Data Qualification Summary - SDG R0905072

SDC.	01-		E1	A a = P	Reason (Code)		
SDG R0905072	EB090309-SO2 TB090309-SO1 TB090309-SO3 TB090309-SO4 TB090309-SO2	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A or P	Initial calibration (RRF)		
R0905072	SA58-0.5B SA58-10B SA58009-28B SA58-28B SA53-10B SA53-25B SA53-32B SA106-12B SA106-20B SA106-35B RSAU7-0.5B RSAU7-10B	2-Chlorotoluene	J+ (all detects)	A	Continuing calibration (%D) (c)		
R0905072	EB090309-SO2 TB090309-SO1 TB090309-SO3 TB090309-SO4	Dibromochloromethane	J+ (all detects)	A	Continuing calibration (%D) (c)		
R0905072	TB090309-SO2	Trichlorofluoromethane Hexachlorobutadiene 2-Hexanone	J+ (all detects) J+ (all detects) J+ (all detects)	A	Continuing calibration (%D) (c)		
R0905072	EB090309-SO2 TB090309-SO1 TB090309-SO3 TB090309-SO4 TB090309-SO2	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Continuing calibration (RRF) (c)		
R0905072	SA58-0.5B SA58-10B SA58009-28B SA58-28B SA53-10B SA53-25B SA53-32B SA106-12B SA106-20B SA106-35B RSAU7-0.5B RSAU7-0.5B RSAU7-10B	Acetone Vinyl chloride	J+ (all detects) J+ (all detects)	Р	Laboratory control samples (%R) (I)		

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905072	EB090309-SO2 TB090309-SO1 TB090309-SO3 TB090309-SO4	Bromomethane Dibromochloromethane	J+ (all detects) J+ (all detects)	Р	Laboratory control samples (%R) (I)
R0905072	RSAU7-25B RSAU7-40B RSAU7-54B SA204-0.5B SA204-10B SA204009-10B SA204-30B SA204-45B	Chloromethane	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0905072	SA58-0.5B SA58-10B SA58009-28B SA58-28B SA53-10B SA53-25B SA53-32B SA106-12B SA106-20B SA106-20B SA106-35B RSAU7-0.5B RSAU7-0.5B RSAU7-10B RSAU7-25B RSAU7-40B RSAU7-54B SA204-0.5B SA204-10B SA204-10B SA204-10B SA204-30B SA204-30B SA204-45B EB090309-SO2 TB090309-SO2 TB090309-SO3 TB090309-SO4	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Laboratory Blank Data Qualification Summary - SDG R0905072

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Trip Blank Data Qualification Summary - SDG R0905072

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Equipment Blank Data Qualification Summary - SDG R0905072

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905072	RSAU7-0.5B	Acetone	12U ug/Kg	Α	be
R0905072	RSAU7009-0.5B	Acetone	11U ug/Kg	А	be
R0905072	RSAU7-10B	Acetone	23U ug/Kg	А	be
R0905072	RSAU7-54B	Acetone	3.1U ug/Kg	А	be
R0905072	SA204-30B	Acetone	14U ug/Kg	А	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Field Blank Data Qualification Summary - SDG R0905072

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905072	SA58-0.5B	Toluene	0.54U ug/Kg	A	bf
R0905072	SA58009-28B	Acetone	3.4U ug/Kg	А	bf
R0905072	SA58-28B	Acetone	6.6U ug/Kg	Α	bf
R0905072	SA53-10B	Acetone	6.5U ug/Kg	Α	bf
R0905072	SA106-12B	Toluene	0.65U ug/Kg	А	bf
R0905072	RSAU7-54B	Acetone	3.1U ug/Kg	Α	bf

Tronox Northgate Henderson

		3	, ,
LDC #:_	21991C1	VALIDATION COMPLETENESS WORKSHEET	Date: 1/30/00
SDG #:_	R0905072	Stage 2B	Page: 1_of_1
Laborato	ry: Columbia An	alytical Services	Reviewer: 374
			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
l.	Technical holding times	A	Sampling dates: 9/6ラ/69
II.	GC/MS Instrument performance check	A	
Ш.	Initial calibration	SW	7. RSD FY
IV.	Continuing calibration/ICV	WZ	CON £25 2
V.	Blanks	_SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SN)	No associated sample, No gral
VIII.	Laboratory control samples	-CM)	us
IX.	Regional Quality Assurance and Quality Control	N	
Χ.	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	ZW	D, = 3,4 D2 = 11,12 D3 = 18,4
XVII.	Field blanks	SW	$D_1 = 3.4$ $D_2 = 11.12$ $D_3 = 18.9$ EB = 22 $TB = 23, 24, 25, 26$ $FB = FB072904-50$

Note: 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:

cail + Water

		2011	***							
1 1	SA58-0.5B	٤	11 1	RSAU7-0.5B	Dy 5	21	SA204-45B	ک	31 1	169909-MB
2 1	SA58-10B	k 7	12	RSAU7009-0.5B	$\mathcal{O}_{\boldsymbol{\gamma}}$	1 × 22 >	EB090309-SO2	W	↓ 32 γ	170003-
3 1	SA58009-28B	b' ₁	13 \	RSAU7-10B		- 23 2	TB090309-SO1	i	33 y	170142_
4	SA58-28B	D_{l}	14 3	RSAU7-25B		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	TB090309-SO2		# 34 £	17023>- +
₅ 1	SA53-10B		153	RSAU7-40B		25 >	TB090309-SO3		35	
6	SA53-25B		16 3	RSAU7-54B		₂₆ >	TB090309-SO4		36	
7 l	SA53-32B		17	SA204-0.5B		27			37	
8 1	SA106-12B		18	SA204-10B	0 >	28			38	
9	SA106-20B		19 3	SA204009-10B	b,	29			39	
10	SA106-35B	4	20 3	SA204-30B	٧	30			40	

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

V. Berzzene PP. Bromochloromentane JJJ. 1.2-Olchloropozane A. C. V. Encardiom** RR. Dibromorethane LLL. Hexachlorobusdiene A. C. Y. 4-Methyl-2-pantanone RR. Dibromorethane LLL. Hexachlorobusdiene Z. 2-Hexanone TT. 1.2-Dibromocethane MMM. Naphthalene D. C. Toluene** VV. Hoppropybenzene PPP. trans-1.2-Dichlorobenzene BB. 1,12.2-Tetrachloroethane VV. Isopropybenzene PPP. trans-1.2-Dichloroethane C. Toluene** WV. Bromobenzene WW. Bromobenzene II. D. Chloroethane WW. Bromobenzene SS. 5. Aylenes EE. Ethyldenzene** VV. L. 2.3-Trichloroponene RRR m.p. Xylenes D. Chloroethane VY. A. 1.2.3-Trimeltylbenzene SS. 6. Xylenes HH. Vinyl acotate BBB. 4-Chlorotoluene VVV. 4-Ethyllouene HH. Vinyl acotate BBB. 4-Chlorotoluene VVV. 4-Ethyllouene JJ. Dichlorofuluromethane CCC. tert-Burylbenzene VVV. 4-Ethyllouene KK. Trichlorofuluromethane EEE. sec-Burylbenzene VVV. 4-Ethyllouene LL. Methyl-tert-buryl ether GCG. tert-Burylbenzene VVV. 4-Ethyllouene <t< th=""><th>A. Chloromethane*</th><th>U. 1,1,2-Trichloroethane</th><th>OO. 2,2-Dichloropropane</th><th>III. n-Butylbenzene</th><th>CCCC.1-Chlorohexane</th></t<>	A. Chloromethane*	U. 1,1,2-Trichloroethane	OO. 2,2-Dichloropropane	III. n-Butylbenzene	CCCC.1-Chlorohexane
W. trans-1,3-Dichloropropene WKK. 1,2-4-Trichloroberzene A. E. Y. 4-Methyl-2-pentanone RR. Dibonomethane LLL. Herachlorobusdiene 2. 2-Hexanone TT. 1,2-Dichloropropene MMM. Naphthalene A.A. Tetrachlorobthane TT. 1,2-Dichloropropene MMM. 1,2,3-Trichloroberzane BB. 1,1,2,2-Tetrachloroethane UU. 1,1,1,2-Tetrachloroethane NV. Isopropythanzane C.C. Tolune** WW. Bromoberzane PPP. trans-1,2-Dichloroethane DD. Chloroberzane** WV. Isopropythanzane RRR. m.p-Xylenes FF. Styrene XX. 1,2,3-Trichloropropane RRR. m.p-Xylenes FF. Styrene ZZ. 2-Chlorotoluene TTT. 1,2-Trichloroethane GG. Xylenes, total AAA. 1,3,5-Trimethythenzane VVV. 4-Eityfroluene HH. Vinyl acetate CC. Istr-Burylbenzane VVV. 4-Eityfroluene MK. Trichlorofulkuoromethane EE. so-Burylbenzane VVV. 4-Eityfroluene MK. Trichlorofulkuoromethane EE. so-Burylbenzane VVV. 4-Eityfroluene MMI. 1,2-Dichromo-3-chloropane GGG, p-lacopyfoluene AAAA. 1,3-Particlorobenzane	B. Bromomethane	V. Benzene	PP. Bromochloromethane	JJJ. 1,2-Dichlorobenzene	DDDD. Isopropyt alcohol
A. A. Tetrachloroethene R.R. Dibomomethane LLL. Hexachlorobuladiene 2. 2-Hexanone S.S. 1,3-Dichloropropene MMM. Naphthalene A. Tetrachloroethene TT. 1,2-Dibromoethane NNN. 1,2,3-Trichlorobarzane BB. 1,1,2,2-Tetrachloroethane VV. Isopropy/benzane PPP. Irane-1,2-Dichloroethene CC. Toluene** WW. Bromobertzene PPP. Irane-1,2-Dichloroethene DD. Chlorobertzene** XX. 1,2,3-Trichloropthane RRR. m,p-Xylenes FF. Styrene ZZ. 2-Chlorotoluene TTT. 1,1,2-Trichloro-1,2-2-trifluoroethane GG. Xylenes, total AAA. 1,3,5-Trimethythenzene VVV. 4-Ethytioluene HH. Vinyl scelate BBB. 4-Chlorotoluene VVV. 4-Ethytioluene MG. Xylenes, total CCC. 1ert-Butylbenzene XXX. Di-soporopy ether MG. Xylenes, total CCC. 1ert-Butylbenzene XXX. Di-soporopy ether MA. 1, 2-Chloroethylene XXX. Di-soporopy ether KK. Trichlorofluoromethane EEE. sec-Butylbenzene YYY: 1ert-Butyl ether KK. Trichlorofluoromethane EEE. sec-Butylbenzene XXX. Di-soporopy ether KK. Trichlorophorophane GGG. p-loopopyritoluene XXX. Di-soporopy ether	C. Vinyl choride**	W. trans-1,3-Dichloropropene	QQ. 1,1-Dichloropropene	KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
Ane Y. 4-Methyl-2-pertanone SS. 1,3-Dichloropropene MMMI. Naphthalene Z. 2-Hexanone TT. 1,2-Dibromoethane NINI. 1,2-Trichlorobenzane AA. Tetrachloroethane UU. 1,1,1,2-Tetrachloroethane OOO. 1,3,5-Trichlorobenzane BB. 1,1,2-2-Tetrachloroethane WW. Bromobenzane PPP. trans. 1,2-Dichloroethane I CC. Toluene** WW. Bromobenzane RRR. mp.Xylenes I DD. Chlorobenzane** XX. 1,2,3-Trichloropropane RRR. mp.Xylenes EE. Ethylbenzane** YY. n-Propylbenzane SSS. o-Xylene FF. Styrene ZZ. 2-Chlorotoluene TTT. 1,1,2-Trichloro-1,2-Lrifluoroethane GG. Xylenes, total AAA. 1,3,5-Trimethylbenzane UUU. 1,2-Dichlorotetrafluoroethane HH. Vinyl sociate BBB. 4-Chlorotoluene VWV. 4-Ethyltoluene JJ. Dichlorodifluoromethane EEE. sec-Butylbenzane VWY. Ethanol II. 2-Chloroethylvinyl ether EEE. sec-Butylbenzane XXX. Di-sopropyl ether KK. Trichlorofluoromethane EEE. sec-Butylbenzane XXX. Di-sopropyl ether KM. 12-Dibromo-3-chloropene GGG. p-Isopropylioluene XXX. Zu-Butyl ethyl eth	D. Chloroethane	X. Bromoform*	RR. Dibromomethane	LLL. Hexachlorobutadiene	FFF. Acrolein
2. 2-Hexanone TT. 1.2-Dibromoethane NNN. 1.2.3-Trichlorobenzene AA. Tetrachloroethane* UU. 1.1.1.2-Tetrachloroethane 0.00. 1.3.5-Trichlorobenzene BB. 1.1.2-2-ferrachloroethane* VV. Isopropy/benzene PPP. trans-1,2-Dichloroethene CC. Toluene* WW. Bromobenzene QQO. ds-1,2-Dichloroethene PD. Chlorobenzane** XX. 1,2,3-Trichloropthene RRR. m,p-Xylenes FE. Ethylbenzane** YY. n-Propy/benzene SSS. 0-Xylenes FF. Sylvene ZZ. 2-Chlorotoluene TTT. 1,1,2-Trichloro-1,2-Urilluoroethane FF. Sylvene ZZ. 2-Chlorotoluene TTT. 1,1,2-Trichloro-1,2-Urilluoroethane HH. Vinyl acetate BBB. 4-Chlorotoluene VVV. 4-Ethyritoluene JJ. Dichloroethyvinyl ether CCC tert-Buty/benzene XXX. Di-tsopropyl ether KK. Trichlorofluoromethane EEE. sec-Buty/benzene XXX. Di-tsopropyl ether KK. Trichlorofluoromethane FFF. 1,3-Dichlorobenzene XXX. Di-tsopropyl ether MM. 1,2-Dibromo-3-chloropopane GGG. P-Isopropyritoluene AAAA. Ethyl tert-butyl ether	E. Methyene chonder + hane	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG. Acrylonitrile
AA. Tetrachloroethane UU. 1,1,1.2-Tetrachloroethane OOO. 1,3,5-Trichlorobenzane BB. 1,1,2,2-Tetrachloroethane* VV. Isopropy/benzane PPP. trans-1,2-Dichloroethane C.C. Toluene** WW. Bromobenzane QQO. cis-1,2-Dichloroethane D. Chlorobenzane** XX. 1,2,3-Trichloropropane RRR. m,p-Xylenes EE. Ethylbenzane** YY. n-Propylbenzane SSS. c-Xylenes FF. Styrene ZZ. 2-Chlorotoluene TTT. 1,2-Trichloro-1,2,2-trifluoroethane GG. Xylenes, total AAA. 1,3,5-Trimethylbenzane UUU. 1,2-Dichlorotetrafluoroethane HH. Vinyl acetate BBB. 4-Chlorotoluene VVV. 4-Ethyltoluene M. Dichlorodifluoromethane CCC. tert-Butylbenzane VYY. 4-Ethyltoluene KK. Trichlorothanethane EEE. sec-Butylbenzane XXX. Di-isopropyl ether KK. Trichlorothuromethane EEE. sec-Butylbenzane XXX. Di-isopropyl ether MM. 1,2-Dibromo-3-chloropropane GGG. Pisopropyltoluene AAAA. Ethyl tert-butyl ether	F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN. 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
BB. 1,1,2,2-Tetrachloroethane* VV. Isopropy/benzene PPP. trans-1,2-Dichloroethene CC. Toluene** WW. Bromobenzene QQQ. cis-1,2-Dichloroethene DD. Chlorobenzene** XX. 1,2,3-Trichloropropane RRR. m,p-Xylenes EE. Ethylbenzene** YY. n-Propylbenzene RRR. m,p-Xylenes FF. Styrene ZZ. 2-Chlorotoluene TTT. 1,1,2-Trichloro-1,2,2-trifluoroethene HH. Vinyl acetate AAA. 1,3,5-Trimethylbenzene UUU. 1,2-Dichlorotetrafluoroethene HH. Vinyl acetate BBB. 4-Chlorotoluene VVV. 4-Ethyltoluene JJ. Dichlorodifluoromethane CCC. tert-Butylbenzene WWW. Ethanol NK. Trichlorofluoromethane EEE. sec-Butylbenzene XXX. Di-isopropyl ether NK. Trichlorofluoromethane EEE. sec-Butylbenzene XXX. Di-isopropyl ether MM. 1,2-Dibromo-3-chloropone GGG. p-Isopropyltoluene AAAA. Ethyl tert-butyl ether	G. Carbon disuffide	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachlomethane	000. 1,3,5-Trichlorobenzene	IIII. Isobutyl alcohol
CC. Toluene** WW. Bromobenzene QQQ. cis-1,2-Dichloroethene IDD. Chlorobenzene** XX. 1,2,3-Trichloropropane RRR. m,p-Xylenes EE. Ethylbenzene** YY. n-Propylbenzene SSS. o-Xylene FF. Styrene ZZ. 2-Chlorotoluene TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane GG. Xylenes, total AAA. 1,3,5-Trimethylbenzene UUU. 1,2-Dichlorotetrafluoroethane HH. Vinyl acetate BBB. 4-Chlorotoluene VVV. 4-Ethyttoluene HH. Vinyl acetate BBB. 4-Chlorotoluene VVV. 4-Ethyttoluene III. 2-Chloroethyvinyl ether CCC. tert-Butylbenzene VVV. 4-Ethyttoluene VKX. Trichlorofluoromethane EEE. sec-Butylbenzene XXX. Di-isopropyl ether VKX. Trichlorophane EEE. sec-Butylbenzene YYY. tert-Butanol ULL. Methyl-tert-butyl ether FFF. 1,3-Dichlorobenzene ZZZ. tert-Butyl ether MMI. 1,2-Dibromo-3-chloropopane GGG. p-Isopropytioluene AAAA. Ethyl tert-butyl ether	H. 1,1-Dkchloroethene**	BB. 1,1,2,2-Tetrachloroethane*	VV. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
ID. Chlorobenzane** XX. 1,2,3-Trichloropropane RRR. m,p-Xylenes EE. Ethylbenzane** YY. n-Propylbenzene SSS. o-Xylene FF. Styrene ZZ. 2-Chlorotoluene TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane IH. Vinyl acotate AAA. 1,3,5-Trimethylbenzene UUU. 1,2-Dichlorotetrafluoroethane II. 2-Chlorodifluoromethane CCC. tert-Butylbenzene WWW. Ethyritoluene III. Dichlorodifluoromethane DDD. 1,2,4-Trimethylbenzene XXX. Di-laopropyl ether KK. Trichlorofluoromethane EEE. sec-Butylbenzene YYY. tert-Butanol LL. Methyl-tert-butyl ether FFF. 1,3-Dichlorobenzene ZZZ. tert-Butyl alcohol MM. 1,2-Dibromo-3-chloropropane GGG. P-Isopropyltoluene AAAA. Ethyl tert-butyl ether	I. 1,1-Dichloroethane*	CC. Toluene**	WW. Bromobenzene	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
EE. Ethylbenzene** YY. n-Propylbenzene SSS. o-Xylene FF. Styrene ZZ. 2-Chlorotoluene TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane GG. Xylenes, total AAA. 1,3,5-Trimethylbenzene UUU. 1,2-Dichlorotetrafluoroethane II. 2-Chloroethylvinyl ather CCC. tert-Butylbenzene WWW. Ethanol JJ. Dichlorodifluoromethane DDD. 1,2,4-Trimethylbenzene XXX. Di-Isopropyl ether KK. Trichlorothuromethane EEE. sec-Butylbenzene YYY: tert-Butyl alcohol MM. 1,2-Dibromo-3-chloropopane GGG. p-Isopropyltoluene AAAA. Ethyl tert-butyl ether	J. 1,2-Dichloroethene, total	DD. Chlorobenzene*	XX. 1,2,3-Trichloropropane	RRR. m,p-Xylenes	LLLL. Ethyl ether
FF. Styrene ZZ. 2-Chlorotoluene TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane GG. Xylenes, total AAA. 1,3,5-Trimethylbenzene UUU. 1,2-Dichlorotetrafluoroethane HH. Vinyl acetate BBB. 4-Chlorotoluene VVV. 4-Ethyltoluene II. 2-Chloroethylvinyl ether CCC. tert-Butylbenzene WWW. Ethanol JJ. Dichlorodifluoromethane DDD. 1,2,4-Trimethylbenzene XXX. Di-laopropyl ether KK. Trichlorofluoromethane EEE. sec-Butylbenzene YYY. tert-Butanol LL. Methyl-tert-butyl ether FFF. 1,3-Dichlorobenzene ZZZ. tert-Butyl alcohol MM. 1,2-Dibromo-3-chloropropane GGG. p-Isopropyltoluene AAAA. Ethyl tert-butyl ether	K. Chloraform**	EE. Ethylbenzene**	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
GG, Xylenes, total AAA. 1,3,5-Trimethylbenzene UUU. 1,2-Dichlorotetrafluoroethane HH. Vinyl acetate BBB. 4-Chlorotoluene VVV. 4-Ethyltoluene II. 2-Chloroethylvinyl ather CCC. tert-Butylbenzene WWW. Ethanol JJ. Dichlorodifluoromethane DDD. 1,2,4-Trimethylbenzene XXX. Di-Isopropyl ether KK. Trichlorofluoromethane EEE. sec-Butylbenzene YYY. tert-Butanol LL. Methyl-tert-butyl ether FFF. 1,3-Dichlorobenzene ZZZ. tert-Butyl alcohol MM. 1,2-Dibromo-3-chloropropane GGG. p-Isopropytioluene AAAA. Ethyl tert-butyl ether	L. 1,2-Dichloroethane	FF. Styrene	ZZ. 2-Chlorotoluene	TTT. 1,1,2-Trichioro-1,2,2-trifluoroethane	NNNN. 2-Methyl-2-propanol
HH. Vinyl acetate BBB. 4-Chlorotoluene VvV. 4-Ethyttoluene II. 2-Chloroethylvinyl ether CCC. tert-Butylbenzene WWW. Ethanol JJ. Dichlorodifluoromethane DDD. 1,2,4-Trimethylbenzene XXX. Di-isopropyl ether KK. Trichlorofluoromethane EEE. sec-Butylbenzene YYY. tert-Butanol LL. Methyl-tert-butyl ether FFF. 1,3-Dichlorobenzene ZZZ. tert-Butyl alcohol MM. 1,2-Dibromo-3-chloropropane GGG. p-Isopropyltoluene AAAA. Ethyl tert-butyl ether	M. 2-Butanone	GG, Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000.
II. 2-Chloroethylvinyl ether CCC. tert-Butylbenzene WWW. Ethanol JJ. Dichlorodifluoromethane DDD. 1,2,4-Trimethylbenzene XXX. Di-isopropyl ether KK. Trichlorofluoromethane EEE. sec-Butylbenzene YYY. tert-Butanol LL. Methyl-tert-butyl ether FFF. 1,3-Dichlorobenzene ZZZ. tert-Butyl alcohol MM. 1,2-Dibromo-3-chloropropane GGG. p-Isopropyltoluene AAAA. Ethyl tert-butyl ether	N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chiorotoluene	VVV. 4-Ethyttoluene	рррр.
JJ. Dichlorodifluoromethane DDD. 1,2,4-Trimethylbenzene XXX. Di-isopropyl ether KK. Trichlorofluoromethane EEE. sec-Butylbenzene YYY. tert-Butanol LL. Methyt-tert-butyl ether FFF. 1,3-Dichlorobenzene ZZZ. tert-Butyl alcohol MM. 1,2-Dibromo-3-chloropropane GGG. p-isopropytioluene AAAA. Ethyl tert-butyl ether	O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	ଉବଦଦ.
KK. Trichlorofluoromethane EEE. sec-Butytbenzene YYY. tert-Butanol LL. Methyt-tert-butyl ether FFF. 1,3-Dichlorobenzene ZZZ. tert-Butyl alcohol MM. 1,2-Dibromo-3-chloropropane GGG. p-Isopropytfoluene AAAA. Ethyl tert-butyl ether	P. Bromodichloromethane	JJ, Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRR.
LL. Methyl-tert-butyl ether FFF. 1,3-Dichlorobenzene ZZZ. tert-Butyl akohol MM. 1,2-Dibromo-3-chloropropane GGG. p-Isopropytfoluene AAAA. Ethyl tert-butyl ether	Q. 1,2-Dichloropropane**	KK. Trichlorofluoromethane	EEE. sec-Buty/benzene	YYY, tert-Butanol	SSSS.
MM. 1,2-Dibromo-3-chloropropane GGG, p-Isopropytioluene AAAA. Ethyl tert-butyl ether	R. cls-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Buty/ alcohol	TTTT.
	S. Trichloroethen®	MM. 1,2-Dibromo-3-chloropropane	GGG. p-Isopropyttoluene	AAAA. Ethyl tert-butyl ether	טטטט.
i NN. Methyl ethyl ketone i HHH. 1,4-Dichlorobenzene BBBB. tอส-Amyl methyl ether	T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amy methyl ether	ww.

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

VALIDATION FINDINGS WORKSHEE! Initial Calibration

Taye. Reviewer: 2nd Reviewer:

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

DC#:

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

sPcc's?		Qualifications	3/45/A (C)												
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? Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's?		Associated Samples	22, 23, 25, 26, 1700 3-MB		- 1	74 110-22-MP									
Did the laboratory perform a 5 point calibration prior to sample analysis? Were percent relative standard deviations (%RSD) and relative response factors (RRF) within methods a control of the secondary for evaluation?	Was a curve in used to evaluation in 100, mild most the initial calibration meet the acceptance criteria? Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF?	Finding RRF (Limit: >0.05)	0, 027		İ	0,017									
n prior to sample analysis? RSD) and relative response	criteria? on criteria of ≤30 %F	Finding %RSD													
m a 5 point calibration andard deviations (%I	meet the acceptance Fs within the validation	Compound	7272			マススフ									
Did the laboratory perform a 5 point calibration prior Were percent relative standard deviations (%RSD) and the standard deviations (%RSD) and the standard laboratory of the standard standard was what was	Was a curve in used for evaluation in 3cs, which was a Did the initial calibration meet the acceptance criteria? Were all %RSDs and RRFs within the validation criteria	Gi brahada	ICA1	447		187)									
N/A N/A	N N N N N N N N N N N N N N N N N N N		8			7/7/09									

21991C SDG #: 22 C2 LDC#:

VALIDATION FINDINGS WORKSHEET Continuing Calibration

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 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?

N N N N

	(c)	7								7	<u>-</u> -}							
Qualifications	J-ACTS /A			J/MI /A	5+ det 4			J+ 11th A	J/115 12	J+000	7							
Associated Samples	1-13, 169909-MB			22 23 25 26,	170003-MB			24 170232-MB			Î							
Finding RRF (Limit: >0.05)				5,000					810 Q									
Finding %D (Limit: <25.0%)	5'58				30.1			29.2		27.9	30,67							
Compound	(+) ZZ			7 2 2 7	(+) L	,		kk (+)	マママス	(t) 711								
Standard ID	10701			10202				F2540										
Date	9/1/bg	-		69 W6				9/4/69	,	,								+
•		T	T	Ť	T	Γ	Г	T	Γ	Γ			Γ	Γ				1

LDC #: 21 941C1 SDG #:

VALIDATION FINDINGS WORKSHEET

Page: Reviewer:_ 2nd Reviewer:

Blanks

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

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

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

Conc. units:

22,23 Associated Samples:

ろと 25

Compound	Blank ID	Sample Identification
	170003-MB	
777	0, 30	
Blank analysis date: 9 /4 /69 Conc. units: 49 /		Associated Samples: 24 (MD)

Sample Identification 170232-MB Blank ID 0,35 0,29 アトト ZZ Compound

15	2
1012	J
DC #:	SDG #:

VALIDATION FINDINGS WORKSHEET Field Blanks

Page: of 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?
Blank units: 49 Associated sample units: 49 Associated sample units: 49 Associated sample units: 49 Associated sample units: 49 Associated sample units: 49 Associated sample units: 49 Associated sample units: 49 Associated sample units: 49 Associated sample units: 49 Associated sample units: 49 Associated sample units: 49 Associated sample units: 49 Associated sample units: 49 Associated sample units: 49 Associated sample units: 49 Associated sample units: 40 Associated samp

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

17-11 Associated Samples: 弘

	Compound	Blank ID 22	Blank 10				Sample Identification	ification			
	Sampling Date	9/02/01		7	13	9	20				
	ட	2	12/4	n/ 11	1782	3,1/4	14 /4				
	ш	0, 27									
				(AT O the	7	(e					
									;		
									:		
	Blank units: 46 /L Associated sample units: Field blank type: (circle one) (Field Blank Arinsate /	ociated samp	ale units: 2	いらんと Trip Blank / Other:	Jer:	Associ	Associated Samples:	21-1	٥	(+9)	
	Compound	FB072901-SD Blank ID Blank ID	So Blank-to				Sample Identification	ification			
	Sampling Date	7/20/69		N	4	2	8				
	1	3'5		3.4 /4	6,6/4	h/5.9					
	· B	0€′0									
) Ke	3	0.44	n/25.0				0.65/4				
			CAII OTHERS	rs ein	her MD	W.	> FB				

/2/	
21 901	j
LDC #:	SDG #:

VALIDATION FINDINGS WORKSHEET

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

† q

12 -11

Field Blanks

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

Note: Were target compounds detected in the field blanks?

Blank units: 49/L Associated sample units: 45/E8

Field blank type: (circle one) Field Blank | Rinsate / Trip Blank / Other. Y N /N/A

Sample Identification Associated Samples: 7 3 F. B. 08 63 09 - S. Blank ID 8/03/69 30 3 O Sampling Date y Compound

S

Associated sample units: Blank units:

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

Sample Identification Associated Samples: Blank ID Blank ID Sampling Date Compound

LDC#: 21 441C/

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

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?

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	(7								(MX)	(l)	3													
Qualifications	J+dets/p (CM) 4/m3/p (ZW)	,												
Associated Samples	1-13 169969-MB)			22 23 25, 26	170003-MP			14-21 17142-418															
RPD (Limits)	()	()	()	()	()	()	())	()	()	()	()	()	()	[()	()	()	()	()	()	()	()	()	(
LCSD %R (Lmits)		()	()	()	()	()	()		()	()	()] (()	()	()	()	()	()	()	()	()	()	()	
LCS %R (Umits)	(251-52) 601	127 ()	[(])	()	134 ()	130 ()	()		() 87	1) >1	1 (/) 901	(,)	()	()	()	()	()	()	()	()	()	()	()	()
Compound	μ.	U	-		В	1			+	∢	MMM													
CS/LCSD ID	527-606691.				17 0003 - 465				170142-145															
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VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:	lof1_
Reviewer:	JV6
2nd reviewer:	4

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

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

		Concentrati	on (Mg/key)		Parent
Compound		3	4	RPD	only
	F	3.4	6.4	3,2 (٤ 30 0)	_
	K	3.4	3, 8	6,4 (= 7.6)	_
	E	7.6 U	1,2	6.4	
	cc	1-8	6.7U	4,9 (=6.70)	

		Concentrat	ion (45/kg)	
Compound		11	12	RPD
	M	1.8	0.92	0.88 (£14D) -
	F	1.2	11	1.0 (=270) -
	cc	2.8	1.6	1.7 (= 6.80) -

		Concentration	ug/kg)	
Compound		18	19	RPD
-	M	3. 4	134	9.6 (4130) -
	cc	1,0	6, 4 U	5.4 (46.4D) -
			5	

	Concentration ()	
Compound		RPD

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date: September 10, 2009

LDC Report Date: December 7, 2009

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905177

Sample Identification

EB091009-SO1 SA126-40B
EB091009-SO2 TB091009-SO2
SA102-10B TB091009-SO3
SA102-30B TB091009-SO4
SA109-10B TB091009-SO5
SA109-25B SA126-40BMS
SA109-25BDL SA126-40BMSD

SA109-25BDL SA109-34B SA124009-10B SA124-0.5B SA124-10B SA125-25B SA125-39B

SA125009-39B SA125-0.5B

SA125-10B

SA126-0.5B

SA126-10B

SA126-18B SA126-25B

Introduction

This data review covers 21 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^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
7/17/09	2-Methyl-2-propanol	0.017 (≤0.05)	All water samples in SDG R0905177	J (all detects) UJ (all non-detects)	А
9/18/09	2-Methyl-2-propanol	0.028 (≤0.05)	SA109-25BDL 171659-MB	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
9/18/09 (H0910)	Hexachlorobutadiene	26.1	SA102-10B SA102-30B SA109-10B SA109-25B 170888-MB	J- (all detects) UJ (all non-detects)	A
9/19/09	Hexachlorobutadiene 1,2,3-Trichlorobenzene	35.2 27.1	SA109-34B SA124009-10B SA124-0.5B SA124-10B SA125-25B SA125-39B SA125-0.5B SA125-0.5B SA126-40B SA126-40BMS SA126-40BMSD 171072-MB	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	Α
9/18/09 (F2667)	2-Methyl-2-propanol	29.4	EB091009-SO1 EB091009-SO2 TB091009-SO2 TB091009-SO3 170939-MB	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
9/18/09 (F2667)	2-Methyl-2-propanol	0.022 (≥0.05)	EB091009-SO1 EB091009-SO2 TB091009-SO2 TB091009-SO3 170939-MB	J (all detects) UJ (all non-detects)	А
9/18/09 (F2693)	2-Methyl-2-propanol	0.020 (≥0.05)	TB091009-SO4 TB091009-SO5 170939-MB	J (all detects) UJ (all non-detects)	A
9/23/09	2-Methyl-2-propanol	0.027 (≥0.05)	SA109-25BDL 171659-MB	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
170936-MB	9/18/09	1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene Acetone Bromomethane Naphthalene	0.29 ug/L 0.21 ug/L 2.8 ug/L 0.42 ug/L 0.31 ug/L	EB091009-SO1 EB091009-SO2 TB091009-SO2 TB091009-SO3
170939-MB	9/19/09	1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene Naphthalene	0.33 ug/L 0.28 ug/L 0.32 ug/L	TB091009-SO4 TB091009-SO5
171110-MB	9/21/09	Dichloromethane	0.77 ug/Kg	SA125-10B SA126-0.5B SA126-10B SA126-18B SA126-25B
171659-MB	9/23/09	2-Butanone	80 ug/Kg	SA109-25BDL

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
EB091009-SO1	Acetone	4.7 ug/L	4.7U ug/L
EB091009-SO2	Acetone	4.0 ug/L	4.0U ug/L
SA109-25BDL	2-Butanone	170 ug/Kg	170U ug/Kg

Samples TB091009-SO2, TB091009-SO3, TB091009-SO4, and TB091009-SO5 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
TB091009-SO3	9/10/09	Acetone	6.9 ug/L	EB091009-SO1 EB091009-SO2 SA102-10B SA102-30B SA109-10B SA109-25B SA109-25BDL SA109-34B SA124-009-10B SA124-0.5B SA124-10B SA125-25B SA125-39B SA125-39B SA125-0.5B SA125-10B SA126-10B SA126-10B SA126-10B SA126-10B SA126-10B SA126-25B SA126-25B SA126-40B
TB091009-SO4	9/10/09	Acetone	2.4 ug/L	EB091009-SO1 EB091009-SO2 SA102-10B SA102-30B SA109-10B SA109-25B SA109-25BDL SA109-34B SA124-0.5B SA124-10B SA125-25B SA125-39B SA125-39B SA125-0.5B SA125-10B SA126-10B SA126-10B SA126-0.5B SA126-0.5B SA126-0.5B

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

Sample	Compound	Reported Concentration	Modified Final Concentration
EB091009-SO1	Acetone	4.7 ug/L	4.7U ug/L
EB091009-SO2	Acetone	4.0 ug/L	4.0U ug/L
SA109-10B	Acetone	5.5 ug/Kg	5.5U ug/Kg

Sample	Compound	Reported Concentration	Modified Final Concentration
SA109-25B	Acetone	13 ug/Kg	13U ug/Kg
SA109-34B	Acetone	13 ug/Kg	13U ug/Kg
SA125-10B	Acetone	8.9 ug/Kg	8.9U ug/Kg
SA126-0.5B	Acetone	4.8 ug/Kg	4.8U ug/Kg
SA126-25B	Acetone	12 ug/Kg	12U ug/Kg

Samples EB091009-SO1 and EB091009-SO2 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
EB091009-SO1	9/10/09	1,4-Dichlorobenzene Acetone Benzene Dichloromethane Toluene	0.51 ug/L 4.7 ug/L 0.36 ug/L 8.3 ug/L 1.9 ug/L	All soil samples in SDG R0905177
EB091009-SO2	9/10/09	Acetone Toluene Trichlorofluoromethane	4.0 ug/L 0.32 ug/L 4.4 ug/L	All soil samples in SDG R0905177

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

Sample	Compound	Reported Concentration	Modified Final Concentration
SA102-10B	Toluene	0.48 ug/Kg	0.48U ug/Kg
SA102-30B	Toluene	0.50 ug/Kg	0.50U ug/Kg
SA109-10B	Acetone Toluene	5.5 ug/Kg 0.58 ug/Kg	5.5U ug/Kg 0.58U ug/Kg
SA109-25B	Dichloromethane Toluene	0.80 ug/Kg 0.82 ug/Kg	0.80U ug/Kg 0.82U ug/Kg
SA109-34B	Toluene	0.58 ug/Kg	0.58U ug/Kg

Sample	Compound	Reported Concentration	Modified Final Concentration
SA124009-10B	Toluene	0.49 ug/Kg	0.49U ug/Kg
SA124-0.5B	Toluene	1.3 ug/Kg	1.3U ug/Kg
SA124-10B	Toluene	3.7 ug/Kg	3.7U ug/Kg
SA125-25B	Toluene	0.36 ug/Kg	0.36U ug/Kg
SA125-39B	Dichloromethane Toluene	0.55 ug/Kg 0.48 ug/Kg	0.55U ug/Kg 0.48U ug/Kg
SA125009-39B	Trichlorofluoromethane	1.8 ug/Kg	1.8U ug/Kg
SA125-0.5B	Toluene	0.47 ug/Kg	0.47U ug/Kg
SA125-10B	Acetone Trichlorofluoromethane	8.9 ug/Kg 1.8 ug/Kg	8.9U ug/Kg 1.8U ug/Kg
SA126-0.5B	Acetone Toluene	4.8 ug/Kg 0.61 ug/Kg	4.8U ug/Kg 0.61U ug/Kg
SA126-10B	Toluene	1.0 ug/Kg	1.0U ug/Kg
SA126-18B	Toluene	0.45 ug/Kg	0.45U ug/Kg
SA126-25B	Toluene	0.49 ug/Kg	0.49U ug/Kg
SA126-40B	Toluene	0.53 ug/Kg	0.53U ug/Kg

Sample FB072909-SO (from SDG R0904226) 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
FB072909-SO	7/29/09	Acetone Dichloromethane Toluene	3.5 ug/L 0.30 ug/L 0.44 ug/L	All soil samples in SDG R0905177

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
SA102-10B	Toluene	0.48 ug/Kg	0.48U ug/Kg
SA102-30B	Toluene	0.50 ug/Kg	0.50U ug/Kg
SA109-10B	Acetone Toluene	5.5 ug/Kg 0.58 ug/Kg	5.5U ug/Kg 0.58U ug/Kg
SA109-25B	Toluene	0.82 ug/Kg	0.82U ug/Kg
SA109-34B	Toluene	0.58 ug/Kg	0.58U ug/Kg
SA124009-10B	Toluene	0.49 ug/Kg	0.49U ug/Kg
SA125-25B	Toluene	0.36 ug/Kg	0.36U ug/Kg
SA125-39B	Dichloromethane Toluene	0.55 ug/Kg 0.48 ug/Kg	0.55U ug/Kg 0.48U ug/Kg
SA125-0.5B	Toluene	0.47 ug/Kg	0.47U ug/Kg
SA126-0.5B	Acetone Toluene	4.8 ug/Kg 0.61 ug/Kg	4.8U ug/Kg 0.61U ug/Kg
SA126-18B	Toluene	0.45 ug/Kg	0.45U ug/Kg
SA126-25B	Toluene	0.49 ug/Kg	0.49U ug/Kg
SA126-40B	Toluene	0.53 ug/Kg	0.53U 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
SA126-40BMS/MSD (SA126-40B)	Dichlorodifluoromethane	49 (70-130)	49 (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
170936-LCS	2-Methyl-2-propanol	130 (75-125)	EB091009-SO1 EB091009-SO2 TB091009-SO2 TB091009-SO3 170936-MB	J+ (all detects)	Р
170936-LCS	Dichlorodifluoromethane	70 (75-125)	EB091009-SO1 EB091009-SO2 TB091009-SO2 TB091009-SO3 170936-MB	J- (all detects) UJ (all non-detects)	Р
170939-LCS	Dichlorodifluoromethane	64 (75-125)	TB091009-SO4 TB091009-SO5 170939-MB	J- (all detects) UJ (all non-detects)	Р
170888-LCS	Carbon tetrachloride Dichlorodifluoromethane	66 (75-125) 71 (75-125)	SA102-10B SA102-30B SA109-10B SA109-25B 170888-MB	J- (all detects) UJ (all non-detects)	Р
171072-LCS	Dichlorodifluoromethane	73 (75-125)	SA109-34B SA124009-10B SA124-0.5B SA124-10B SA125-25B SA125-39B SA125-009-39B SA125-0.5B SA126-40B 171072-MB	J- (all detects) UJ (all non-detects)	Р
171110-LCS	Dichlorodifluoromethane	67 (75-125)	SA125-10B SA126-0.5B SA126-10B SA126-18B SA126-25B 171110-MB	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 with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
SA109-25B	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 R0905177	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

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
SA109-25B	Chloroform	×	Α
SA109-25BDL	All TCL compounds except Chloroform	X	А

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

XVI. Field Duplicates

Samples SA124009-10B and SA124-10B and samples SA125-39B and SA125009-39B were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concentrati	on (ug/Kg)	555	D:#		
Compound	SA124009-10B	SA124-10B	RPD (Limits)	Difference (Limits)	Flags	A or P
2-Butanone	1.3	1.6	-	0.3 (≤13)	-	-
Acetone	63	19	-	44 (≤26)	J (all detects)	А
Chloroform	0.97	0.87	-	0.10 (≤6.5)	-	-
Toluene	0.49	3.7	-	3.21 (≤6.5)	-	-

	Concentration (ug/Kg)					
Compound	SA125-39B	SA125009-39B	RPD (Limits)	Difference (Limits)	Flags	A or P
Chloroform	44	41	7 (≤50)	-	-	-
Dichloromethane	0.55	4.8U	-	4.25 (≤4.8)	-	-
Toluene	0.48	4.8U	-	4.32 (≤4.8)	-	-
2-Butanone	11U	0.96	-	10.04 (≤11)		
Trichlorofluoromethane	5.6U	1.8	-	3.8 (≤5.6)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Data Qualification Summary - SDG R0905177

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905177	EB091009-SO1 EB091009-SO2 TB091009-SO2 TB091009-SO3 TB091009-SO4 TB091009-SO5 SA109-25BDL	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Initial calibration (RRF) (c)
R0905177	SA102-10B SA102-30B SA109-10B SA109-25B	Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	А	Continuing calibration (%D) (c)
R0905177	SA109-34B SA124009-10B SA124-0.5B SA124-10B SA125-25B SA125-39B SA125009-39B SA125-0.5B SA126-40B	Hexachlorobutadiene 1,2,3-Trichlorobenzene	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	A	Continuing calibration (%D) (c)
R0905177	EB091009-SO1 EB091009-SO2 TB091009-SO2 TB091009-SO3	2-Methyl-2-propanol	J+ (all detects)	А	Continuing calibration (%D) (c)
R0905177	EB091009-SO1 EB091009-SO2 TB091009-SO2 TB091009-SO3 TB091009-SO4 TB091009-SO5 SA109-25BDL	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Continuing calibration (RRF) (c)
R0905177	SA126-40B	Dichlorodifluoromethane	J- (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R) (m)
R0905177	EB091009-SO1 EB091009-SO2 TB091009-SO2 TB091009-SO3	2-Methyl-2-propanol	J+ (all detects)	Р	Laboratory control samples (%R) (I)

				_	
SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905177	EB091009-SO1 EB091009-SO2 TB091009-SO2 TB091009-SO3 TB091009-SO4 TB091009-SO5 SA109-34B SA124009-10B SA124-0.5B SA124-10B SA125-25B SA125-39B SA125-0.5B SA125-0.5B SA126-40B SA126-10B SA126-10B SA126-10B SA126-10B SA126-10B SA126-10B SA126-10B SA126-25B	Dichlorodifluoromethane	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0905177	SA102-10B SA102-30B SA109-10B SA109-25B	Carbon tetrachloride Dichlorodifluoromethane	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0905177	SA109-25B	Chloroform	J (all detects)	А	Project Quantitation Limit (e)
R0905177	EB091009-SO1 EB091009-SO2 SA102-10B SA102-30B SA109-10B SA109-25B SA109-25BDL SA109-34B SA124-009-10B SA124-0.5B SA124-10B SA125-25B SA125-39B SA125-39B SA125-0.5B SA125-10B SA126-10B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0905177	SA109-25B	Chloroform	х	A	Overall assessment of data (o)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905177	SA109-25BDL	All TCL compounds except Chloroform	x	А	Overall assessment of data (o)
R0905177	SA124-10B SA124009-10B	Acetone	J (all detects)	Α	Field duplicates (Difference) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Laboratory Blank Data Qualification Summary - SDG R0905177

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905177	EB091009-SO1	Acetone	4.7U ug/L	А	Ы
R0905177	EB091009-SO2	Acetone	4.0U ug/L	А	Ы
R0905177	SA109-25BDL	2-Butanone	170U ug/Kg	Α	Ы

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Trip Blank Data Qualification Summary - SDG R0905177

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905177	EB091009-SO1	Acetone	4.7U ug/L	А	bt
R0905177	EB091009-SO2	Acetone	4.0U ug/L	А	bt
R0905177	SA109-10B	Acetone	5.5U ug/Kg	А	bt
R0905177	SA109-25B	Acetone	13U ug/Kg	Α	bt
R0905177	SA109-34B	Acetone	13U ug/Kg	А	bt
R0905177	SA125-10B	Acetone	8.9U ug/Kg	А	bt
R0905177	SA126-0.5B	Acetone	4.8U ug/Kg	А	bt
R0905177	SA126-25B	Acetone	12U ug/Kg	Α	bt

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Equipment Blank Data Qualification Summary - SDG R0905177

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905177	SA102-10B	Toluene	0.48U ug/Kg	Α	be
R0905177	SA102-30B	Toluene	0.50U ug/Kg	А	be
R0905177	SA109-10B	Acetone Toluene	5.5U ug/Kg 0.58U ug/Kg	А	be
R0905177	SA109-25B	Dichloromethane Toluene	0.80U ug/Kg 0.82U ug/Kg	А	be
R0905177	SA109-34B	Toluene	0.58U ug/Kg	А	be
R0905177	SA124009-10B	Toluene	0.49U ug/Kg	А	be
R0905177	SA124-0.5B	Toluene	1.3U ug/Kg	А	be
R0905177	SA124-10B	Toluene	3.7U ug/Kg	А	be
R0905177	SA125-25B	Toluene	0.36U ug/Kg	А	be
R0905177	SA125-39B	Dichloromethane Toluene	0.55U ug/Kg 0.48U ug/Kg	A	be
R0905177	SA125009-39B	Trichlorofluoromethane	1.8U ug/Kg	А	be
R0905177	SA125-0.5B	Toluene	0.47U ug/Kg	А	be
R0905177	SA125-10B	Acetone Trichlorofluoromethane	8.9U ug/Kg 1.8U ug/Kg	А	be
R0905177	SA126-0.5B	Acetone Toluene	4.8U ug/Kg 0.61U ug/Kg	A	be
R0905177	SA126-10B	Toluene	1.0U ug/Kg	А	be
R0905177	SA126-18B	Toluene	0.45U ug/Kg	А	be
R0905177	SA126-25B	Toluene	0.49U ug/Kg	A	be
R0905177	SA126-40B	Toluene	0.53U ug/Kg	А	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Field Blank Data Qualification Summary - SDG R0905177

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905177	SA102-10B	Toluene	0.48U ug/Kg	А	bf
R0905177	SA102-30B	Toluene	0.50U ug/Kg	А	bf
R0905177	SA109-10B	Acetone Toluene	5.5U ug/Kg 0.58U ug/Kg	А	bf
R0905177	SA109-25B	Toluene	0.82U ug/Kg	А	bf
R0905177	SA109-34B	Toluene	0.58U ug/Kg	А	bf
R0905177	SA124009-10B	Toluene	0.49U ug/Kg	А	bf
R0905177	SA125-25B	Toluene	0.36U ug/Kg	А	bf
R0905177	SA125-39B	Dichloromethane Toluene	0.55U ug/Kg 0.48U ug/Kg	А	bf
R0905177	SA125-0.5B	Toluene	0.47U ug/Kg	А	bf
R0905177	SA126-0.5B	Acetone Toluene	4.8U ug/Kg 0.61U ug/Kg	А	bf
R0905177	SA126-18B	Toluene	0.45U ug/Kg	А	bf
R0905177	SA126-25B	Toluene	0.49U ug/Kg	А	bf
R0905177	SA126-40B	Toluene	0.53U ug/Kg	А	bf

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #:	21991D1	VALIDATION COMPLETENESS WORKS
SDG #:_	R0905177	Stage 2B
	mu Calumahia Amaludi	ical Caminas

Page: _of_\ Reviewer: _**3/** 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: 9/10/69
11.	GC/MS Instrument performance check	A	•
HI.	Initial calibration	ZM	3 RSD r
IV.	Continuing calibration/	WZ	cw = 25 }
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SM	
VIII.	Laboratory control samples	SW	· KS
IX.	Regional Quality Assurance and Quality Control	N	
Χ.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	2M	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	ZM	
XVI.	Field duplicates	SW	$D_1 = 9$, 11 $D_2 = 13,14$ EB = 1, 7 $TB = 22,23,24, 35 TB = FB = 10,12$
XVII.	Field blanks	∠M,	EB = 1, γ TB = 22,23, γ 4 χ 5 = FB 072 (R0 90

Note: A = Acceptable

N = Not provided/applicable

SW = See worksheet

plicable R = Rinsate et FB = Field blank D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

Water + Soil

	· · · · · ·	τ,	1 2011				
1	EB091009-SO1	J 11	4 SA124-10B D 1 S	21 4	SA126-40B	+ 31/	170936-MB
2	EB091009-SO2	/ 12	SA125-25B	22	TB091009-SO2 W	32	170888 -
3 7	SA102-10B	13	SA125-39B D~	23 1	TB091009-SO3	33	171659-
4 ٢	SA102-30B	14	⁴ SA125009-39B	+ 6	TB091009-SO4	34 4	171672-
5 7	SA109-10B	15	9 SA125-0.5B	25 6	TB091009-SO5	35	171110 -
6 ~	SA109-25B	16	SA125-10B	26 4	SA126-40BMS S	36	170 939-
7 3	SA109-25BDL	17	SA126-0.5B	27 4	SA126-40BMSD	37	
8 4	SA109-34B	18	SA126-10B	28		38_	
9 4	SA124009-10B 4	19	SA126-18B	29		39	
10 4	SA124-0.5B	20	SA126-25B	30		40	

ND = No compounds detected

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

B. Bromomethane V. Benzene C. Vinyl chordethane W. trans-1,3-Dichloropropene D. Chloroethane X. Bromoform* E. Methylene Chordethane Y. 4-Methyl-2-pentanone F. Acetone Z. 2-Hexanone				
		PP. Bromochloromethane	JJJ. 1,2-Dichlorobenzene	DDDD. Isopropył akohol
	rcnioropropene	QQ. 1,1-Dichloropropene	KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
		RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF, Acrolein
	pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG. Actyonitrile
		TT. 1,2-Dibromoethane	NNN. 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
G. Carbon disulfide AA. Tetrachloroethene	oethene	UU. 1,1,1,2-Tetrachloroethane	000. 1,3,5-Trichlorobenzene	IIII. Isobutyl alcohol
H. 1,1-Dkchloroethene** BB. 1,1,2,2-Tetr	BB. 1,1,2,2-Tetrachloroethane*	VV. Isopropylbenzene	PPP, trans-1,2-Dichloroethene	JJJJ. Methacrytonitrile
I. 1,1-Dichloroethane*		WW. Bromobenzene	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
J. 1,2-Dichloroethene, total DD, Chlorobenzene*	*enez	XX. 1,2,3-Trichloropropane	RRR. m,p-Xylenes	LLLL, Ethyl ether
K. Chloroform** EE. Ethylbenzene**	ene**	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	total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000.
N. 1,1,1-Trichloroethane HH. Vinyl acatate	ate	BBB. 4-Chlorotoluene	VVV. 4-Ethyttoluene	рррр.
O. Carbon tetrachloride II. 2-Chloroethyfvinyl ether	ylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	0000.
P. Bromodichloromethane JJ. Dichlorodifluoromethane	luoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
Q. 1,2-Dichloropropane** KK. Trichlorofluoromethane	uoromethane	EEE. sec-Butylbenzene	YYY, tert-Butanol	SSSS.
R. cis-1,3-Dichloropropene LL. Methyl-tert-butyl ether	-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl akochol	TITI.
S. Trichloroethene MM. 1,2-Dibrorr	MM. 1,2-Dibromo-3-chloropropane	GGG. p-isopropyitoluene	AAAA. Ethyl tert-butyl ether	ບບບບ.
T. Dibromochloromethane NN. Methyl ethyl ketone	nyi ketone	HHH. 1,4-Dichlorobenzene	BBBB, tert-Amyl methyl ether	ww.

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

DC#: //14/ D/	306# 32 Car

VALIDATION FINDINGS WURNSHEET

Initial Calibration



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

પ્રક્ ase 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? Ware a curve fit used for evaluation? $\frac{1}{100} = \frac{1}{100}

Did the initial calibration meet the acceptance criteria?

z X X	A A	Did the initial calibration meet the acceptance oriena? Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF?	meet the acceptance RFs within the validation	on criteria of ≤30 %F	RSD and ≥0.05 RRF?		
#	Date	Standard ID	Compound	Finding %RSD (Limit: <30.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	7 1/7/04	7 \$3	NANA		0, 017	1, 2, 22-25 170936-AN	
						170931-MB	
ما	9/18/69	1547	NNN		0,028	/ WINSHIMP	
_]							
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SDG#: See Comme LDC # 21991 D/

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? Y N N/A N/A N/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 ${\le}25$ %D and ${\ge}0.05$ RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	4/8/69	H0910	(-) 111	26.1		3-6, 170888- MB	J-/NJ/A (c)
	9 Na /09	27 60 H	(-) 111	25.5		8-15, 21, 26, 27	
			(-) NNN	17.		171072 -MB	->
	60/81/6	F2667	クマンタ		0.022	1, 2, 22, 23, 170929-MB	8 JMI/A
			HUNNN	29.4			J+ acts A
	4/18/69	F2693	2227		0.620	24 25, 170931-MB	J/W #
	,	1			1000	7 12 16 76 141	7 4, 7 4
	7/23/04	2	2 2 2		,		7
					Ē		

219912 LDC #:_ SDG #:

VALIDATION FINDINGS WORKSHEET

Blanks

Page: Reviewer: 2nd Reviewer.

> 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. Find analysis date: $\frac{1}{1000}$

Conc. units: vg L			As	Associated Samples: 1, 2,	1,2,22,23	3	(64)	
Compound	Blank ID				Sample Identification	cation		
	170936-NB	1 8	7					
NNN	0.29							
KKK	0.2							
II_	2.8	4.7 /u	4.0/4					
8	0.42							
MMM	6.0							
Blank analysis date: 9/4/64			<		24 X	(20)		
			AS	Associated Samples:		100		
Compound	Blank ID				Sample Identification	cation		
	170939-MB							
222	0.33							
YXX	0.28							
P. P. P.	0.32							

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SDG #: Su Cary

VALIDATION FINDINGS WORKSHEET

Page:__

2nd Reviewer: Reviewer

Blanks

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 Y 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: 6/21/09 Conc. units:

16-20 Associated Samples:

(AM)

Sample Identification Sample Identification Associated Samples: 176 171659-M 171110-MB Blank ID 0.77 8 Blank analysis date: 9 /23 /6 9 W Compound Compound Ξ Conc. units:

LDC #: 2/ 44 | D |
SDG #: 3 c Cm-

VALIDATION FINDINGS WORKSHEET Field Blanks

Reviewer: 34 2nd Reviewer: Page:_

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

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

	11					3.7/4				
	Q					1.3/4				
	6					0.49/W				
ıtification	8					1.58/4				
Sample Ider	J				h/08.0	0.82/4 C				
	ک		h/ 5's	•)	1 1/850				
	4					h/as 0				
	4					0,48/y				
Blank ID	9		4.0			0.32	4.4			
Blank ID	9/0/6	15.0	4.7	98.0	8.3	1.9	,			
Compound	Samnling Date	###	1	.>	Œ	3	メン			
	Compound Blank ID Blank ID Sample Identification	Sample Identification C	Sample Identification C C 8	Sample Identification 5.5 /4	Sample Identification 2	Sample Identification 4	Sample Identification 5.5 \(\(\text{V} \) \(\text{Sample Identification} \) 6.80 \(\text{V} \) \(0.58 \text{V} \)	Compound Blank ID 1 Blank ID 2 3 4 5 C C 8 9 10 11 HHH 0,51 4.0 5.5 /4 6.5 /4 6.80 /4 6.80 /4 6.80 /4 6.80 /4 6.80 /4 6.80 /4 6.80 /4 6.90 /4	Compound Blank ID 7 3 4 5 C C Sample Identification HHH 0.51 4.0 4.0 5.5 /4 6 6 6 11 Y 0.36 4.0 5.5 /4 6.80 /4 6.80 /4 6.80 /4 6.49 /4 1.3/4 3.7 /4 KK 4.4 4.4 4.4 6.50 /4 6.58 /4 6.49 /4 1.3/4 3.7 /4	Compound Blank ID 1 Blank ID 2 3 4 € C B 9 11 HHH 0,51 4.0 5 4 6 6 6 11 F 4,7 4.0 6.36 6.80/µ 6.80/µ 6.80/µ 6.80/µ 6.80/µ 6.80/µ 6.80/µ 6.44/µ 6.52õ 6.44/µ 6.52õ 6.44/µ 6.44/µ 6.52õ 6.44/µ 6.52õ 6.44/µ 6.52õ 6.44/µ 6.57/µ 6.44/µ 6.52õ 6.44/µ 6.52õ 6.44/µ 6.57/µ 6.44/µ 6.57/µ 6.44/µ 6.57/µ 6.44/µ 6.44/µ 6.44/µ 6.57/µ 6.44/µ 6.44/µ

200

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

abre

Z

Associated Samples:

1.0/4 7 4.8/4 و. و ا 7 Sample Identification 2.0 ∞. 0,47/4 28:-0.48/M 0,55/4 D.36/4 Blank ID 0.32 Blank ID 15.0 4.7 0.36 ∞. √ 7 エエエ Sampling Date スト ႘ Compound

VALIDATION FINDINGS WORKSHEET Field Blanks

Page: Yof > Reviewer: 36 2nd Reviewer:

(be)

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

SDG# Tre Cony LDC #: 4121171

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

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

Blank units: V5 / L5

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

Ay Soils Sample Identification Associated Samples: 石田 0.53/4 n 0.49 2 Blank ID 0,32 4.0 4.4 Blank ID 0.36 15.0 8 4.7 Sampling Date キャル 44 Compound

Associated Samples: 84/89 : Blank units: Ng /L Associated sample units: N5/L; Ng/kg Field blank type: (circle one) Field Blank / Rinsate (Trip Blank / Other.

All except

bt.

2

8.9/4

Sample Identification Blank ID 29 Blank ID 24 9 10 10g

3 4.0 Compound

4,4

VALIDATION FINDINGS WORKSHEET Field Blanks

10 15 mm

SDG #: LDC #:

Page: 3 of 2 Reviewer: 372 2nd Reviewer:

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

Were target compounds detected in the field blanks?

Lo L Associated sample units: V6/K5

Lordo Const Early Blank Directed Trin Blank / Other V/N N/A Blank units:

A11 Seile

		13		n/25.0	0.48/4					/ /									
		/		0,0					7 7								 	 	
		/2			6.36/4														
Ties		6			0.49/4														
s: A1/	Sample Identification	8			0.58/4					S:	ntification	/ <			N.53/U				
Associated Samples:	Sample Ide	J	簽		0.82/4					Associated Samples:	Sample Identification	20			0. 49 /U				
Assoc		ν	h/5'5		0.58/41				as above	Associ		19			0.45/4				
her:		4			b/ 05.0				Same a	ier:		17	4.8/4		0.61/4				
ip Blank / Other:		n			0.48 /u				9	ip Blank / Oth		15			0.47/4				
Rinsate / Tr	Blank ID								le units:	/ Rinsate / Tr	1-50 Blank ID								
Field Blank	F-2072404-50 Blank ID	7/24/69	3.5	0.33	0,44			·	Associated sample units:	Field Blank	FB67 29 61-50 Blank ID Blank ID	7/29/69	3.5	06.90	0.94	-			
Field blank type: (circle one) Field Blank/ Rinsate / Trip Blanl	Compound	Sampling Date	Щ	E	33				nits: Asso	ype: (circle	Compound	Sampling Date	4	T)	$\alpha_{\mathcal{C}}$				
Field bl				Q.	75				Blank units:	Field bla									

LDC #: 24 441 D)

SDG #: Cee Cory

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Page: of Reviewer: OLZ

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 YN 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?

*	ę.	di OSM/SM	Compand	MS (1 mits)	MSD %R (Limits)	RPO (Limits)	Aesociated Samples	Oualifications
╁		1 Comon	10 10 19	(of 1.05)	(421 42) 27		21	No med (108th
-		/ d / d /	X X X X X		() 69			
\vdash			7	() ()	59(1)			\
			4	<u> </u>	(51-05) 721	(06) 79		ખ. S₩)
-			¥	() 84	(ne 1 ng) 29	()		m 507) /
\vdash			35	49 (//)		()		J-/45/A (m)
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\vdash				()	()	()		
		Compound	punc	ac Li	QC Limits (Soll)	RPD (Soll)	QC Limits (Water)	RPD (Water)
	ī	1,1-Dichloroethene		69	59-172%	< 22%	61-145%	< 14%
	S.	Trichloroethene		62	62-137%	< 24%	71-120%	< 14%
	۷.	Benzene		99	66-142%	< 21%	76-127%	< 11%
	CC.	Toluene		59	59-139%	< 21%	76-125%	< 13%
	2	Chlorobenzene		9	60-133%	< 21%	75-130%	s 13%

LDC#: 2/441 D) SDG #: 54

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

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?

	\mathcal{Z}	7													${=}$	·								
Qualifications	5 J+1008/P (J-/MJ/P	,		J-113 A			J-145 A	Ţ			5-14519			J-/M/P									
Associated Samples	2 22, 23 170986+MB				24 25 170939-MB			3-6 170888-MA				8-15 21 171672-MB			16-20 171110-MD	,								
RPD (Limits)	/ ()	()	()	()	()	()	()		()	()	(()	()	()) (]()	()	()	()	()	()	()	()	()
LCSD %R (Limits)	()	()	()	()	()	()	()	, ,	()	()	(()	()	()	()	()	()	()	()	()	()	()	()	()
LCS %R (Limits)	(35-125) 06)	(1) %	()	()	() †9	()	()	1 7 7 7 7 7	() (()		73 ()	()	(')	67 (V)	()	()	()	()	()	()	()	()	()
Compound	NNN	7.7	1		47			0	45			77			77									
LCS/LCSD ID	170926-165				170939-165			170688-115				171072-165			M1110 - LCS									
Derte																		•						
**																		L_						

191101	Sections
**	#
	SDG

VALIDATION FINDINGS WORKSHEE! Compound Quantitation and CRQLs

rage: or Reviewer: 2nd Reviewer:

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

Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound? Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Y N KI/A

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

ations	J dots 14 (e)													
Associated Samples	000	9												
Finding	CAS F.													
Sample ID	9													
Date								,						
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Comments: See sample calculation verification worksheet for recalculations

SDG #: 24 (200)

VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page: of A

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	
		9	K > CN range		X /A (6	
			0			_
		7	All except K	di)		7
l o	Comments:					
;))	 					

LDC #: >1991 D/ SDG #: Su Come/

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	<u></u> of_)_
Reviewer:	JVR
2nd reviewer:	W

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

1	Y	N	N/A
ŀ	Ŋ	N	N/A

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

		Concentration	n us/ter	PA	irent
Compound		ſ	91	RPD ⁶	only
	M	1.3	1.6	0.3 (=130)	900
		63	19	44 (<260) Jd	ots/A
	K	0.97	0.87	0.10 (£ 6.5 A)	_
	cc	0,49	3.7	3,21	_

		Concentration	n us/se		Parent
Compound		13	14	RPD	orly
	k	44	41	7 (450% RPD)	•
	E	0,55	4.8 U	4.25 (£ 4.8 D)	,
	a	0,48	4.8 U	4.32	-
	M	11 U	0.91	10.04 (= 110)	,
	KK	5,6 U	1.8	3.8 (45.6D)	-

	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: September 9, 2009

LDC Report Date: December 6, 2009

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Stage 4

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905138

Sample Identification

SA187-10B SA122-0.5B SA187-25B SA122-10B SA122-20B SA187-39B SA122-31B SA45-10B SA45-25B TB090909-SO1 TB090909-SO2 SA45-36B TB090909-SO3 SA186-10B RSAQ5-41BMS SA186-25B SA186-37B RSAQ5-41BMSD

SA188-10B SA188-25B

SA188-37B

RSAQ5-0.5B

RSAQ5-10B

RSAQ5-25B

RSAQ5-41B

SA31-20B

SA31-32B

SA31-0.5B

SA31-10B

Introduction

This data review covers 26 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.

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
9/18/09	2-Methyl-2-propanol	0.028 (≥0.05)	All water samples in SDG R0905138	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
9/17/09	tert-Butylbenzene sec-Butylbenzene p-Isopropyltoluene n-Butylbenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	25.2 25.5 25.3 25.8 43.7 25.5 26.5	SA186-10B SA186-25B SA186-37B SA188-10B SA188-25B SA188-37B RSAQ5-0.5B RSAQ5-10B RSAQ5-41B RSAQ5-41B RSAQ5-41BMS RSAQ5-41BMSD 170690-MB	J- (all detects) UJ (all non-detects)	A
9/18/09	Hexachlorobutadiene	26.1	RSAQ5-25B SA31-20B SA31-32B SA31-0.5B SA31-10B SA122-0.5B SA122-10B SA122-20B SA122-31B 170888-MB	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
9/22/09	2-Methyl-2-propanol	0.025 (≥0.05)	All water samples in SDG R0905138	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 TB090909-SO1, TB090909-SO2, and TB090909-SO3 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
TB090909-SO1	9/9/09	2-Methyl-2-propanol Acetone	6.0 ug/L 9.1 ug/L	SA187-10B SA187-25B SA187-39B SA45-10B SA45-25B SA45-36B SA186-10B SA186-25B SA186-37B SA188-10B SA188-25B SA188-37B
TB090909-SO2	9/9/09	Bromoform Chloromethane Dibromochloromethane	1.1 ug/L 0.92 ug/L 0.70 ug/L	RSAQ5-0.5B RSAQ5-10B RSAQ5-25B RSAQ5-41B SA31-20B SA31-32B SA31-0.5B SA31-10B SA122-0.5B SA122-10B SA122-10B SA122-20B SA122-31B

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

Sample	Compound	Reported Concentration	Modified Final Concentration
SA45-36B	Acetone	9.7 ug/Kg	9.7U ug/Kg
SA186-10B	Acetone	12 ug/Kg	12U ug/Kg

Sample FB072909-SO (from SDG R0904226) 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
FB072909-SO	7/29/09	Acetone Dichloromethane Toluene	3.5 ug/L 0.30 ug/L 0.44 ug/L	All soil samples in SDG R0905138

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
SA187-10B	Toluene	0.60 ug/Kg	0.60U ug/Kg
SA187-39B	Toluene	0.61 ug/Kg	0.61U ug/Kg
SA186-10B	Toluene	0.37 ug/Kg	0.37U ug/Kg
SA188-10B	Toluene	0.33 ug/Kg	0.33U ug/Kg
SA188-25B	Toluene	0.51 ug/Kg	0.51U ug/Kg
RSAQ5-41B	Acetone Toluene	4.0 ug/Kg 0.36 ug/Kg	4.0U ug/Kg 0.36U ug/Kg
SA122-0.5B	Acetone Dichloromethane Toluene	3.0 ug/Kg 0.59 ug/Kg 0.65 ug/Kg	3.0U ug/Kg 0.59U ug/Kg 0.65U ug/Kg
SA122-10B	Dichloromethane Toluene	0.55 ug/Kg 0.54 ug/Kg	0.55U ug/Kg 0.54U ug/Kg
SA122-20B	Acetone	2.8 ug/Kg	2.8U ug/Kg
SA122-31B	Toluene	0.41 ug/Kg	0.41U 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
RSAQ5-41BMS/MSD (RSAQ5-41B)	Chloromethane Dichlorodifluoromethane Hexachlorobutadiene	59 (70-130) 41 (70-130) 49 (70-130)	64 (70-130) 45 (70-130) 49 (70-130)	- - -	J- (all detects) UJ (all non-detects)	А

VIII. Laboratory Control Samples (LCS)

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

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
170690-LCS	Chloromethane Dichlorodifluoromethane Hexachlorobutadiene	71 (75-125) 69 (75-125) 69 (75-125)	SA186-10B SA186-25B SA186-37B SA188-10B SA188-25B SA188-37B RSAQ5-0.5B RSAQ5-10B RSAQ5-10B RSAQ5-41B 170690-MB	J- (all detects) UJ (all non-detects)	Р
170888-LCS	Carbon tetrachloride Dichlorodifluoromethane	66 (75-125) 71 (75-125)	RSAQ5-25B SA31-20B SA31-32B SA31-0.5B SA31-10B SA122-0.5B SA122-10B SA122-20B SA122-31B 170888-MB	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

All target compound identifications were within validation criteria.

XII. Project Quantitation Limit

All project quantitation limits were within validation criteria.

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0905138	All compounds reported below the PQL.	J (all detects)	Α

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

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 R0905138

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905138	TB090909-SO1 TB090909-SO2 TB090909-SO3	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	Α	Initial calibration (RRF) (c)
R0905138	SA186-10B SA186-25B SA186-27B SA188-10B SA188-25B SA188-37B RSAQ5-0.5B RSAQ5-10B RSAQ5-41B	tert-Butylbenzene sec-Butylbenzene p-Isopropyltoluene n-Butylbenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J- (all detects) UJ (all non-detects)	Α	Continuing calibration (%D) (c)
R0905138	RSAQ5-25B SA31-20B SA31-32B SA31-0.5B SA31-10B SA122-0.5B SA122-10B SA122-20B SA122-31B	Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	A	Continuing calibration (%D) (c)
R0905138	TB090909-SO1 TB090909-SO2 TB090909-SO3	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Continuing calibration (RRF) (c)
R0905138	RSAQ5-41B	Chloromethane Dichlorodifluoromethane Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	А	Matrix spike/Matrix spike duplicates (%R) (m)
R0905138	SA186-10B SA186-25B SA186-37B SA188-10B SA188-25B SA188-37B RSAQ5-0.5B RSAQ5-10B RSAQ5-41B	Chloromethane Dichlorodifluoromethane Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0905138	RSAQ5-25B SA31-20B SA31-32B SA31-0.5B SA31-10B SA122-0.5B SA122-10B SA122-20B SA122-31B	Carbon tetrachloride Dichlorodifluoromethane	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905138	SA187-10B SA187-25B SA187-25B SA187-39B SA45-10B SA45-25B SA45-36B SA186-25B SA186-25B SA188-37B SA188-10B SA188-25B SA188-25B SA188-37B RSAQ5-0.5B RSAQ5-10B RSAQ5-10B RSAQ5-25B RSAQ5-41B SA31-20B SA31-20B SA31-20B SA31-20B SA31-20B SA31-20B SA31-20B SA31-20B SA31-2-31B TB090909-SO1 TB090909-SO2 TB090909-SO3	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 R0905138

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Trip Blank Data Qualification Summary - SDG R0905138

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905138	SA45-36B	Acetone	9.7U ug/Kg	A	bt
R0905138	SA186-10B	Acetone	12U ug/Kg	А	bt

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Field Blank Data Qualification Summary - SDG R0905138

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905138	SA187-10B	Toluene	0.60U ug/Kg	А	bf

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905138	SA187-39B	Toluene	0.61U ug/Kg	А	bf
R0905138	SA186-10B	Toluene	0.37U ug/Kg	А	bf
R0905138	SA188-10B	Toluene	0.33U ug/Kg	А	bf
R0905138	SA188-25B	Toluene	0.51U ug/Kg	А	bf
R0905138	RSAQ5-41B	Acetone Toluene	4.0U ug/Kg 0.36U ug/Kg	Α	bf
R0905138	SA122-0.5B	Acetone Dichloromethane Toluene	3.0U ug/Kg 0.59U ug/Kg 0.65U ug/Kg	A	bf
R0905138	SA122-10B	Dichloromethane Toluene	0.55U ug/Kg 0.54U ug/Kg	A	bf
R0905138	SA122-20B	Acetone	2.8U ug/Kg	А	bf
R0905138	SA122-31B	Toluene	0.41U ug/Kg	Α	bf

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #: 21991E1 VALIDATION COMPLETENESS

SDG #: R0905138 Stage 4

Laboratory: Columbia Analytical Services

Date: \(\frac{12/63/c}{\rm Page: \(\ldots \) of \(\frac{1}{\rm Page: \ldots \) Of \(\frac{1}{\rm Page: \ldots \} \) According to the second Reviewer: \(\frac{1}{\rm Page: \ldots \} \)

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: 9/69/69
II.	GC/MS Instrument performance check	À	·
ИІ.	Initial calibration	SW	3 RSD +
IV.	Continuing calibration/(EV	SW	ca = 25]
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	ics
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	<u> </u>	
XII.	Compound quantitation/CRQLs	A	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	A	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	SW	TB= 25, 26, 27 FB= FB 072909-50 (R09042>6

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

		>011 T	vater						
1 1	SA187-10B	S 11 3	SA188-25B	S	21 3	SA122-0.5B	5	31 l	170485-MB
2 1	SA187-25B	12	SA188-37B		22 3	SA122-10B		32 Y	170690-
3	SA187-39B	13	RSAQ5-0.5B		23	SA122-20B		33 3	170858-
4	SA45-10B	14	RSAQ5-10B		₂₄ 3	SA122-31B		- 34 4	171241 -
5	SA45-25B	15	RSAQ5-25B		† 25 †	TB090909-SO1	W	35	
6	SA45-36B	16	RSAQ5-41B		+ 4 26	TB090909-SO2		36	
ت	SA186-10B	17	SA31-20B		- 9 27	TB090909-SO3	\downarrow	37	
8	SA186-25B	18	SA31-32B		28 28	RSAQ5-41BMS	ς	38	
9	SA186-37B	19	SA31-0.5B		29	RSAQ5-41BMSD		39	
10	SA188-10B	20 3	SA31-10B	\downarrow	30	l		40	

DC#: DIGGIE)
DG#: See Cover

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: 1/7
2nd Reviewer: 1

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.		*******************************	000000000000000000000000000000000000000	
II. GC/MS instrument performance check		r		
Were the BFB performance results reviewed and found to be within the specified criteria?	_			
Were all samples analyzed within the 12 hour clock criteria?				
III. Initial calibration		ı		
Did the laboratory perform a 5 point calibration prior to sample analysis?				
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?				
Was a curve fit used for evaluation?		<u> </u>		
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.				
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?	/			

DC#: 21991 E)
DG#: See Cover

VALIDATION FINDINGS CHECKLIST

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

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per analytical batch?		.,,_	1	· manigo.commona
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		/	-	
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?				
Were the performance evaluation (PE) samples within the acceptance limits?				
X. Internal standards	r			
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?				
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	/	-	ļ	
Were chromatogram peaks verified and accounted for?				
XII. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	/			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?				
XIII. Tentatively identified compounds (TICs)				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?			/	
Were relative intensities of the major ions within <u>+</u> 20% between the sample and the reference spectra?			/	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?			/	
XIV. System performance		7	·	
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			<u></u>	
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. kopropyl 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 - METhyl - 2 program of
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	
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	0000
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-kopropyltoluene	AAAA. Ethyl ten-butyl ether	uuuu.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	ww.

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

Initial Calibration

2nd Reviewer:_ Reviewer:_

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

SDG#: 214 Cm LUC# 21771 C

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? $V \geq 0.49$

Did the initial calibration meet the acceptance criteria?

一儿	₹	Y N N/A	Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.03 RRF	KKFS within the Validat	Ion criteria oi sou 70r	אח 20.03 אחר בייבי :-			Г
·	*	Date	Standard ID	Compound	Finding %RSD (Limit: <30.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications	-
<u> </u>		4/8/09	1941	スススス		0,028	25-27, 171241-MB	J/13/A (C)	Т
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SDG #: 250 C2-2

VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page: 1 of 1 Reviewer: 2nd Reviewer:

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

N N/A

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

	T	1	1				- Т		1				-			_	- i-	7	-	ī	T			_	
	J-/45/A (CC)								W.			J/WJ/A													
Associated Samples	7-1416 28,29	170690-MB					>		15 17-24 170888-MB			25-27 171241-MB													
Finding RRF (Limit: >0.05)												250.0							-						
Finc (Limit					43.7		26,5		26.1																
Compound	(3) (3)	(·) <u>444</u>	966 F)	(-) 11t	(-) 111	(-) MMM	NNN (-)		(上して)			N N N N													
Standard ID	40875								H 0 410			C 0 874													
Date	60/41/6	-							9/0/04	<u> </u>		9/22/69													
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VALIDATION FINDINGS WORKSHEET

Page: __lof_

Reviewer:__ 2nd Reviewer.

(61)

7 -

Field Blanks

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

3/49/E

LDC #:

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

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

Sample Identification Associated Samples: h/21 Blank ID Blank ID 2 Sampling Date Compound NNNN

13- 24 Associated Samples: Blank units: W5/L Associated sample units: W5/E5
Field blank type: (circle one) Field Blank / Rinsate (Trip Blank) Other.

r									
	ification					- ,			
	Sample Identification								
10110									
icia piani () ba: (an ala ana) i iaia piani ()	lank ID								
	Blank ID 26 Blank ID	9/64/65	<u>.</u>	0.97	* 0				
(2010 2010)		oling Date	1	I	-				
Diality types	Compound	25							
5									<u>.</u>

<u> </u>	Cm
1 2	See
LDC #:	SDG #:

VALIDATION FINDINGS WORKSHEET Field Blanks

Page: Y of Y 2nd Reviewer: Reviewer:

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

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

| V/N N/A | Were target compounds detected in the field blanks? | Blank units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated sample units: | Ng / L | Associated s

A11 30115 Associated Samples:

	74			0.41/	n/			
	रेंद	2.8/4		0				
	25		0.55/U	10.52 M				
	2.	3,0/4	0,59/4 0.55/4	1/50.0 1/26.0 1/12,0 1/66,0 1/76.0				
Sample Identification	<u>3</u>	4.0/4		11/96.0	-			
Sample to	11			N/ 15'0	/			:
	10			h/ee'0	/	7 FB)	/	
	7			0.37 /u		ND W		
	m			h/ 19.0		either 1		
S ^O Blapk110	-			0.60/4 0.61/				
FB 0729 09-50 Black ID	7/20/64	3.5	06.0	0.44		(All others		
Compound	Sampling Date	#	Th.	20				

Associated sample units: Blank units:

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

Associated Samples:

ntification						
Sample Identification						
Blank ID						
Blank ID						
pund	Sampling Date					
Compound						

SDG #: 274 (M2) LDC #: -1:"1 F

VALIDATION FINDINGS WORKSHEE! Matrix Spike/Matrix Spike Duplicates

Page: ___ot_ 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

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

MS/MSD. Soil / Water. YN 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?

				MS	MSD			
*	Date	MS/MSD ID	Compound	%R (Limits)	- 13	RPD (Limits)	Associated Samples	Qualifications
		bc/ 8c	Sexcras	compound	have 2 R	and & RPB)	91	No mal
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			5)	'	Summer	(
))		
			4	(20-130)	64 (20-120)	()		J-143 A (F)
			7,7	4) ()	45 (1)			
			711	(1) 64	(1) 64	()		
				()	()	()		
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				())	()		
				()	·	()		
				()	()	()		
		Compound	punc	ac Um	QC Limits (Soll)	RPD (Soll)	QC Limits (Water)	RPD (Water)
	Ŧ	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%

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:

Northgate Environmental

Project:

Tronox LLC Henderson/2027.001

Sample Matrix:

Soil

Service Request: R0905138 Date Collected: 9/9/09 Date Received: 9/10/09

Date Analyzed: 9/17/09

Matrix Spike Summary Volatile Organic Compounds by GC/MS

Sample Name:

RSAQ5-41B

Lab Code:

R0905138-016

Units: µg/Kg Basis: Dry

Analytical Method: 8260B

	Sample		Iatrix Spike Q0908733-0:				ate Matrix Q0908733-0			% Rec		RPD
Analyte Name	Result	Result	Amount	% Rec		Result	Amount	% Rec		Limits	RPD	Limit
1,1,1,2-Tetrachloroethane	ND	37.5	55.4	68	*	34.0	54.3	63	*	70 - 130	10	30
1,1,1-Trichloroethane (TCA)	ND	40.3	55.4	73		40.9	54.3	75		70 - 130	1	30
1,1,2,2-Tetrachloroethane	ND	37.7	55.4	68	*	38.4	54.3	71		70 - 130	2	30
1,1,2-Trichloroethane	ND	39.8	55.4	72		39.1	54.3	72		70 - 130	2	30
1,1-Dichloroethane (1,1-DCA)	ND	39.0	55,4	70		39.8	54.3	73		70 - I30	2	30
1,1-Dichloroethene (1,1-DCE)	ND	36.2	55.4	65	*	39.2	54.3	72		70 - 130	8	30
1,1-Dichloropropene	ND	39.9	55.4	72		37.6	54.3	69	*	70 - 130	6	30
1,2,3-Trichlorobenzene	ND	31.1	55.4	56	*	34.3	54.3	63	*	70 - 130	10	30
1,2,3-Trichloropropane	ND	36.7	55.4	66	*	38.8	54.3	72		70 - 130	6	30
1,2,4-Trichlorobenzene	ND	31.9	55.4	58	*	34.0	54.3	63	*	70 - 130	6	30
1,2,4-Trimethylbenzene	ND	33.1	55.4	60	*	32.3	54.3	59	*	70 - 130	2	30
1,2-Dibromo-3-chloropropane (DBC	ND	35.7	55,4	64		40.3	54.3	74		50 - 150	12	30
1,2-Dibromoethane	ND	39.3	55.4	71		38.1	54.3	70		70 - 130	3	30
1,2-Dichlorobenzene	ND	33.6	55.4	61	*	34.0	54.3	63	*	70 - 130	1	30
1,2-Dichloroethane	ND	38.1	55.4	69	*	38.4	54.3	71		70 - 130	1	30
1,2-Dichloropropane	ND	39.0	55.4	70		37 .4	54.3	69		70 - 130	4	30
1,3,5-Trimethylbenzene	ND	34.3	55.4	62	*	33.0	54.3	61		70 - 130	4	30
1,3-Dichlorobenzene	ND	33.3	55.4	60	*	32.7	54.3	60	*	70 - 130	2	30
1,3-Dichloropropane	ND	38.7	55.4	70		37.4	54.3	69	*	70 - 130	4	30
1,4-Dichlorobenzene	ND	33.5	55.4	60	*	31.9	54.3	59	*	70 - 130	5	30
2,2-Dichloropropane	ND	38.6	55.4	70		41.6	54.3	77		70 - 130	8	30
2-Butanone (MEK)	ND	43.0	55.4	78		45.4	54.3	84		50 - 150	6	30
2-Chlorotoluene	ND	33.4	55.4	60	*	33.3	54.3	61	*	70 - 130	0	30
2-Hexanone	ND	41.1	55.4	74		42.2	54.3	78		70 - 130	3	30
2-Methyl-2-propanol	ND	777	1110	70		882	1090	81		50 - 150	13	30
4-Chlorotoluene	ND	33.6	55.4	61	*	32.9	54,3	61	*	70 - 130	2	30
4-Isopropyltoluene	ND	32.7	55.4	59	*	30.3	54.3	56	*	70 - 130	8	30
4-Methyl-2-pentanone	ND	41.6	55.4	75		41.9	54.3	77		70 - 130	1	30
Acetone	4.0	52.3	55.4	87		66.7	54.3	116		50 - 150	24	30
Benzene	ND	36.6	55.4	66	*	37.3	54.3	69	*	70 - 130	2	30
Bromobenzene	ND	34.5	55.4	62	*	34.8	54.3	64	*	70 - 130	1	30
Bromochloromethane	ND	37.1	55.4	67	¥	38,5	54.3	71		70 - 130	4	30
Bromodichloromethane	ND	38.2	55.4	69	*	39.2	54.3	72		70 - 130	2	30

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:

Northgate Environmental

Project:

Tronox LLC Henderson/2027.001

Sample Matrix:

Soil

Service Request: R0905138 **Date Collected:** 9/9/09

Date Collected: 9/9/09 Date Received: 9/10/09 Date Analyzed: 9/17/09

Matrix Spike Summary Volatile Organic Compounds by GC/MS

Sample Name:

RSAQ5-41B

Lab Code:

R0905138-016

Units: μg/Kg Basis: Dry

Analytical Method: 8260B

	Sample		Iatrix Spike Q0908733-03			-	cate Matrix Q0908733-0	-	% Rec		RPD
Analyte Name	Result	Result	Amount	% Rec		Result	Amount	% Rec	Limits	RPD	Limit
Bromoform	ND	40.3	55.4	73		37.7	54.3	70	70 - 130	7	30
Bromomethane	ND	30.0	55.4	54		33.0	54.3	61	50 - 150	10	30
Carbon Tetrachloride	ND	40.2	55.4	73		40.9	54.3	75	70 - 130	2	30
Chlorobenzene	ND	36.6	55.4	66	*	34.2	54.3	63	* 70 - 130	7	30
Chloroethane	ND	34.8	55.4	63	*	35.2	54.3	65	* 70 - 130	1	30
Chloroform	ND	39,4	55.4	71		39.6	54.3	73	70 - 130	1	30
Chloromethane	ND	32.8	55.4	59	*	34.7	54.3	64	* 70 - 130	6	30
Dibromochloromethane	ND	40.5	55.4	73		38.4	54.3	71	70 - 130	5	30
Dibromomethane	ND	38,5	55.4	69	*	38,3	54.3	71	70 - 130	0	30
Dichlorodifluoromethane (CFC 12)	ND	22.9	55.4	41	*	24.5	54.3	45	* 70 - 130	7	30
Dichloromethane	ND	36.4	55.4	66	*	38.1	54.3	70	70 - 130	4	30
Diisopropyl Ether	ND	40.5	55.4	73		41.0	54.3	75	70 - 130	1	30
Ethyl tert-Butyl Ether	ND	41.2	55.4	74		41.4	54 .3	76	70 - 130	0	30
Ethylbenzene	ND	38.3	55.4	69	*	33.7	54.3	62	* 70 - 130	13	30
Hexachlorobutadiene	ND	26.9	55.4	49	*	26.4	54.3	49	* 70 - 130	2	30
Isopropylbenzene (Cumene)	ND	36.9	55.4	67	*	33.7	54.3	62	* 70 - 130	9	30
Methyl tert-Butyl Ether	ND	39.2	55.4	71		38.2	54.3	70	70 - 130	2	30
Naphthalene	ND	35.1	55.4	63		40.5	54.3	75	50 - 150	14	30
Styrene	ND	38.3	55.4	69	*	35.3	54.3	65	* 70 - 130	8	30
Tetrachloroethene (PCE)	ND	40.0	55.4	72		36.4	54.3	67	* 70 - 130	10	30
Toluene	0.36	38.7	55.4	69	*	36.6	54.3	67	* 70 - 130	5	30
Trichloroethene (TCE)	ND	38.6	55.4	70		38.1	54.3	70	70 - 130	1	30
Trichlorofluoromethane (CFC 11)	ND	38.3	55.4	69	*	41.4	54.3	76	70 - 130	8	30
Vinyl Chloride	ND	35.1	55.4	63	*	38.8	54.3	72	70 - 130	10	30
cis-1,2-Dichloroethene	ND	35.7	55.4	64	*	38.0	54.3	70	70 - 130	6	30
cis-1,3-Dichloropropene	ND	39.1	55.4	71		37.2	54.3	69	* 70 - 130	5	30
m,p-Xylenes	ND	73.3	111	66	*	66.7	109	61	* 70 - 130	9	30
n-Butylbenzene	ND	32.0	55.4	58	*	29.4	54.3	54	* 70 - 130	8	30
n-Propylbenzene	ND	33.5	55.4	60	*	32.0	54.3	59	* 70 - 130	5	30
o-Xylene	ND	36.3	55.4	65	*	33.8	54.3	62	* 70 - 130	7	30
sec-Butylbenzene	ND	33.5	55,4	60	*	31.4	5 4,3	58	* 70 - 130	6	30
tert-Amyl Methyl Ether	ND	39.8	55.4	72		40.4	54.3	74	70 - 130	1	30
tert-Butylbenzene	ND	33.2	55.4	60	*	32.1	54.3	59	* 70 - 130	3	30
trans-1,2-Dichloroethene	ND	35.7	55,4	65	*	37.7	54.3	69	* 70 - 130	5	30

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:

Northgate Environmental

Project:

Tronox LLC Henderson/2027.001

Sample Matrix:

Soil

Service Request: R0905138

Date Collected: 9/9/09 **Date Received:** 9/10/09

....

Date Analyzed: 9/17/09

Matrix Spike Summary Volatile Organic Compounds by GC/MS

Sample Name:

RSAQ5-41B

Lab Code:

R0905138-016

Units: μg/Kg Basis: Dry

Analytical Method: 8260B

	Sample		Matrix Spike Q0908733-0			ate Matrix Q0908733-0	% Rec		RPD	
Analyte Name	Result	Result	Amount	% Rec	Result	Amount	% Rec	Limits	RPD	Limit
trans-1,3-Dichloropropene	ND	39,3	55.4	71	36.5	54.3	67	* 70 - 130	7	30

Comments:

1C#: 21991 E

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: 1 of

Reviewer: 2nd Reviewer:

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

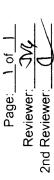
ease see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

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

Date	LCS/LCSD ID	Compound	%R (I	%R (Limits)	%R	%R (Limits)	RPD (Limits)		Associate	Associated Samples		Qualifications	
	577 -069921	0) 0/	(75-125)		()		7-14,16	170 696-MB	- 1	No gral	(MS/MCD"
		Ą		(())	^				J-145/P	
		77) 69)						
		777) 69			())	7		7			7
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)			())						
	170888-165	0) 99	(())	^	15 17-24	4 170888-MB	8-mB	J-/NI /P	7
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日からた See Cover SDG #: LDC#:

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET



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

A_x = Area of compound,
C_x = Concentration of compound,
S = Standard deviation of the RRFs
X = Mean of the RRFs

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

					Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
#	Standard ID	Calibration Date	Compound	Compound (Reference Internal Standard)	RRF (50 std)	RRF (STO std)	Average RRF (initial)	Average RRF (initial)	%RSD	%RSD
-	12/2	9/2/69	J	(1st internal standard)	0.922	0.422	4140	0,414	11. 5	6-11
	-		9	(2nd internal standard)	480	0.327	6.8.0	0.319	11.7	7.11
	ms 7		£E	(3rd internal standard)	1.5%	1,521	1.497	1.497	9.7	4.2
2			g B	(1st internal standard)	1.159	1-159	1.143	1.143	10.8	8'01
				(2nd internal standard)						
				(3rd internal standard)						
3		2/0/6	2	(1st internal standard)	6,523	0,523	0. (Tey	0,521	7.7	7.7
	7	60/01	S	(2nd internal standard)	0,250	0.250	0,2X	525.0	9.9	9.9
	MS 1D		2.3	(3rd internal standard)	5660	565 O	514.0	0,416	6.9	6.9
4			A A	(1st internal standard)	Eps.0	6,543	C \$5.0	2ts.0	38	りゃ
				(2nd internal standard)						
				(3rd internal standard)						

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

SDG #: 300 Cm

VALIDATION FINDINGS WORKSHEET Continuing Calibration Results Verification

Page: of Reviewer: NC

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 = $(A_{\rm x})(C_{\rm s})/(A_{\rm s})(C_{\rm x})$

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

 $A_x = Area of compound,$ $A_s = Concentration of compound,$ $C_s = Concentration of compound,$

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

#	Standard ID	Calibration Date	Compound (Refer	Compound (Reference internal Standard)	Average RRF	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
_	_ T	4/10/04	0	(1st internal standard)	0, 414	0.4h	0.412	0.5	カ・り
l		-	5	(2nd internal standard)	6.319	6, 303	6,36,0	5.0	5,0
I			33	(3rd internal standard)	1. 497	1, 3>5	1.335	10,8	10.8
l			88	(4th internal standard)	1.143	1,071	1.671	6.3	6.3
2	278 oH	4/2/64	2	(1st internal standard)		0, 410	0.410	1.0	1.0
l			5	(2nd internal standard)		0.24	0.261	18.2	18.3
I			33	(3rd internal standard)		712.1	1.212	19.0	19.1
l I			BB	(4th internal standard)		866.0	0.998	7.0	12.7
ო	016 011	9 /8/ba	2	(1st internal standard)		6.38.0	0.383	、いん	7.4
			\$	(2nd internal standard)		0.277	0,277	73.7	(3.3
l			5 3	(3rd internal standard)		1.238	1,338	2.0)	10,0
i l			98	(4th internal standard)		(1053	1.000	7.9	7.7
4	C0879	9/2/5	٥	(1st internal standard)	0,52	6.52.0	652,0	6.1	6.7
		10/11/	5	(2nd internal standard)	0.275	0.299	0,299	۲. ۶	8.7
1			廷	(3rd internal standard)	0,415	0, 445	to 445	7,7	7,2
			BB	(4th internal standard)	6,547	605.0	ر وي . ه	8.9	8,3

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 #: _ 71991 E | SDG #: See Cover

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:_	1 of 1
Reviewer:	SVE
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:

,	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8	50	51.42	103	103	ဉ
Bromofluorobenzene		46.33	93	93	
1,2-Dichloroethane-d4					
Dibromofluoromethane	\ \	50.65	101	/01	V

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:

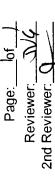
	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4					
Dibromofluoromethane					

Sample ID:

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

La Gary LDC#: 2111 E) SDG #:

Matrix Spike/Matrix Spike Duplicates Results Verification VALIDATION FINDINGS WORKSHEET



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

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

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

Where: SSC = Spiked sample concentration SA = Spike added

SC = Sample concentration

MSDC = Matrix spike duplicate concentration

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

MSC = Matrix spike concentration

MS/MSD sample:

	S	oike	Sample	Spiked Sample	ample	Matrix Spike	Spike	Matrix Spike Duplicate	• Duplicate	M	MS/MSD
,	¥ ;		Concentration	Concentration	tration						
Compound	3	15/FC	(k/E)	(Percent Recovery	ecovery	Percent Recovery	ecovery		RPD
	MS	MSD	0 5	MS	MSD	Reported	Recalc	Reported	Recaic	Reported	Recalculated
1,1-Dichloroethene	25, 4	54.3	Q-	36.7	29.2	57	اوکر	77	77	8	8
Trichloroethene				38.6	381	70	20	20	70	1	
Benzene			_~	ファチ	37.3	94	99	69	69	7	7
Toluene			96'0	38.7	372	67	63	67	63	7	2
Chlorobenzene	→	A	Þ	3.78	34.2	97	99	2)	63	7	7

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

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET Laboratory Control Sample Results Verification

Reviewer: 10f 1.

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

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

% Recovery = 100 * SSC/SA Where: SSC =

Where: SSC = Spiked sample concentration SA = Spike added

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

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

LCS ID: 1712-41- LCS

	<i>S</i> .	oike	Spiked S	ample	SOI	S	uso i	ເກ	SUL	CS/I CSD
Compound	\$ Z	Added (1/2/1/2)	Concentration (μ_5/L)	tration	Percent Recovery	есочегу	Percent Recovery	ecovery		RPD
	1.08	I CSD	1.08	1.CSD	Reported	Recalc	Renorted	Paralc	Detrone	
1,1-Dichloroethene	50.05	N.A	۲,۲	¥.	701	901				
Trichloroethene			۲. 8		104	109				
Benzene			19.6		86	96				
Toluene			70.9		00	201				
Chlorobenzene	1	P	7.92	-	5-	191				

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.

DC #:	7	991	E	1
SDG #:_			1	

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:	<u>l</u> of <u>l</u>
Reviewer:	SVE
2nd reviewer:	Z

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

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

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

Concentration = $(A_x)(I_x)(DF)$ $(A_{is})(RRF)(V_o)(\%S)$ Area of the characteristic ion (EICP) for the A, compound to be measured Area of the characteristic ion (EICP) for the specific internal standard Amount of internal standard added in nanograms Relative response factor of the calibration standard. **RRF** = Volume or weight of sample pruged in milliliters (ml) V_{o} or grams (g). Df Dilution factor. %S Percent solids, applicable to soils and solid matrices Example: Sample I.D. $\frac{1}{2}$, $\frac{1}{2}$. Conc. = $\frac{4378}{45666}$, $\frac{50}{(0.902)}$, $\frac{1}{0.912}$

= 0.58 mg/leg

	only.				
#	Sample ID	Compound	Reported Concentration ()	Calculated Concentration ()	Qualification
	.,				
	· · · · · · · · · · · · · · · · · · ·				
			`	!	
	-				
		4	_ 	•	

LDC Report# 21991F1

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date: September 10 through September 16, 2009

LDC Report Date: January 7, 2010

Matrix: Soil

Parameters: Volatiles

Validation Level: Stage 4

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905192

Sample Identification

SA102-10BSPLP3 SA102-30BSPLP3 SA30-9BSPLP3 SA128-10BSPLP3 SA128-29BSPLP3

Introduction

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

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
9/30/09	Bromomethane	35.2	SA128-10BSPLP3 SA128-29BSPLP3 172647-MB SPLP-BLK2	J- (all detects) UJ (all non-detects)	Α

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

V. Blanks

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

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
SPLP-BLK1	9/28/09	4-Methyl-2-pentanone Acetone Chloroform	1.1 ug/L 4.7 ug/L 2.9 ug/L	SA102-10BSPLP3 SA102-30BSPLP3 SA30-9BSPLP3
SPLP-BLK2	9/30/09	Acetone Chloroform Dichloromethane	4.0 ug/L 2.4 ug/L 4.0 ug/L	SA128-10BSPLP3 SA128-29BSPLP3

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
SA102-10BSPLP3	Acetone	4.8 ug/L	4.8U ug/L
	Chloroform	2.8 ug/L	2.8U ug/L
SA102-30BSPLP3	Acetone	4.8 ug/L	4.8U ug/L
	Chloroform	2.9 ug/L	2.9U ug/L
SA30-9BSPLP3	Acetone	4.1 ug/L	4.1U ug/L
	Chloroform	2.7 ug/L	2.7U ug/L
SA128-10BSPLP3	Acetone	7.0 ug/L	7.0U ug/L
	Chloroform	2.1 ug/L	2.1U ug/L
	Dichloromethane	3.8 ug/L	3.8U ug/L
SA128-29BSPLP3	Acetone	4.8 ug/L	4.8U ug/L
	Chloroform	3.1 ug/L	3.1U ug/L
	Dichloromethane	4.0 ug/L	4.0U ug/L

No field blanks were identified in this SDG.

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

All target compound identifications were within validation criteria.

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 R0905192	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

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 R0905192

SDG	Sample	Compound	Flag	A or P	Reason (Code)
*R0905192	SA128-10BSPLP3 SA128-29BSPLP3	Bromomethane	J- (all detects) UJ (all non-detects)	А	Continuing calibration (%D) (c)
R0905192	SA102-10BSPLP3 SA102-30BSPLP3 SA30-9BSPLP3 SA128-10BSPLP3 SA128-29BSPLP3	All compounds reported below the PQL.	J (all detects)	А	Project Quantitation Limit (PQL) (sp)

^{*}Corrected Samples for Continuing Calibration qualification.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Laboratory Blank Data Qualification Summary - SDG R0905192

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905192	SA102-10BSPLP3	Acetone Chloroform	4.8U ug/L 2.8U ug/L	А	bl
R0905192	SA102-30BSPLP3	Acetone Chloroform	4.8U ug/L 2.9U ug/L	Α	bl
R0905192	SA30-9BSPLP3	Acetone Chloroform	4.1U ug/L 2.7U ug/L	А	bl
R0905192	SA128-10BSPLP3	Acetone Chloroform Dichloromethane	7.0U ug/L 2.1U ug/L 3.8U ug/L	А	bl
R0905192	SA128-29BSPLP3	Acetone Chloroform Dichloromethane	4.8U ug/L 3.1U ug/L 4.0U ug/L	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Field Blank Data Qualification Summary - SDG R0905192

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

		1.01.01.101.11.9.00	
LDC #:_	21991F1	VALIDATION COMPLETENESS WORKSHEET	Date: <u>l</u>
SDG #:	R0905192	Stage 4	Page:
Laborato	ory: Columbia Ana	lytical 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
1.	Technical holding times	A	Sampling dates: 9/10 - 14/09
H.	GC/MS Instrument performance check	A	'
111.	Initial calibration	A	2 95D m
IV.	Continuing calibration/LCV	SW	ca € 25 }
V.	Blanks	SW	
VI.	Surrogate spikes	<u> </u>	
VII.	Matrix spike/Matrix spike duplicates	N	Client spec
VIII.	Laboratory control samples	A	Client spec
IX.	Regional Quality Assurance and Quality Control	N N	, , , , , , , , , , , , , , , , , , ,
X.	Internal standards	A_	
XI.	Target compound identification	A	
XII.	Compound quantitation/CRQLs	A	
XIII.	Tentatively identified compounds (TICs)	Ŋ	
XIV.	System performance	Α	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

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

Page: of

Validated Samples:

	501					
1	SA102-10BSPLP3	11	172327- MB	21	31	
2	SA102-30BSPLP3	担	SPLP-BK 1	22	32	
3	SA30-9BSPLP3	13 7	172647-MB	23	33	
4 -	SA128-10BSPLP3	14 2	SPLP-BLEZ	24	34	
5	7 SA128-29BSPLP3	15		25	35	
6	,	16		26	36	
7		17		27	37	
8		18		28	38	
9		19		29	39	
10		20		30	40	

DC #: 2 | 991 F | DG #: See Cover

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: 2nd Reviewer:

Method: Volatiles (EPA SW 846 Method 8260B)

Method: Volatiles (EPA SW 846 Method 8260B)		T		r
Validation Area	Yes	No	NA	Findings/Comments
l. Technical holding times				
All technical holding times were met.				
Cooler temperature criteria was met.		<u> </u>		
II. GC/MS Instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	/			
Were all samples analyzed within the 12 hour clock criteria?				
III. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	_			
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?		_		
Was a curve fit used for evaluation?				
Did the initial calibration meet the curve fit acceptance criteria of > 0.990?	/	<u> </u>		
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 $(\%D) \le 25\%$ and relative response factors $(RRF) \ge 0.05?$	<u> </u>		K	
V Blanks				
Was a method blank associated with every sample in this SDG?		<u> [</u>		
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		,	,	Y
Were all surrogate %R within QC limits?	_	1_	_	
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.		/	1	
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?	1	1	1	

DC #: 21991 F1
DG #: See Cover

VALIDATION FINDINGS CHECKLIST

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?				
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		_		
Were the performance evaluation (PE) samples within the acceptance limits?		000000000000		
X. Internat 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?			<u> </u>	
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	/			
Were chromatogram peaks verified and accounted for?				
XII. Compound quantitation/CRQLs	,		i i	
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?			/	
Were relative intensities of the major ions within \pm 20% between the sample and the reference spectra?			/	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?		/		
XIV. System performance				
System performance was found to be acceptable.			•	
XV. Overall assessment of data				
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. Fleid blanks				1
Field blanks were identified in this SDG.			Ĺ	
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. kopropyl 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	FFF. 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. kopropylbenzene	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.
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-Ethyttoluene	ррър.
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether.	CCC. tert-Butylbenzene	www.Ethand	0000
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-tsopropyttoluene	AAAA. Ethyl tert-butyl ether	ບບບບ.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	ww.

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

LDC # 2 | 99 | F SDG #: Sta

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".

	Standard ID	Compound	Finding %D (Limit: <25,0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	X 4567	(-) B	35.~		45 172647-MB	J- MIA (C)
					SPLP-BLKY	
. 1						
. 1						
l						
1						
1						
1						
l						
l						

SDG# See Gray LDC#: 21991 F)

VALIDATION FINDINGS WORKSHEET

Blanks

2nd Reviewer. Page: Reviewer

> Phease 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?

Y N/A

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. 1269 Blank analysis date: Y/N N/A

(PF) Sample Identification Associated Samples: Ψ N, 4 λ 4.8 u e 2.9 /W 4.8/4 SPLP-B) Blank ID 4.7 Conc. units: 45 Compound

				Ī	T		T	
~								
ار	_							
	Sample Identification							
v	ample Ide							
4	S							
ples:								
Associated Samples:								
Asso			λ,	7,7	12			
		7	4,	3.1/	4.0/			
		4	7.0 /4	2,1/4	3.8/4			
		7 7						
	Blank ID	SPLP-BLAZ	4,0	2,4	0.4			
			щ	*	177			
/ bu	Compound							
Conc. units: 416	Col							
S								

Blank analysis date:

21 adi FI See Cover SDG #: LDC #:

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Page: 1 of 1 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:

 $\label{eq:RFS} $$RF = (A_i)(C_b_s)(C_s)$$ average RRF = sum of the RRFs/number of standards $$RSD = 100 \cdot (S/X)$$$

 $A_{\rm s}$ = Area of associated internal standard $C_{\rm s}$ = Concentration of internal standard A, = Area of compound,
C, = Concentration of compound,
S = Standard deviation of the RRFs
X = Mean of the RRFs

					Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
**	Standard ID	Calibration Date	Compound	Compound (Reference Internal Standard)	RRF (S7 std)	RRF (Co std)	Average RRF (initial)	Average RRF (initial)	%RSD	%RSD
-	1(4)	, , ,	O	(1st internal standard)	0.699	0.699	0.648	ه. د ۶۶	6.8	د, 8
	3	60/51/n	4	(2nd internal standard)	80.8. g	804 '0	906.9	706.0	4.4	4,8
	.,		77	1	145.0	0.57	0. 528	822.0	3.7	3.7
2			88	it i	565'0	h65.0	0.5%)	0.58/	ط ۶	£,3
				(2nd internal standard)						
	-			(3rd internal standard)						
۳.				(1st internal standard)						
				(2nd internal standard)						
				(3rd internal standard)						
4				(1st internal standard)						
				(2nd internal standard)						
				(3rd internal standard)						V

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.

21 A A A I F SDG #: Sec Cover LDC #:

Continuing Calibration Results Verification VALIDATION FINDINGS WORKSHEET

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

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

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

% Difference = 100 * (ave. RRF - RRF)/ave. RRF RRF = (4,)(C_s)/(A_s)(C_s)

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

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

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

Recalculated %D

8.7

o V

7

4 ر م

Ö

0,651 6.367

157.0

0.307

(2nd internal standard)

8

(1st internal standard)

0

60/0c/ 6

4517X

5,50

Reported %D ≈ 7 ゲイ 7.) Recalculated RRF o. 283 CO9,0 0, 43 217.0 7 7090 Reported RRF 0.283 0.539 ٥ Average RRF K D. 64X 0,306 3 0 Compound (Reference internal Standard) (2nd internal standard) (2nd internal standard) (3rd internal standard) (1st internal standard) (3rd internal standard) (1st internal standard) 88 EF ೮ 40/82/4 Calibration Standard ID x4565

o, 6,0 0.576 16510 (3rd internal standard) (2nd internal standard) (3rd internal standard) (1st internal standard) 85

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results. LDC #: 21 991 F1 SDG #: See cover

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:_	1	_of_	1
Reviewer:		7	16
2nd reviewer:		A	

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

The percent recoveries (%			

% Recovery: SF/SS * 100

Where: SF = Surrogate Found

SS = Surrogate Spiked

Sample ID: #)

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8	(7)	52.00	104	104	0
Bromofluorobenzene		50,18	102	102	
1,2-Dichloroethane-d4					
Dibromofluoromethane	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	51.5/	103	103	4

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					

LDC #: 21491 FJ SDG #: Ste Coner

VALIDATION FINDINGS WORKSHEET Laboratory Control Sample Results Verification

Page: 1 of 1
Reviewer: 5/6
2nd Reviewer:

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

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

% Recovery = 100 * SSC/SA Where: SSC = Spik

Where: SSC = Spiked sample concentration SA = Spike added

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

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

LCS ID: 172647 - VCS

	JS.	oike	Spiked S	ample	וט	CS	usoı	g	/รวา	I CS/I CSD
Compound	A A	Added Mg/L)	Concentration (1)	ration	Percent Recovery	ecovery	Percent Recovery	scovery	ī.	RPD
	801	I.GSD	1.68	1 CSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
1,1-Dichloroethene	20.0	₩.	6,52	N.A	71 4	114				
Trichloroethene			24,0		201	701				
Benzene			7.02		104	104				
Toluene			21.15		701	107				
Chlorobenzene	7	X	۲.۲	\ \	801	801				
		7				\	\			
					The state of the s		,			

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. DC #: 21991 F1 SDG #: See Cover

Df

%S

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	1 of 1
Reviewer:	51/4
2nd reviewer:	4

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

Percent solids, applicable to soils and solid matrices

Dilution factor.

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?

(A,)(I,)(DF) Example: Concentration = (A_s)(RRF)(V_o)(%S) Sample I.D. Area of the characteristic ion (EICP) for the compound to be measured Area of the characteristic ion (EICP) for the specific internal standard Conc. = (38238) (50)() Amount of internal standard added in nanograms Relative response factor of the calibration standard. RRF = 2.80 mg/L Volume or weight of sample pruged in milliliters (ml) v. or grams (g).

#	Sample ID	Compound	Reported Concentration	Calculated Concentration ()	Qualification
	Sample 1D	Compound		<u> </u>	
ļ			<u> </u>		
 					
 					
 					
-					
 			 	<u> </u>	
1					

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date: September 11, 2009

LDC Report Date: December 7, 2009

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905198

Sample Identification

RSAQ6-0.5B

RSAQ6-10B

RSAQ6-25B

RSAQ6-38B

RSAQ6009-38B

SA41-12B

SA41-25B

SA41-38B

SA40-10B

SA40-25B

SA40-41B

SA114-10B

SA114-30B

SA124-25B

SA124-42B

TB091109-SO1

TB091109-SO2

SA40-41BMS

SA40-41BMSD

Introduction

This data review covers 17 soil samples and 2 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
9/18/09	2-Methyl-2-propanol	0.028 (≤0.05)	All water samples in SDG R0905198	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
9/22/09 (H1021)	Dichlorodifluoromethane Carbon tetrachloride n-Propylbenzene 2-Chlorotoluene n-Butylbenzene	34.6 29.4 25.3 28.4 27.0	RSAQ6009-38B SA41-12B SA41-25B SA41-38B SA40-10B SA40-25B SA114-10B SA114-30B SA114-30B SA124-25B SA124-42B 171297-MB	J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) 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
9/22/09 (C0879)	2-Methyl-2-propanol	0.025 (≤0.05)	All water samples in SDG R0905198	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
171110-MB	9/21/09	Dichloromethane	0.77 ug/Kg	RSAQ6-0.5B RSAQ6-10B RSAQ6-25B RSAQ6-38B SA40-41B

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

Samples TB091109-SO1 and TB091109-SO2 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
TB091109-SO2	9/11/09	Bromoform Chloromethane	0.23 ug/L 0.22 ug/L	RSAQ6-0.5B RSAQ6-10B RSAQ6-25B RSAQ6-38B RSAQ6009-38B SA124-25B SA124-42B

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

Sample FB072909-SO (from SDG R0904226) 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
FB072909-SO	7/29/09	Acetone Dichloromethane Toluene	3.5 ug/L 0.30 ug/L 0.44 ug/L	All soil samples in SDG R0905198

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
RSAQ6009-38B	Toluene	0.54 ug/Kg	0.54U ug/Kg
SA41-12B	Toluene	0.56 ug/Kg	0.56U ug/Kg
SA40-10B	Acetone	1.6 ug/Kg	1.6U ug/Kg
SA114-10B	Acetone Toluene	6.0 ug/Kg 0.44 ug/Kg	6.0U ug/Kg 0.44U ug/Kg
SA124-42B	Toluene	0.77 ug/Kg	0.77U 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
SA40-41BMS/MSD (SA40-41B)	Dichlorodifluoromethane	53 (70-130)	50 (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
171110-LCS	Dichlorodifluoromethane	67 (75-125)	RSAQ6-0.5B RSAQ6-10B RSAQ6-25B RSAQ6-38B SA40-41B 171110-MB	J- (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0905198	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 RSAQ6-38B and RSAQ6009-38B were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concentration (ug/Kg)		555			
Compound	RSAQ6-38B	RSAQ6009-38B	RPD (Limits)	Difference (Limits)	Flags	A or P
Chloroform	43	33	-	10 (≤7.3)	-	-
2-Butanone	14U	1.4	-	12.6 (≤14)	•	-
Toluene	7.2U	0.54	-	6.66 (≤7.2)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Data Qualification Summary - SDG R0905198

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905198	TB091109-SO1 TB091109-SO2	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Initial calibration (RRF) (c)
R0905198	RSAQ6009-38B SA41-12B SA41-25B SA41-38B SA40-10B SA40-25B SA114-10B SA114-30B SA1124-25B SA124-42B	Dichlorodifluoromethane Carbon tetrachloride n-Propylbenzene 2-Chlorotoluene n-Butylbenzene	J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects)	A	Continuing calibration (%D) (c)
R0905198	TB091109-SO1 TB091109-SO2	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Continuing calibration (RRF) (c)
R0905198	SA40-41B	Dichlorodifluoromethane	J- (all detects) UJ (all non-detects)	А	Matrix spike/Matrix spike duplicates (%R) (m)
R0905198	RSAQ6-0.5B RSAQ6-10B RSAQ6-25B RSAQ6-38B SA40-41B	Dichlorodifluoromethane	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0905198	RSAQ6-0.5B RSAQ6-10B RSAQ6-25B RSAQ6-25B RSAQ6009-38B SA41-12B SA41-25B SA41-38B SA40-10B SA40-25B SA40-41B SA114-10B SA114-30B SA114-30B SA124-25B SA124-42B TB091109-SO1	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Laboratory Blank Data Qualification Summary - SDG R0905198

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Trip Blank Data Qualification Summary - SDG R0905198

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Field Blank Data Qualification Summary - SDG R0905198

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905198	RSAQ6009-38B	Toluene	0.54U ug/Kg	А	bf
R0905198	SA41-12B	Toluene	0.56U ug/Kg	А	bf
R0905198	SA40-10B	Acetone	1.6U ug/Kg	А	bf
R0905198	SA114-10B	Acetone Toluene	6.0U ug/Kg 0.44U ug/Kg	A	bf
R0905198	SA124-42B	Toluene	0.77U ug/Kg	А	bf

Tronox Northqate Henderson

LDC #:_	21991G1	VALIDATION COMPLETENESS WORKSHEET
SDG #:_	R0905198	Stage 2B
Laborato	ry. Columbia Analytica	al Services

Date:	12/02/09
Page:_	lof'
Reviewer:	JV6
2nd Reviewer:	0

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: 9/11/09
II.	GC/MS Instrument performance check	A	,
III.	Initial calibration	SW	2 RSD r2
IV.	Continuing calibration/JCV	SW	cay & 25 }
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	Wک	
VIII.	Laboratory control samples	_cw	US
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	<u> </u>	
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	SM	D = 4,5
XVII.	Field blanks	SM,	TB = 14, 17 FB = FB 072909-SO (R0904)

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:

Coil + Water

,	701	1 00	Mer			
1 1	RSAQ6-0.5B	11	SA40-41B 5	21	171110 - MB	31
2 1	RSAQ6-10B	12	SA114-10B	22 7	171241-	32
3 I	RSAQ6-25B	133	SA114-30B	23 >	171297-	33
† 4	RSAQ6-38B	14 3	SA124-25B	24		34
5 3	RSAQ6009-38B b	15 3	SA124-42B	25		35
6	SA41-12B	16	TB091109-SO1	26		36
7 3	SA41-25B	17 7	TB091109-SO2	27		37
8 3	SA41-38B	18	SA40-41BMS S	28		38
9)	SA40-10B	19 \	SA40-41BMSD	29		39
10 3	SA40-25B	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. Isopropy/ alcohol
C. Vinyl choride**	W. trans-1,3-Dichloropropene	QQ. 1,1-Dichioropropene	KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
D. Chloroethane	X. Bromoform*	RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF, Acrolein
E. Methyene allonde	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. Isopropyłbenzene	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. Chloroform⁴	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-Ethyttoluene	РРРР.
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Buty/benzene	www. Ethanol	0000.
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. ds-1,3-Dichloropropene	LL. Methyf-tert-butyf ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyf alcohol	TTTT.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-Isopropyltoluene	AAAA. Ethyl tert-butyl ether	תחחח.
T. Dibromochioromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amy methyl ether	ww.

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

raye. Reviewer:_ 2nd Reviewer:

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

3DG#: Ca Con

.DC#:

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}{2} = \frac{2}{6} \cdot \frac{9}{7}

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

| N | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

		Word all 701000 and 1010 with the veneral circle of 101000000000000000000000000000000000		in an in minor in			
#2		Standard ID	Compound	Finding %RSD (Limit: <30.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	9/2/6		2 2 2 2		0,028	16 17 171241- MB	J/M3/A (C)
	\ \ \ \						
					_		
<u> </u>							
<u> </u>							
<u> </u>							

SDG #: LDC #:

VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page: of] Reviewer._ 2nd Reviewer:

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

N N/A

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

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

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

Were all %D and RRFs within the validation criteria of <25 %D and >0.05 RRF? N/A/N

Date	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
4/25/64		NNNN		520 a	16,17, 171241-MB	5/YZ/A (C)
22/09	HIOZI	JJ (t)	34.6		5-10, 12-15	J+dots/A
		(+) O	29.4	_	712	
		(t)	25.3			
		,	28.4			
		\sim	27.0			
					>	

SDG #: La and LDC#: 21991 6/

VALIDATION FINDINGS WORKSHEET Blanks

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

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

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

Associated Samples: Conc. units:

(an)

Sample Identification 1-4 11 171110-M# Blank ID 0.77 μ Compound Blank analysis date:

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

LDC #: 21 991 H)

VALIDATION FINDINGS WORKSHEET Field Blanks

Page: of Reviewer: 316 2nd Reviewer:

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

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

Y/N N/A

Were target compounds detected in the field blanks?

Blank units: 49 / Associated sample units: 45 / F

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

14 15

<u>S</u>

Associated Samples:

Compound	Blank ID 17 Blank ID	Blank ID				Sample Identification	tification			
Sampling Date	9/11/6									
×	6,23									
¥	0, 22									
							,			
Blank units: 16 /L Associated sample units: 16 /k $_{8}$ Field blank/ Rinsate / Trip Blank / Other:	ocja ted sa mp e)(Fjeld Blank	ole units: ^h V Rinsate / Tr	19/ks rip Blank / Othe	er:	Associa	Associated Samples:		Slios liA	(79)	
	43 199 05 CY YE	8								

	,								
							()		
	ntification	15			0.77/4		7 FB		
Associated Samples.	Sample Identification	7	h/0.7		0, 44/4 0.77/4		either ND or		
JOSE V		6	1.0/4				ei ther		
. ICI.		9			0.56 /u		thers		
ייושום ליו		א			n, 54/4		CAN		
ו ווווסמובי ו	Slank ID								
יון וכוח חומו ולי	FB 672909 SB	2/29/64	, 5'8	06.0	6.44	1			
ני (חווחום חוונ	nnd	Sampling Date	L	حلا	CC				
leid Dialik () pe. (clicle Orie) leid Dialik Allisate IIIp Dialik Ottiel	Compound								

100 #: 2/99/6 SDG #:

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

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".

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

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

-							
# Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	18/19	Several	compands)	have BR an	¥		No mal (e)the
		out sive	(Whits)	()	()		MS/MSB or Le
			-	rehit (Gynn)a	\(\frac{1}{2}\)		
					()		
		りり	53 (76-170)	(061-87) OZ)		J-/47/4 (A)
			()	()	()		
			()	()	()		
)	()		
			()	()	()		
			()	()	()		
			()	()	()		
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			()	()	()		
			()	()	()		
			()	()	()		
	Compound	pund	QC Limits (Soil)	ts (Soll)	RPD (Soil)	QC Limits (Water)	RPD (Water)
ï	1,1-Dichloroethene		59-1	59-172%	< 22%	61-145%	< 14%
Ŋ.	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%

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:

Northgate Environmental

Project:

Tronox LLC Henderson/2027.001

Sample Matrix:

Soil

Service Request: R0905198

Date Collected: 9/11/09 Date Received: 9/12/09 Date Analyzed: 9/21/09

Matrix Spike Summary Volatile Organic Compounds by GC/MS

Sample Name:

SA40-41B

Lab Code:

R0905198-011

Units: μg/Kg Basis: Dry

Analytical Method: 8260B

	Sample		Aatrix Spike Q0908828-03				ate Matrix :		% Rec		RPD
Analyte Name	Result	Result	Amount	% Rec		Result	Amount	% Rec		RPD	Limit
1,1,1,2-Tetrachloroethane	ND	58.9	78.8	75		59.6	79.6	75	70 - 130	1	30
1,1,1-Trichloroethane (TCA)	ND	74.0	78.8	94		74.3	79.6	93	70 - 130	0	30
1,1,2,2-Tetrachloroethane	ND	58.7	78.8	74		64.6	79.6	81	70 - 130	10	30
1,1,2-Trichloroethane	ND	58.0	78.8	74		60.7	79.6	76	70 - 130	5	30
1,1-Dichloroethane (1,1-DCA)	ND	69.6	78.8	88		68.4	79.6	86	70 - 130	2	30
1,1-Dichloroethene (1,1-DCE)	0.88	67.8	78.8	85		67.8	79.6	84	70 - 130	0	30
1,1-Dichloropropene	ND	62.8	78.8	80		65.7	79.6	83	70 - 130	5	30
1,2,3-Trichlorobenzene	ND	41.1	78.8	52	*	47.1	79.6	59	* 70 - 130	14	30
1,2,3-Trichloropropane	ND	54.2	78.8	69	*	58.2	79.6	73	70 - 130	7	30
1,2,4-Trichlorobenzene	ND	44.0	78.8	56	*	51.1	79.6	64	* 70 - 130	15	30
1,2,4-Trimethylbenzene	ND	53.9	78.8	68	*	61.4	79.6	77	70 - 130	13	30
1,2-Dibromo-3-chloropropane (DBC	ND	49.3	78.8	63		55.4	79.6	70	50 - 150	12	30
1,2-Dibromoethane	ND	55.7	78.8	71		57.8	79.6	73	70 - 130	4	30
1,2-Dichlorobenzene	ND	52.9	78.8	67	*	61.4	79.6	77	70 - 130	15	30
1,2-Dichloroethane	ND	58.3	78.8	74		63.2	79.6	79	70 - 130	8	30
1,2-Dichloropropane	ND	59.3	78.8	75		64.2	79.6	81	70 - 130	8	30
1,3,5-Trimethylbenzene	ND	57.2	78.8	73		60.8	79.6	76	70 - 130	6	30
1,3-Dichlorobenzene	ND	54.2	78.8	69	*	60.5	79.6	76	70 - 130	11	30
1,3-Dichloropropane	ND	55.9	78.8	71		57.8	79.6	73	70 - 130	3	30
1,4-Dichlorobenzene	ND	55.4	78.8	70		60.4	79.6	76	70 - 130	9	30
2,2-Dichloropropane	ND	70.1	78.8	89		66.6	79.6	84	70 - 130	5	30
2-Butanone (MEK)	1.6	56.9	78.8	70		52.6	79.6	64	50 - 150	8	30
2-Chlorotoluene	ND	55.8	78.8	71		60.9	79.6	77	70 - 130	9	30
2-Hexanone	ND	34.4	78.8	44	*	38.5	79.6	48	* 70 - 130	11	30
2-Methyl-2-propanol	ND	1210	1580	77		1130	1590	71	50 - 150	7	30
4-Chlorotoluene	ND	55.6	. 78.8	71		63.9	79.6	80	70 - 130	14	30
4-Isopropyltoluene	ND	53.6	78.8	68	*	59.4	79.6	75	70 - 130	10	30
4-Methyl-2-pentanone	ND	50.1	78.8	64	*	51.9	79.6	65	* 70 - 130	4	30
Acetone	ND	83.2	78.8	106		61.8	79.6	78	50 - 150	30	30
Benzene	ND	57.8	78.8	73		63.4	79.6	80	70 - 130	9	30
Bromobenzene	ND	57.0	78.8	72		63.4	79.6	80	70 - 130	11	30
Bromochloromethane	ND	62.4	78.8	79		60.0	79.6	75	70 - 130	4	30
Bromodichloromethane	ND	61.5	78.8	78		65.4	79.6	82	70 - 130	6	30

Comments:

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Matrix Spike Summary

SuperSet Reference:

09-0000120541 rev 00

00082

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:

Northgate Environmental

Tronox LLC Henderson/2027.001 Project:

Sample Matrix:

Soil

Service Request: R0905198 Date Collected: 9/11/09 Date Received: 9/12/09

Date Analyzed: 9/21/09

Matrix Spike Summary Volatile Organic Compounds by GC/MS

Sample Name: Lab Code:

SA40-41B

R0905198-011

Units: µg/Kg Basis: Dry

Analytical Method: 8260B

	Sample		Iatrix Sp ike Q0908828-0				cate Matrix Q0908828-0		% Rec		RPD
Analyte Name	Result	Result	Amount	% Rec		Result	Amount	% Rec	Limits	RPD	Limit
Bromoform	ND	56.2	78.8	71		59.6	79.6	75	70 - 130	6	30
Bromomethane	ND	52.9	78.8	67		56.8	79.6	71	50 - 150	7	30
Carbon Tetrachloride	ND	70.2	78.8	89		72.1	79.6	91	70 - 130	3	30
Chlorobenzene	ND	57.0	78.8	72		59.2	79.6	74	70 - 130	4	30
Chloroethane	ND	64.9	78.8	82		60:0	79.6	75	70 - 130	8	30
Chloroform	61	134	78.8	94		148	79.6	110	70 - 130	10	30
Chloromethane	ND	61.4	78.8	78		59.4	79.6	75	70 - 130	3	30
Dibromochloromethane	ND	60.2	78.8	76		62.0	79.6	78	70 - 130	3	30
Dibromomethane	ND	54.5	78.8	69	*	60.2	79.6	76	70 - 130	10	30
Dichlorodifluoromethane (CFC 12)	ND	42.1	78.8	53	*	40.0	79.6	50	* 70 - 130	5	30
Dichloromethane	ND	69 .0	78.8	88		64.9	79.6	82	70 - 130	6	30
Diisopropyl Ether	ND	69.3	78.8	88		67.4	79.6	85	70 - 130	3	30
Ethyl tert-Butyl Ether	ND	71.0	78.8	90		69.7	79.6	88	70 - 130	2	30
Ethylbenzene	ND	59.1	78.8	75		61.8	79.6	78	70 - 130	5	30
Hexachlorobutadiene	ND	45.3	78.8	57	*	51.3	79.6	64	* 70 - 130	13	30
Isopropylbenzene (Cumene)	ND	59.9	78.8	76		64.1	79.6	81	70 - 130	7	30
Methyl tert-Butyl Ether	ND	63.0	78.8	80		63.3	79.6	80	70 - 130	1	30
Naphthalene	ND	48.3	78.8	61		58.8	79.6	74	50 - 150	20	30
Styrene	ND	59.1	78.8	75		65.0	79.6	82	70 - 130	9	30
Tetrachloroethene (PCE)	ND	58.6	78.8	74		63.3	79.6	79	70 - 130	8	30
Toluene	ND	61.1	78.8	77		61.9	79.6	78	70 - 130	1	30
Trichloroethene (TCE)	12	72.8	78.8	78		80.9	79.6	87	70 - 130	11	30
Trichlorofluoromethane (CFC 11)	ND	70.0	78.8	89		66.7	79.6	84	70 - 130	5	30
Vinyl Chloride	ND	60.1	78.8	76		63.6	79.6	80	70 - 130	6	30
cis-1,2-Dichloroethene	ND	67.3	78.8	85		63.6	79.6	80	70 - 130	6	30
cis-1,3-Dichloropropene	ND	57.4	78.8	73		62.9	79.6	79	70 - 130	9	30
m,p-Xylenes	ND	113	158	72		118	159	74	70 - 130	4	30
n-Butylbenzene	ND	52.4	78.8	66	*	58.1	79.6	73	70 - 130	10	30
n-Propylbenzene	ND	57.4	78.8	73		62.6	79.6	79	70 - 130	9	30
o-Xylene	ND	56.8	78.8	72		59.6	79.6	75	70 - 130	5	30
sec-Butylbenzene	ND	56.4	78.8	71		62.9	79.6	79	70 - 130	11	30
tert-Amyl Methyl Ether	ND	66.6	78,8	85		64.5	79.6	81	70 - 130	3	30
tert-Butylbenzene	ND	57.5	78.8	73		61.3	79.6	77	70 - 130	6	30
trans-1,2-Dichloroethene	ND	65.3	78.8	83		66.1	79.6	83	70 - 130	1	30

Comments:

Printed 10/26/09 8:50 \Unflow2\Starlims\LimsReps\MatrixSpike.rpt Matrix Spike Summary

SuperSet Reference:

09-0000120541 rev 00

LDC #: 21 991 61 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?

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	Qualifications	J-/MJ/P																										
V	ociated	1-4 11 171110-MB																										
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LCSD %R (Limits)		_					-	()		()	_		-1-	-	^ ·					(()	(-			
LCS %R (Limits)	67 (75 126)	- 1)	~)		-			~	<u> </u>				_	(-	^)				,			
Compound	トナー															-												
CCS/CCSD ID	(71110 - 175																									•		
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LDC #: 2/99/H/ SDG #: Su Cme/

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	_\ of_
Reviewer:	JVI
2nd reviewer	7

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

Y	N	N/A
y	Ŋ	N/A

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

		Concentratio	n ug/ky		Parent
Compound		4	7	RPD	mly
	K	43	33	10 (47.30)	
	М)4 y	1. 4	12.6(=14)	
	a	7.21	0,54	666(£7.2D)	

	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: September 14, 2009

LDC Report Date: December 8, 2009

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905218

Sample Identification

EB091409-SO1 TB091409-SO2 SA42-10B TB091409-SO3 SA42009-10B RSAR6-37BMS SA42-25B RSAR6-37BMSD

SA42-38B SA43-10B SA43-25B SA43-25BRE SA43-43B SA44-10B SA44-25B SA44-42B

RSAR6-37B RSAR6-25B

RSAR6-0.5B

RSAR6-9B

RSAO8-43B

RSAO8-11.5B

RSAO8-21.5B

TB091409-SO1

Introduction

This data review covers 20 soil samples and 4 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
SA43-25BRE	All TCL compounds	17	14	J- (all detects) UJ (all non-detects)	Α

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
9/18/09	2-Methyl-2-propanol	0.028 (≤0.05)	EB091409-SO1 RSAR6-37B TB091409-SO1 TB091409-SO2 TB091409-SO3 RSAR6-37BMS RSAR6-37BMSD 171241-WMB 171241-SMB	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
9/22/09 (H1021)	Dichlorodifluoromethane Carbon tetrachloride n-Propylbenzene 2-Chlorotoluene n-Butylbenzene	34.6 29.4 25.3 28.4 27.0	SA42-10B SA42009-10B SA42-38B 171297-MB	J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects)	А
9/24/09	Hexachlorobutadiene	31.6	RSAR6-9B RSAO8-43B RSAO8-11.5B RSAO8-21.5B 171735-MB	J- (all detects) UJ (all non-detects)	А
10/1/09	tert-Butylbenzene sec-Butylbenzene p-Isopropyltoluene 1,2-Dibromo-3-chloropropane Hexachlorobutadiene	28.1 25.2 25.5 25.6 45.9	SA43-25BRE 172787-MB	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
9/22/09 (C0879)	2-Methyl-2-propanol	0.025 (≤0.05)	EB091409-SO1 RSAR6-37B TB091409-SO1 TB091409-SO2 TB091409-SO3 RSAR6-37BMS RSAR6-37BMSD 171241-WMB 171241-SMB	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
171241-SMB	9/22/09	2-Butanone	88 ug/Kg	RSAR6-37B

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
RSAR6-37B	2-Butanone	140 ug/Kg	140U ug/Kg

Samples TB091409-SO1, TB091409-SO2, and TB091409-SO3 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
TB091409-SO1	9/14/09	Acetone	11 ug/L	EB091409-SO1 SA42-10B SA42009-10B SA42-25B SA42-38B SA43-10B SA43-25B SA43-25B SA43-25BRE SA43-43B SA44-10B SA44-25B SA44-42B

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
TB091409-SO2	9/14/09	Acetone	2.0 ug/L	RSAR6-37B RSAR6-25B RSAR6-0.5B RSAR6-9B RSAO8-43B RSAO8-11.5B RSAO8-21.5B
TB091409-SO3	9/14/09	Chloromethane	0.21 ug/L	EB091409-SO1 SA42-10B SA42009-10B SA42-25B SA42-38B SA43-10B SA43-25B SA43-25B SA43-25BRE SA43-43B SA44-10B SA44-25B SA44-42B

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

Sample	Compound	Reported Concentration	Modified Final Concentration
EB091409-SO1	Acetone	7.9 ug/Kg	7.9U ug/Kg
SA42-25B	Acetone	2.1 ug/Kg	2.1U ug/Kg
SA42-38B	Acetone	17 ug/Kg	17U ug/Kg
SA43-10B	Acetone	9.8 ug/Kg	9.8U ug/Kg
SA44-10B	Acetone	7.9 ug/Kg	7.9U ug/Kg
SA44-42B	Acetone	13 ug/Kg	13U ug/Kg

Sample EB091409-SO1 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
EB091409-SO1	9/14/09	Acetone Dichloromethane Chlorobenzene	7.9ug/L 0.21 ug/L 0.42 ug/L	SA42-10B SA42009-10B SA42-25B SA42-38B SA43-10B SA43-25B SA43-25BRE SA43-43B SA44-10B SA44-25B SA44-12B RSAR6-37B RSAR6-37B RSAR6-9B

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

Sample	Compound	Reported Concentration	Modified Final Concentration
SA42-25B	Acetone	2.1 ug/Kg	2.1U ug/Kg
SA43-10B	Acetone	9.8 ug/Kg	9.8U ug/Kg
SA44-10B	Acetone	7.9 ug/Kg	7.9U ug/Kg
SA44-42B	Acetone	13 ug/Kg	13U ug/Kg
RSAR6-0.5B	Acetone	14 ug/Kg	14U ug/Kg

Samples FB072909-SO (from SDG R0904226) and FB082809-SO (from SDG R0904894) were identified as field blanks. No volatile contaminants were found in these blanks with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072909-SO	7/29/09	Acetone Dichloromethane Toluene	3.5 ug/L 0.30 ug/L 0.44 ug/L	SA42-10B SA42009-10B SA42-25B SA42-38B SA43-10B SA43-25B SA43-25BRE SA43-43B SA44-10B SA44-10B SA44-25B SA44-42B RSAR6-37B RSAR6-25B RSAR6-25B RSAR6-0.5B
FB082809-SO	8/28/09	Acetone Toluene	9.2 ug/L 0.44 ug/L	RSAO8-43B RSAO8-11.5B RSAO8-21.5B

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
SA42-10B	Dichloromethane	0.48 ug/Kg	0.48U ug/Kg
SA42-25B	Acetone Dichloromethane	2.1 ug/Kg 0.43 ug/Kg	2.1U ug/Kg 0.43U ug/Kg
SA43-43B	Toluene	0.70 ug/Kg	0.70U ug/Kg
SA44-42B	Dichloromethane	0.50 ug/Kg	0.50U ug/Kg
RSAR6-25B	Toluene	0.70 ug/Kg	0.70U ug/Kg
RSAR6-9B	Toluene	0.61 ug/Kg	0.61U ug/Kg
RSAO8-43B	Toluene	0.73 ug/Kg	0.73U ug/Kg
RSAO8-11.5B	Acetone	8.6 ug/Kg	8.6U ug/Kg
RSAO8-21.5B	Toluene	0.51 ug/Kg	0.51U 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 some compounds, the 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 LCS percent recoveries (%R) for a second LCS analysis were within QC limits and no data were qualified.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
SA43-25B	Pentafluorobenzene 1,4-Difluorobenzene Chlorobenzene-d5 1,4-Dichlorobenzene-d4	124883 (285820-1143278) 229271 (473981-1895922) 203306 (424973-1699892) 86736 (190690-762760)	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 compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0905218	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
SA43-25B	All TCL compounds	Х	А

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

XVI. Field Duplicates

Samples SA42-10B and SA42009-10B were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concentration (ug/Kg)		Concentration (ug/Kg)		222	5.77		
Compound	SA42-10B	SA42009-10B	RPD (Limits)	Difference (Limits)	Flags	A or P		
Dichloromethane	0.48	5.7U	-	5.22 (≤5.7)	-	-		

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Data Qualification Summary - SDG R0905218

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905218	SA43-25BRE	All TCL compounds	J- (all detects) UJ (all non-detects)	А	Technical holding times (h)
R0905218	EB091409-SO1 RSAR6-37B TB091409-SO1 TB091409-SO2 TB091409-SO3	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Initial calibration (RRF) (c)
R0905218	SA42-10B SA42009-10B SA42-38B	Dichlorodifluoromethane Carbon tetrachloride n-Propylbenzene 2-Chlorotoluene n-Butylbenzene	J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects)	А	Continuing calibration (%D) (c)
R0905218	RSAR6-9B RSAO8-43B RSAO8-11.5B RSAO8-21.5B	Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	А	Continuing calibration (%D) (c)
R0905218	SA43-25BRE	tert-Butylbenzene sec-Butylbenzene p-Isopropyltoluene 1,2-Dibromo-3-chloropropane Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	Α	Continuing calibration (%D) (c)
R0905218	EB091409-SO1 RSAR6-37B TB091409-SO1 TB091409-SO2 TB091409-SO3	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Continuing calibration (RRF) (c)
R0905218	SA43-25B	All TCL compounds	J (all detects) R (all non-detects)	А	Internal standards (area)
R0905218	SA43-25B	All TCL compounds	х	А	Overall assessment of data (o)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905218	EB091409-SO1 SA42-10B SA42009-10B SA42-25B SA42-35B SA42-35B SA43-25B SA43-25B SA43-25BRE SA43-43B SA44-10B SA44-25B SA44-25B SA44-25B RSAR6-37B RSAR6-37B RSAR6-0.5B RSAR6-9B RSAR6-9B RSAO8-43B RSAO8-411.5B RSAO8-21.5B TB091409-SO1 TB091409-SO2 TB091409-SO3	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Laboratory Blank Data Qualification Summary - SDG R0905218

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code	
R0905218	RSAR6-37B	2-Butanone	140U ug/Kg	Α	bl	

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Trip Blank Data Qualification Summary - SDG R0905218

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905218	EB091409-SO1	Acetone	7.9U ug/Kg	А	bt
R0905218	SA42-25B	Acetone	2.1U ug/Kg	А	bt
R0905218	SA42-38B	Acetone	17U ug/Kg	А	bt
R0905218	SA43-10B	Acetone	9.8U ug/Kg	А	bt
R0905218	SA44-10B	Acetone	7.9U ug/Kg	Α	bt
R0905218	SA44-42B	Acetone	13U ug/Kg	А	bt

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Equipment Blank Data Qualification Summary - SDG R0905218

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905218	SA42-25B	Acetone	2.1U ug/Kg	А	be
R0905218	SA43-10B	Acetone	9.8U ug/Kg	А	be
R0905218	SA44-10B	Acetone	7.9U ug/Kg	А	be
R0905218	SA44-42B	Acetone	13U ug/Kg	А	be
R0905218	RSAR6-0.5B	Acetone	14U ug/Kg	Α	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Field Blank Data Qualification Summary - SDG R0905218

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R090218	SA42-10B	Dichloromethane	0.48U ug/Kg	А	bf
R090218	SA42-25B	Acetone Dichloromethane	2.1U ug/Kg 0.43U ug/Kg	А	bf
R090218	SA43-43B	Toluene	0.70U ug/Kg		bf
R090218	SA44-42B	Dichloromethane	0.50U ug/Kg		bf
R090218	RSAR6-25B	Toluene	0.70U ug/Kg	А	bf
R090218	RSAR6-9B	Toluene	0.61U ug/Kg	А	bf
R090218	RSAO8-43B	Toluene	0.73U ug/Kg	А	bf
R090218	RSAO8-11.5B	Acetone	8.6U ug/Kg	А	bf
R090218	RSAO8-21.5B	Toluene	0.51U ug/Kg	А	bf

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #: 21991H1 SDG #: R0905218 Stage 2B Laboratory: Columbia Analytical Services

Date: 4/62/09 Page: 1 of 1 Reviewer: 3/4 2nd Reviewer: _Q

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	SW	Sampling dates: 9/14/09
H.	GC/MS Instrument performance check	<u> </u>	'
111.	Initial calibration	WZ	7 RSD r√
IV.	Continuing calibration/ICV	SW	ca € 25 }
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	LCS /D
IX.	Regional Quality Assurance and Quality Control	N	·
Χ.	Internal standards		
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	Su	D = 2,3
KVII.	Field blanks	SW	EB = 1 $TB = 20, 21, 22$ $TB = FB 0729 09-50$ ($R = FB 0828 09-50$ (R

N = Not provided/applicable

SW = See worksheet

R = Rinsate

FB = Field blank

TB = Trip blank

EB = Equipment blank

Validated Samples:

mater + Soil

	WATE	r	1 30)				
1 1	EB091409-SO1 W	11 3	SA44-25B \$	21	TB091409-SO2	# 31	1 171241 - WMB
2	SA42-10B D 5	12	SA44-42B	+ 22	2 I TB091409-SO3	32	7 17/297- MB
3 ?	SA42009-10B D	13	RSAR6-37B	23	RSAR6-37BMS	33	3 171498-
4 3	SA42-25B	14	RSAR6-25B	24	RSAR6-37BMSD	34	9 172787-
5 7	SA42-38B	15 3	RSAR6-0.5B	25	5	†	5 171241- SMB
6 3	SA43-10B	16 6	RSAR6-9B	26	5	36	6 171735 - MB
₇ 3	SA43-25B	17 6	RSAO8-43B	27	7	37	
8 4	SA43-25BBL RE	18 6	RSAO8-11.5B	28	3	38	
9 3	SA43-43B	19 6	RSAO8-21.5B	29		39	
10	SA44-10B	20 1	TB091409-SO1 W	/ 30		40	

TARGET COMPOUND WORKSHEET

AETHOD: 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. Benzane	PP. Bromochloromethane	JJJ. 1,2-Dichlorobenzene	DDDD. Isopropy/ 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	FFF, Acrolein
E. Methylane chonc than e	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG. Acrytontrile
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. Chloroform⁴	EE. Ethylbenzane**	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-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-Ethyttoluene	рррр.
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Buty/benzene	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. Methyf-tert-butyf 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	חחחם.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB, tert-Amyl methyl ether	ww.

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

LDC #:_	21991	<u>#</u>
SDG #:_	See	Comer

VALIDATION FINDINGS WORKSHEET Technical Holding Times

Page:_	<u></u> of
Reviewer:	SVC
2nd Reviewer:	

All circled dates have exceeded the technical holding times.

	temperatures within	

METHOD : GC/M	IS VOA (EPA S	W 846 Method	8260B)				
Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total #	Qualifier
8	5	N	Sampling Date 9 /14 /0 9		Analysis date	17	J-/WJ/1
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FECHNICAL HOLDING TIME CRITERIA

Vater unpreserved:

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

Vater preserved:

Boil:

14 101 K	ところ
#1	#:
DC.	DG

VALIDATION FINDINGS WORNSHEET **Initial Calibration**



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{1}{2} \frac{2}{2} \frac{2}{2} \frac{2}{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?

4 (λ β δ η 1 (Δ L	ł							
4/264 1(AL WNN 0,028 1,13,20-24, 17124-WAD 17124-SMB		Date	Standard ID	Compound	Finding %RSD (Limit: <30.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
171241-WNB 171241-SNB 171241-SNB	╢	1/8 /ca	17.41-	722		0,028	1, 13 20-24,	J/WS A (C)
(7)241-SNP	+	2/8/					171241-WMB,	
	╁						171241-SMB	
	-							
	-							
	1							
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1H 16/12 # 7071 SDG #:

VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page: 1 of /

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? N N N X

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	
	9 /22/09	60879	NNN		2.0.0	1, 13, 20-24.	J/WJ/A (c)	7
	1					171241- WMB		
						171241-5MB		T
								T
	6/22/6	H 1021	(+) 0	29,4		2 3 5 171297- MB	J+ dets A	1
) yy (+)	25.3				T
			(+) 7,2	28.4				Ī
			(+) III	0 ,۲ ح		- 7		
			JJ (+)	34.6				
<u> </u>								Ĩ
	1/24/69	H 108)	(-) 777	3).6		16-19 171735-MB	J-/NJ/A	
L								
	10/01/69	41236	(-) 222	28.1		8 17 2787-MB	T-/NJ A	
			(५) बन्ध	25.2				
			(-)555	5.25				
			MM (-)	25.6				
			161771					\
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VALIDATION FINDINGS WODKSHEFT

Page: Reviewer: 2nd Reviewer.

VALIDALION TINDINGO WORKUHELI	Blanks	
L 2	ш	

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.

Slank analysis date: 9

Colic. units: 712/ Ke/			Associated Samples:	(2)				-
Compound	Blank ID			Sample Identification	ation		N. C.	
	171241-SNB	18 13						
M	88	140/4						_
	; !							
Blank analysis date:								
rts:			Associated Samples.					

	Sample Identification								
Associated Samples:									
	Blank ID								
colle, utilis.	Compound								

Se Carr 21991 4) SDG #: LDC #:

VALIDATION FINDINGS WORKSHEET

Field Blanks

Page: of > Reviewer: 31/6 2nd Reviewer:_

(be)

2-16

石を

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

Y N N/A

Were field blanks identified in this SDG? Were target compounds detected in the field blanks? Were Associated sample units: $\frac{1}{2}$ $\frac{1}{4}$ OHank units:

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

EB Sample Identification Associated Samples: ٤ 4 Ş 6. ther <u>v</u> のなれる d 7 <u>8</u>. Blank-ID 9/14/09 Blank ID 0.47 0.2 Sampling Date. 2 Ш ىلا Compound <u>4.</u>

Associated Samples: 13 / Es Blank units: 45/L Associated sample units: 45/L ; 49/L ; 49/L ; Field blank type: (circle one) Field Blank / Rinsate /(Tip Blank) Other:

7

	_							
١.								
		7	13/4					
	ntification	10	7.9/4					
Associated Sallipies.	Sample Identification	و	4.8/4		7 78)			
TOSSEL		تر	1/6.7 4/8.8 W/71		ND ~ 78)			
		4	2.1/4		others			
Specification of the second of			7.9 /y		(A11 0			
i i i i i i i i i i i i i i i i i i i	Blank ID 22	^		0,21				
2000	Blank ID 20	9/14/09-	=					
oi (all ala all	punc	Sampling Date 9/4 /69	ı	A				
16	Compound		3					
	<u> </u>					 	1	

VALIDATION FINDINGS WORKSHEET

Page: of 3 Reviewer: N6

2nd Reviewer:

Field Blanks

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

2/99/ #/

LDC#: SDG #:

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

Were target compounds detected in the field blanks?

49 / Associated sample units: 49 / E

13- 19 Associated Samples: Blank units: いり /上 Associated sample units: いっぱん たん Field blank type: (circle one) Field Blank / Rinsate / 「Trip Blank / Other:

Compound	Blank ID 2	Blank ID				Sample Identification	intification			
Sampling Date	Sampling Date 4/4/69									
- C	2.0	CA	St/WSa/	5 either	er ND	$\alpha >$	TB)			
		-								
Blank units: 45 / Associated sample units: 49 /kg Field blank type: (circle one) (Field Blank) Rinsate / Trip Blank)	sociated sam	ple units: V/ Rinsate / T	us /kg rip Blank / Other:	ier:	Associa	Associated Samples:	s. 2-16	,	(Pt)	
Compound	FB 0729 09 CO Blank 10	Blankto				Sample Ide	Sample Identification			
Sampling Date	1	2	4	9	2	<u> </u>	16			
Щ	35		h/1.5							

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10.48/4 10,43/4

0,30 440

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SDG #: 54 Cres (414117)

LDC #:

VALIDATION FINDINGS WORKSHEET Field Blanks

Page: Reviewer: 2nd Reviewer:

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

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

Were target compounds detected in the field blanks?

Slank units: 19 / Associated sample units: 19 / S

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

17-19

	7		_		_	_		_	_	_
ntification										
Sample Ider										
	19		D. 51 /4							
	81	h/ 9.8	-							
	21		0.73/y							
So Blank ID										
F B 08 28 09- Blank ID	8/28/09	4.2	0.44							
Compound	Sampling Date	4	3							
		4 .	<i>×</i>					-		
	F 203 28 09 - \$0 Blank ID Blank ID	F P S S S S S S S S S	Compound Fp.03-38 09-50 Blank ID Sampling Date 8/28/09 17 18 19 F 9.2 3.6 4	Compound Fp.08.28 09-50 Blank ID 17 18 19 Sampling Date 8/28/09 17 18 19 Ellow Co. 44 0.75/4 8.6 /4 0.51 /4	Compound Fp.03.28 09-50 Blank ID 17 18 19 Sampling Date 8/28/09 17 18 19 E 9.2 8.6 /y 0.51 /y C 0.44 0.51 /y 0.51 /y	Compound Fp.08.38.69-10	Compound Fp.08.38.69—50 Blank ID 17 18 19 19 15 18 19 15 18 19 15 18 19 15 18 19 15 18 19 19 19 19 19 19 19	Compound Fp.08.38.69-50 Blank ID	Compound Fp.08.38.69-10 17 18 19 19 15 18 19 15 18 19 15 18 19 15 18 19 15 18 19 19 19 19 19 19 19	Compound Fb68.28.69

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

Associated Samples:

	_	 	_	 	; 	_	
ntification							
Sample Identification							
Blank ID							
Blank ID							
Compound	Sampling Date						

SDG #: See Cory LDC #: 21791 # /

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

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". 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 associate

MS/MSD. Soil / Water.

V N/A

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

#	Date	QI QSW/SW	Compound	₩.	MS %R (Limits)	MSD %R (Umits)	RPD (Limits)	Associat	Associated Samples	Qualifications	
		23/24	00	44	(70-170)	(59 (70-190)		(13		No and CLESia	۲.
			B	91	(asi-as)	(astres) 91) () (
			Д	27	(06 (-01)	1) (4)			7
			XXX	47	())) ()		(MSDin	7,
			\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	69	^ → ~))	7			/ 1
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					~	Ú)) (
						J)	(
					())) [() [
		Compound	puno		ac Lim	QC Limits (Soil)	RPD (Soll)	ac Limit	QC Limits (Water)	RPD (Water)	
	ï	1,1-Dichloroethene			59-1	59-172%	< 22%	61-1	61-145%	< 14%	
	S.	Trichloroethene			62-	62-137%	< 24%	71-1	71-120%	< 14%	
	۷.	Benzene			-99	66-142%	< 21%	76-1	76-127%	< 11%	
	CC.	Toluene			-69	59-139%	< 21%	76-1	76-125%	< 13%	
	ä	Chlorobenzene			90-	60-133%	< 21%	75-1	75-130%	< 13%	

LDC#: 21991 H)

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

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".

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

CS/LCSD ID	puno	¥	LCS %R (Limits)	LCSD %R (Limits)		RPD (Limits)	Associated Samples	Qualifications
	0	99	(]×1-51))	1	()	4,6,7 9-12,14 IC	No great
	A	69	())	(()	_	Conother set
	71	69	(1)		()		al LCS/D analyzes
			())		()		in this batth allin
			())		()		
			()))	()		
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VALIDATION FINDINGS WORNSHEEL Internal Standards

SDG #: See

Reviewer: 2nd Reviewer:

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". N N/A

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

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

	(:			\											
	J/R/A				(411 766)										
DT // inite	43278)	895922)	(286 897)	762760)											
Area (Limits)	124883 (285820-11.	229271 (473981-1895922)	203 306 (424 973 -	-069 061) 98238											
Internal	PFB	DFB	CBZ	4 DCB											
Sample ID		_													
Date							-								
**			ا	7											

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

(FBZ) = Fluorobenzene

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

SDG# 500 (Porty

VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page: of Areviewer: 3/6.2nd 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?

*	Date	Sample ID	Finding	Associated Samples	Qualifications	
		7	Is ortside limits	Fin		0)
Com	Comments:					

LDC #: 21991 4) SDG #: Su Green

VALIDATION FINDINGS WORKSHEET <u>Field Duplicates</u>

Page:_	of
Reviewer:	J/C
2nd reviewer:	9

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

<u></u>	γ	N	N/A
J	Y.	Ν	N/A

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

	Concentra	tion (15/kg		Parent
Compound	2	3	RPD	only
E	0.48	5.7U	5,22(45.70)	_

	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: September 15 through September 16, 2009

LDC Report Date: December 6, 2009

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905260

Sample Identification

EB091509-SO1 SA128-10B SA136-0.5B SA128-29B SA136-10B SA65-0.5B SA136-25B SA65009-0.5B SA136-40B TB091609-SO1 SA30-5B SA153-25BMS SA30-9B SA153-25BMSD

SA30-9B SA30-25B SA30-38B SA153-10B SA153-25B SA153-38B SA172-10B

SA172-25B SA172-40B

TB091509-SO1

TB091509-SO2

TB091509-SO3 EB091609-SO1

SA128-0.5B

Introduction

This data review covers 21 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^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
9/18/09	2-Methyl-2-propanol	0.028 (≤0.05)	EB091509-SO1 TB091509-SO1 TB091509-SO2 TB091509-SO3 EB091609-SO1 SA128-29B TB091609-SO1 171659-SMB 171659-WMB	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
9/24/09	Hexachlorobutadiene	31.6	SA136-0.5B SA136-10B SA136-25B SA136-40B SA30-5B SA153-25B SA153-25BMS SA153-25BMSD 171735-MB	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
9/23/09	2-Methyl-2-propanol	0.027 (≤0.05)	EB091509-SO1 TB091509-SO1 TB091509-SO2 TB091509-SO3 EB091609-SO1 SA128-29B TB091609-SO1 171659-SMB	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
171659-SMB	9/23/09	2-Butanone	80 ug/Kg	SA128-29B

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
171962-MB	9/25/09	Dichloromethane	0.42 ug/Kg	SA30-9B SA30-25B SA30-38B SA153-10B SA153-38B SA172-10B SA172-25B SA172-40B SA128-0.5B SA128-10B SA65-0.5B SA65-0.5B

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
SA128-29B	2-Butanone	130 ug/Kg	130U ug/Kg

Samples TB091509-SO1, TB091509-SO2, TB091509-SO3, and TB091609-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
TB091509-SO2	9/15/09	Bromoform Chloromethane Dibromochloromethane	1.6 ug/L 0.24 ug/L 0.77 ug/L	SA136-0.5B SA136-10B SA136-25B SA136-40B SA30-5B SA30-9B SA30-25B SA30-38B
TB091509-SO3	9/25/09	Chloromethane	0.22 ug/L	EB091509-SO1 SA153-10B SA153-25B SA153-38B SA172-10B SA172-25B SA172-40B
TB091609-SO1	9/16/09	Acetone	1.9 ug/L	EB091609-SO1 SA128-0.5B SA128-10B SA128-29B SA65-0.5B SA65009-0.5B

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

Sample	Compound	Reported Concentration	Modified Final Concentration
SA30-38B	Dibromochloromethane	0.57 ug/Kg	0.57U ug/Kg
SA128-10B	Acetone	3.0 ug/Kg	3.0U ug/Kg
SA65009-0.5B	Acetone	3.4 ug/Kg	3.4U ug/Kg

Samples EB091509-SO1 and EB091609-SO1 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
EB091509-SO1	9/15/09	Acetone Dichloromethane Toluene	3.5 ug/L 0.28 ug/L 0.41 ug/L	SA136-0.5B SA136-10B SA136-25B SA136-40B SA30-5B SA30-9B SA30-25B SA30-38B SA153-10B SA153-25B SA153-38B SA172-10B SA172-25B SA172-40B
EB091609-SO1	9/16/09	Acetone	4.9 ug/L	SA128-0.5B SA128-10B SA128-29B SA65-0.5B SA65009-0.5B

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

Sample	Compound	Reported Concentration	Modified Final Concentration
SA136-10B	Toluene	0.60 ug/Kg	0.60U ug/Kg
SA136-25B	Toluene	0.54 ug/Kg	0.54U ug/Kg

Sample	Compound	Reported Concentration	Modified Final Concentration
SA30-5B	Toluene	0.47 ug/Kg	0.47U ug/Kg
SA30-9B	Toluene	0.62 ug/Kg	0.62U ug/Kg
SA30-25B	Acetone Toluene	2.9 ug/Kg 0.67 ug/Kg	2.9U ug/Kg 0.67U ug/Kg
SA128-10B	Acetone	3.0 ug/Kg	3.0U ug/Kg
SA65009-0.5B	Acetone	3.4 ug/Kg	3.4U ug/Kg

Sample FB072909-SO (from SDG R0904226) 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
FB072909-SO	7/29/09	Acetone Dichloromethane Toluene	3.5 ug/L 0.30 ug/L 0.44 ug/L	All soil samples in SDG R0905260

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
SA136-10B	Toluene	0.60 ug/Kg	0.60U ug/Kg
SA136-25B	Toluene	0.54 ug/Kg	0.54U ug/Kg
SA30-5B	Toluene	0.47 ug/Kg	0.47U ug/Kg
SA30-9B	Toluene	0.62 ug/Kg	0.62U ug/Kg
SA30-25B	Acetone Toluene	2.9 ug/Kg 0.67 ug/Kg	2.9U ug/Kg 0.67U ug/Kg
SA128-10B	Acetone	3.0 ug/Kg	3.0U ug/Kg
SA65-0.5B	Toluene	0.45 ug/Kg	0.45U ug/Kg

Sample	Compound	Reported Concentration	Modified Final Concentration
SA65009-0.5B	Acetone	3.4 ug/Kg	3.4U ug/Kg
	Toluene	0.63 ug/Kg	0.63U 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/MSD percent recoveries (%R) and relative percent differences (RPD) 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 R0905260	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 SA65-0.5B and SA65009-0.5B were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concentrat	ion (ug/Kg)	DDD.	Diff		
Compound	SA65-0.5B	SA65009-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P
2-Butanone	1.3	1.2	-	0.1 (≤14)	-	-
Acetone	27U	3.4	-	23.6 (≤27)	-	_
Toluene	0.45	0.63	_	0.18 (≤6.8)	-	•

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Data Qualification Summary - SDG R0905260

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905260	EB091509-SO1 TB091509-SO1 TB091509-SO2 TB091509-SO3 EB091609-SO1 SA128-29B TB091609-SO1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Initial calibration (RRF) (c)
R0905260	SA136-0.5B SA136-10B SA136-25B SA136-40B SA30-5B SA153-25B	Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	A	Continuing calibration (%D) (c)
R0905260	EB091509-SO1 TB091509-SO1 TB091509-SO2 TB091509-SO3 EB091609-SO1 SA128-29B TB091609-SO1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Continuing calibration (RRF) (c)
R0905260	EB091509-SO1 SA136-0.5B SA136-10B SA136-25B SA136-40B SA30-5B SA30-9B SA30-25B SA30-25B SA153-10B SA153-25B SA153-10B SA172-10B SA172-10B SA172-40B TB091509-SO1 TB091509-SO1 TB091509-SO3 EB091609-SO1 SA128-0.5B SA128-10B SA128-29B SA65-0.5B SA65009-0.5B TB091609-SO1	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Laboratory Blank Data Qualification Summary - SDG R0905260

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905260	SA128-29B	2-Butanone	130U ug/Kg	Α	Ы

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Trip Blank Data Qualification Summary - SDG R0905260

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905260	SA30-38B	Dibromochloromethane	0.57U ug/Kg	А	bt
R0905260	SA128-10B	Acetone	3.0U ug/Kg	А	bt
R0905260	SA65009-0.5B	Acetone	3.4U ug/Kg	А	bt

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Equipment Blank Data Qualification Summary - SDG R0905260

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905260	SA136-10B	Toluene	0.60U ug/Kg	А	be
R0905260	SA136-25B	Toluene	0.54U ug/Kg	А	be
R0905260	SA30-5B	Toluene	0.47U ug/Kg	А	be
R0905260	SA30-9B	Toluene	0.62U ug/Kg	А	be
R0905260	SA30-25B	Acetone Toluene	2.9U ug/Kg 0.67U ug/Kg	А	be
R0905260	SA128-10B	Acetone	3.0U ug/Kg	А	be
R0905260	SA65009-0.5B	Acetone	3.4U ug/Kg	А	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Field Blank Data Qualification Summary - SDG R0905260

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905260	SA136-10B	Toluene	0.60U ug/Kg	А	bf
R0905260	SA136-25B	Toluene	0.54U ug/Kg	А	bf
R0905260	SA30-5B	Toluene	0.47U ug/Kg	А	bf
R0905260	SA30-9B	Toluene	0.62U ug/Kg	А	bf
R0905260	SA30-25B	Acetone Toluene	2.9U ug/Kg 0.67U ug/Kg	А	bf
R0905260	SA128-10B	Acetone	3.0U ug/Kg	А	bf
R0905260	SA65-0.5B	Toluene	0.45U ug/Kg	А	bf
R0905260	SA65009-0.5B	Acetone Toluene	3.4U ug/Kg 0.63U ug/Kg	A	bf

Tronox Northgate Henderson

LDC #: 21991I1	VALIDATION COMPLETENESS WORKSHEET	
SDG #: R0905260	Stage 2B	
Laboratory: Columbia Analytica	al 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
l.	Technical holding times	A	Sampling dates: 9/15-16/09
11.	GC/MS Instrument performance check	Ā	, '
III.	Initial calibration	SW	3 RSD r2
IV.	Continuing calibration/ICV	SW	(a) € 25 }
V.	Blanks	SW	
VI.	Surrogate spikes		
VII.	Matrix spike/Matrix spike duplicates	ŚW	
VIII.	Laboratory control samples	A	ICS
IX.	Regional Quality Assurance and Quality Control	N N	
X.	Internal standards	A	
XI.	Target compound identification	N 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	SN	D = 23,24
XVII.	Field blanks	SW	EB= 1, 19 TB= 16, 17, 18, 25 FB= FB072909-50

(from R0904226)

Note:

A = Acceptable N = Not provided/applicable

SW = See worksheet

X ND = No compounds detected

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

EB = Equipment blank

Validated Samples:

water + Soil

11	EB091509-SO1 W	11 2	SA153-25B	21	SA128-10B S	31	171659 - WMB
		3	SA153-23B		SA128-29B	32	171735 MB
2 7	SA136-0.5B	12	SA153-38B	22		 	
3	SA136-10B	13 "	SA172-10B	23	SA65-0.5B D	33 /	171962-
4	SA136-25B	14 3	SA172-25B	24	\Rightarrow SA65009-0.5B b	34 4	171659- SMB
5 >	SA136-40B	15 3	SA172-40B	25	TB091609-SO1 W	35	
6 ~	SA30-5B	16	TB091509-SO1 W	26	SA153-25BMS S	36	
₇ 3	SA30-9B	47 1	TB091509-SO2	27	SA153-25BMSD	37	
8 3	SA30-25B	18 1	TB091509-SO3	28		38	
9 3	SA30-38B	19	EB091609-SO1	29		39	
10 >	SA153-10B	20 3	SA128-0.5B	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-Buthdhenzene	
B. Bromomethane	V. Benzene	PP Bromochiocomethose	r-Duyloel zene	CCCC.1-Chlorohexane
C. Vinyl choride**	W trees 4.2 Oct.		JJJ. 1,2-Dichlorobenzene	DDDD. kopropyl alcohol
	vv. uaris-1,3-Dichloropropene	QQ. 1,1-Dichloropropene	KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
U. Crioroethane	X. Bromoform*	RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF Acrolein
E. Methylene chloride	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	
F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN 1 2 3-Trickloss bases	GGGG: Actylonitrile
G. Carbon disulfide	AA. Tetrachloroethene	1 1 2 Tetrachland	9197190001011 0141	НННН. 1,4-Dioxane
H. 1.1-Dichloroethene**	DD 4400 H	oo. i, i, i,z-retrachioroethane	OOO. 1,3,5-Trichlorobenzene	IIII. Isobutyl alcohol
	DD: 1,1,2,2-1 ett acritoroemane	VV. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacryfonitrile
r. r. r Ordinologinane	CC. Toluene**	WW. Bromobenzene	QQQ. cis-1,2-Dichloroethene	KKKK Dronionitrile
J. 1,2-Dichloroethene, total	DD. Chlorobenzene*	XX. 1,2,3-Trichloropropane	RRR m p. Volence	
K. Chloroform**	FF Fflv/henzene**		salus d'in 'h-vyienes	LLLL. Ethyl ether
	Lt. Luiyibelizerle	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	Z
M. 2-Butanone	GG. Xylenes, total	AAA 13 5-Trimethylhenzene		
N. 1.1.1-Trichloroethana			UUU. 1,2-Dichlorotetrafluoroethane	0000
	nn. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	dddd
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	www. Ethanol	COCC
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX Discorporal attack	, in the second
Q. 1,2-Dichloropropane**	KK. Trichlorofluoromethane	FFF sec. Rut/henvene	an a chaology and	KRRR.
R. cis-13-Dichloronronene		rrr. sec-parylogizene	YYY. tert-Butanol	SSSS.
and do not a little of the lit	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohol	1111
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-IsopropyItoluene	AAAA. Ethyl tert-butyl ether	
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	100	
			DDDD. tert-Amyl methyl ether	WW.

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

VALIDATION FINDINGS WORNSHELL **Initial Calibration**

Reviewer: 2nd Reviewer:

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

3DG #: La Conny DC #: 21 471 4/

N/A". Not applicable questions are identified as "N/A". Not applicable questions are identified as "N/A".

| N | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 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? $\frac{1}{2}$ $\frac{2}{2}$ $\frac{2}{3}$

1 I by K # 707

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".

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?

standard ID	Standard ID	1	Compound	Finding %D (Limit: <25.0%)		Associated Samples	dons
4 60946		NNNN	7		0.027	1, 16-19 22 25	I/NJ/A (C)
						171659-WMB	
						171654-5MR	
(S) 177 1801T 89 87 8		İ		31.6		76 16 11 9-8	J- MJ A (C)
			1			7	
			,				
			L				
			L				
			L.				
			السيا				

LDC# 21991 II SDG #:

VALIDATION FINDINGS WORKSHEET Blanks

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". Y 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: 4 A/N N

(79) Sample Identification 22 Associated Samples: 4 30 171659-5MB Blank ID 80 2 Compound Conc. units:_

Associated Samples: 7-10 12-15 20,21 23 24 (MD)	Sample Identification					
	Blank ID	171962-MB	0.42			
Blank analysis date: 9/25/09 Conc. units: 1/6 /k <	Compound		ىلا			

	/w/s
18615	
DC #:	DC #:

VALIDATION FINDINGS WORKSHEET Field Blanks

Page: Vof Reviewer: JW 2nd Reviewer.

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

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

No N/A Were target compounds detected in the field blanks?

Blank units: "15 Associated sample units: "15 Associated sample units: "15 Associated sample units: "15 Associated sample units: "15 Associated sample units: "15 Associated sample units: "15 Associated sample units: "15 Associated sample units: "16 Associated sample units: "17 Associated sample units: "18 Associated sample units: "

(bt)Associated Samples: 2 – 9 Sample Identification 0.57 4 Blank ID Blank ID 17 0.24 Sampling Date Compound

Blank units: $\frac{46/L}{(\text{circle one})}$ Associated sample units: $\frac{49/L}{(\text{circle one})}$ bight $\frac{45/L}{(\text{circle one})}$ Field Blank / Rinsate $\sqrt{\text{Trip Blank}}$ Other:

Associated Samples:

10-15

(an)

Sample Identification Blank ID 6 Blank ID 0, 22 Sampling Date. Compound

1	3
-14617	
DC #:	SDG #:

VALIDATION FINDINGS WORKSHEET

Page: of 3 Reviewer: 16 2nd Reviewer:

(be)

2-15

品

Field Blanks

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

Were field blanks identified in this SDG?
Were target compounds detected in the field blanks?
No A Associated sample units: NS Ks Y/N N/A

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

Sample Identification Associated Samples: 0, 57 ď 67 Z 0.47 O n/ ts 0 Blankto 0.00 9/12/6 Blank ID 0.28 3 4 ò Sampling Date W) Compound

ب

Associated Samples: 石田 Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: NS /RS Blank units: No 1/2 Associated sample units:

20-24

Sample Identification 24 3 Blankto 3 ى ە Blank ID 19 9/16/ Sampling Date Compound

Sre Cones 21991 I) LDC #: SDG #:

VALIDATION FINDINGS WORKSHEET

Field Blanks

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

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

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

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

Blank units: 1/2 Associated sample units: 1/45 Associated blank / Rinsate / Trip Blank / Other.

19 20-24 Associated Samples:

Compound	Blank ID 25 Blank ID	Blank ID				Sample Identification	ntification		
Sampling Date	9 No/09		72	24					
4	1,9		2,0/4	3.4/4					
			,						
			CAII OTE	others either ND	er ND	67	(87		
		:							
Blank units: 49 /L Associated sample units: 49/kg	ociated samp	le units:	45/kg						() 4)
Field blank type: (circle one) Field Blank > Rinsate / Trip Blank / Other.	e) K ield Blank	≯Rinsate / T	rip Blank / Oth	ier:	Associa	Associated Samples:		7165 JIH	

The factor of th		Tangara L) / Williams		Assoc	Associated Salliples.	3.	1	,	\
Compound	F B 072909-50 Blank ID Blank ID	09-50 Blank ID				Sample Identification	ntification			
Sampling Date	19/50/2	4	5	4	3	7	8	7	23	7,
11	3,5		•				2.9/4 3.0/4	3.0/4		34/4
44	0.30									
2)	0,44		0,60/4	0.60/4 0.54 /4 0.47/4 0.62/4 0.57/4	0.47/4	W/23.0	0.67/4		0 45/4 0.63/4	0.63/4
										1

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LDC#: 2491 I)

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?

				WS	GSW			
#	Date	MS/MSD ID	Compound	%R (Limits)	%R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		26/27	Several	(4		and 2RPAS)		No gud
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		Compound	punc	QC Limits (Soil)	its (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
	r	1,1-Dichloroethene		59-1	59-172%	< 22%	61-145%	< 14%
	σ	Trichloroethene		62-1	62-137%	< 24%	71-120%	< 14%
	>	Benzene		66-1	66-142%	< 21%	76-127%	< 11%
	CC.	Toluene		59-1	59-139%	< 21%	76-125%	< 13%
	90	Chlorobenzene		60-1	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: R0905260 Date Collected: 9/15/09 Date Received: 9/16/09

Date Analyzed: 9/24/09

Matrix Spike Summary Volatile Organic Compounds by GC/MS

Sample Name:

SA153-25B

Lab Code:

R0905260-011

Units: µg/Kg Basis: Dry

Analytical Method: 8260B

	Sample		1atrix Spike Q0909047-0				ate Matrix Q0909047-0			% Rec		RPD
Analyte Name	Result	Result	Amount	% Rec		Result	Amount	4 % Rcc	:	Limits	RPD	Limit
1,1,1,2-Tetrachloroethane	ND	39.3	57.4	68	*	39.7	58.9	67	*	70 - 130	1	30
1,1,1-Trichloroethane (TCA)	ND	43.2	57.4	75		44.4	58.9	75		70 - 130	3	30
1,1,2,2-Tetrachloroethane	ND	40.6	57.4	71		44.9	5 8.9	76		70 - 130	10	30
1,1,2-Trichloroethane	ND	42.1	57.4	73		44.2	58.9	75		70 - 130	5	30
1,1-Dichloroethane (1,1-DCA)	ND	42.4	57.4	74		42.2	58.9	72		70 - 130	0	30
1,1-Dichloroethene (1,1-DCE)	ND	37.3	57.4	65	*	40.1	58.9	68	*	70 - 130	7	30
1,1-Dichloropropene	ND	39.2	57.4	68	*	42.4	58.9	72		70 - 130	8	30
1,2,3-Trichlorobenzene	ND	28.2	57.4	49	*	29.5	58.9	50	*	70 - 130	4	30
1,2,3-Trichloropropane	ND	41.4	57.4	72		44.9	58.9	76		70 - 130	8	30
1,2,4-Trichlorobenzene	ND	27.5	57.4	48	*	29.0	58.9	49	*	70 - 130	5	30
1,2,4-Trimethylbenzene	ND	30.6	57.4	53	*	33.3	58.9	56	*	70 - 130	8	30
1,2-Dibromo-3-chloropropane (DBC	ND	41.2	57.4	72		47.6	58.9	81		50 - 150	14	30
1,2-Dibromoethane	ND	41.5	57.4	72		43.5	58.9	74		70 - 130	5	30
1,2-Dichlorobenzene	ND	33.7	57.4	5 9	*	34.0	58.9	58	*	70 - 130	1	30
1,2-Dichloroethane	ND	42.5	57.4	74		43.7	58.9	74		70 - 130	3	30
1,2-Dichloropropane	ND	43.3	57.4	75		43.8	5 8.9	74		70 - 130	1	30
1,3,5-Trimethylbenzene	ND	31.7	57.4	55	*	33.9	58.9	57	*	70 - 130	7	30
1,3-Dichlorobenzene	ND	32.6	57.4	57	*	33.5	58.9	57	*	70 - 130	3	30
1,3-Dichloropropane	ND	41.4	57.4	72		42.4	58.9	72		70 - 130	2	30
1,4-Dichlorobenzene	ND	32.3	57.4	56	*	33.9	58,9	58	*	70 - 130	5	30
2,2-Dichloropropane	ND	41.6	57.4	73		45.2	58.9	77		70 - 130	8	30
2-Butanone (MEK)	1.2	47.9	57.4	81		53.7	58.9	89		50 - 150	11	30
2-Chlorotoluene	ND	32.2	57.4	56	*	37.4	58.9	63	*	70 - 130	15	30
2-Hexanone	ND	42.0	57.4	73		47.0	58.9	80		70 - 130	11	30
2-Methyl-2-propanol	ND	917	1150	80		994	1180	84		50 - 150	8	30
4-Chlorotoluene	ND	31.6	57.4	55	*	34.3	58.9	58	*	70 - 130	8	30
4-Isopropyltoluene	ND	29,8	57.4	52	*	31.1	58.9	53	*	70 - 130	4	30
4-Methyl-2-pentanone	ND	43.2	57.4	75		48.1	58.9	82		70 - 130	11	30
Acetone	ND	56.3	57.4	98		64.2	58.9	109		50 - 150	13	30
Benzene	ND	38.9	57.4	68	*	40.8	58.9	69	*	70 - 130	5	30
Bromobenzene	ND	35.2	57.4	61	*	36.8	58.9	62	*	70 - 130	4	30
Bromochloromethane	ND	40.4	57.4	70		40.5	58.9	69	*	70 - 130	0	30
Bromodichloromethane	ND	43.1	57.4	75		44.3	58.9	75		70 - 130	3	30

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:

Northgate Environmental

Project:

Tronox LLC Henderson/2027.001

Sample Matrix:

Soil

Service Request: R0905260 **Date Collected:** 9/15/09

Date Collected: 9/15/09 Date Received: 9/16/09 Date Analyzed: 9/24/09

Matrix Spike Summary Volatile Organic Compounds by GC/MS

Sample Name:

SA153-25B

Lab Code:

R0905260-011

Units: µg/Kg Basis: Dry

Analytical Method: 8260B

	Sample		Aatrix Spike Q0909047-0				cate Matrix Q0909047-0		% Rec		RPD
Analyte Name	Result	Result	Amount	% Rec		Result	Amount	% Rec	Limits	RPD	Limit
Bromoform	ND	43.8	57.4	76		45.7	58.9	77	70 - 130	4	30
Bromomethane	ND	34.9	57.4	61		37.2	58.9	63	50 - 150	6	30
Carbon Tetrachloride	ND	42.6	57.4	74		46.7	58.9	79	70 - 130	9	30
Chlorobenzene	ND	35.7	57.4	62	*	37.5	58.9	64	* 70 - 130	5	30
Chloroethane	ND	35,5	57.4	62	*	35.1	58.9	60	* 70 - 130	1	30
Chloroform	1.8	44.8	57.4	75		45,6	58.9	74	70 - 130	2	30
Chloromethane	ND	27.6	57.4	48	*	30.1	58.9	51	* 70 - 130	8	30
Dibromochloromethane	ND	42.0	57.4	73		44.1	58.9	75	70 - 130	5	30
Dibromomethane	ND	41.6	57.4	73		43,7	58.9	74	70 - 130	5	30
Dichlorodifluoromethane (CFC 12)	ND	23.9	57.4	42	*	25.3	58.9	43	* 70 - 130	6	30
Dichloromethane	ND	40.4	57.4	70		40.4	58.9	68	* 70 - 130	0	30
Diisopropyl Ether	ND	43.3	57.4	75		44.0	58.9	75	70 - 130	2	30
Ethyl tert-Butyl Ether	ND	46.4	57.4	81		46.6	58.9	79	70 - 130	0	30
Ethylbenzene	ND	37.4	57.4	65	*	38.0	58.9	64	* 70 - 130	2	30
Hexachlorobutadiene	ND	24.1	57.4	42	*	24.4	58.9	41	* 70 - 130	1	30
Isopropylbenzene (Cumene)	ND	36.4	57.4	63	*	38.0	58.9	64	* 70 - 130	4	30
Methyl tert-Butyl Ether	ND	43.4	57.4	7 6		43.7	58.9	74	70 - 130	1	30
Naphthalene	ND	34.6	57.4	60		41,6	58.9	71	50 - 150	18	30
Styrene	ND	38.6	57.4	67	*	39.5	58.9	67	* 70 - 130	2	30
Tetrachloroethene (PCE)	ND	37.6	57.4	66	*	37.9	58.9	64	* 70 - 130	1	30
Toluene	ND	37.9	57.4	66	*	39.9	58.9	68	* 70 - 130	5	30
Trichloroethene (TCE)	ND	39.6	57.4	69	*	42.3	58.9	72	70 - 130	7	30
Trichlorofluoromethane (CFC 11)	ND	40.6	57.4	71		41.6	58.9	71	70 - 130	3	30
Vinyl Chloride	ND	33.9	57.4	59	*	38.5	58.9	65	* 70 - 130	13	30
cis-1,2-Dichloroethene	ND	40.5	57.4	71		42.5	58.9	72	70 - 130	5	30
cis-1,3-Dichloropropene	ND	40.0	57.4	70		42.5	58.9	72	70 - 130	6	30
m,p-Xylenes	ND	71.5	115	62	*	73,4	118	62	* 70 - 130	3	30
л-Butylbenzene	ND	27.6	57.4	48	*	27.6	58.9	47	* 70 - 130	0	30
n-Propylbenzene	ND	31.9	57.4	5 6	*	34.2	58.9	58	* 70 - 130	7	30
o-Xylene	ND	36.4	57.4	63	*	36,9	58.9	63	* 70 - 130	1	30
sec-Butylbenzene	ND	31.7	57.4	55	*	34.3	58.9	58	* 70 - 130	8	30
tert-Amyl Methyl Ether	ND	44.0	57.4	77		45.0	58.9	76	70 - 130	2	30
tert-Butylbenzene	ND	32.8	57.4	57	*	34.8	58.9	59	* 70 - 130	6	30
trans-1,2-Dichloroethene	ND	38.1	57.4	66	*	39.0	58.9	66	* 70 - 130	2	30

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:

Northgate Environmental

Project:

Tronox LLC Henderson/2027.001

Sample Matrix:

Soil

Service Request: R0905260

Date Collected: 9/15/09 **Date Received:** 9/16/09

Date Analyzed: 9/24/09

Matrix Spike Summary Volatile Organic Compounds by GC/MS

Sample Name:

SA153-25B

Lab Code:

R0905260-011

Units: µg/Kg

Basis: Dry

Analytical Method: 8260B

		N	Aatrix Spike	:		Duplic	ate Matrix	Spike			
	Sample	R	Q0909047-0	3		RO	Q0909047-0	4	% Rec		RPD
Analyte Name	Result	Result	Amount	% Rec		Result	Amount	% Rec	Limits	RPD	Limit
trans-1,3-Dichloropropene	ND	39.8	57.4	69	*	41.1	58.9	70	70 - 130	3	30

Comments:			
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LDC # 2/99 I1 SDG #: See Corel

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	
Reviewer:	WY
2nd reviewer:	V

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

\widehat{Y}	N	N/A
<u>Y/</u>	N	N/A
$\overline{}$		

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

	Concentratio	n us/kex		Pared
Compound	23	24	RPD .	
M	1,3	1.2	0,1(£14D)	_
F	2711	3,4	23,6 (4270)	
ec	0,45	0.63	0.18 (= 6.80)	

	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: September 17, 2009

LDC Report Date: December 6, 2009

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905331

Sample Identification

SA165-0.5B

SA165-10B

SA165-28B

SA151-0.5B

SA151-10B

SA151-25B

SA151-39B

SA151009-39B

SA51-10B

SA51009-10B

SA51-25B

SA51-36B

TB091709-SO1

TB091709-SO3

SA165-10BMS

SA165-10BMSD

Introduction

This data review covers 14 soil samples and 2 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
9/18/09	2-Methyl-2-propanol	0.028 (≤0.05)	SA165-28B TB091709-SO1 TB091709-SO3 171659-SMB 171659-WMB	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
9/28/09	Hexachlorobutadiene	30.8	SA165-0.5B SA165-10B SA151-0.5B SA151-10B SA151-25B SA151-39B SA151009-39B SA51-10B SA51-36B SA165-10BMS SA165-10BMSD 172205-MB	J- (all detects) UJ (all non-detects)	A
9/29/09	Acetone	27.5	SA51009-10B SA51-25B 172392-MB	J+ (all detects)	А
9/29/09	Hexachlorobutadiene	28.4	SA51009-10B SA51-25B 172392-MB	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
9/23/09	2-Methyl-2-propanol	0.027 (≤0.05)	SA165-28B TB091709-SO1 TB091709-SO3 171659-SMB 171659-WMB	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
171659-MB	9/23/09	2-Butanone	80 ug/Kg	SA165-28B

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
SA165-28B	2-Butanone	120 ug/Kg	120U ug/Kg

Samples TB091709-SO1 and TB091709-SO3 were identified as trip blanks. No volatile contaminants were found in these blanks.

Sample FB072909-SO (from SDG R0904226) 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
FB072909-SO	7/29/09	Acetone Dichloromethane Toluene	3.5 ug/L 0.30 ug/L 0.44 ug/L	All soil samples in SDG R0905331

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
SA165-0.5B	Toluene	0.40 ug/Kg	0.40U ug/Kg
SA165-10B	Toluene	0.38 ug/Kg	0.38U ug/Kg
SA151-0.5B	Toluene	0.41 ug/Kg	0.41U ug/Kg
SA151-10B	Toluene	0.48 ug/Kg	0.48U ug/Kg
SA151-25B	Acetone	6.8 ug/Kg	6.8U ug/Kg
SA151009-39B	Toluene	0.38 ug/Kg	0.38U ug/Kg
SA51-10B	Acetone Toluene	1.5 ug/Kg 0.77 ug/Kg	1.5U ug/Kg 0.77U ug/Kg
SA51-25B	Acetone Toluene	1.9 ug/Kg 0.34 ug/Kg	1.9U ug/Kg 0.34U 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
SA165-10BMS/MSD (SA165-10B)	Hexachlorobutadiene	52 (70-130)	67 (70-130)	40 (≤30)	J (all detects) UJ (all non-detects)	А

VIII. Laboratory Control Samples (LCS)

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

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
172205-LCS	Hexachlorobutadiene	63 (75-125)	SA165-0.5B SA165-10B SA151-0.5B SA151-10B SA151-25B SA151-39B SA151009-39B SA51-10B SA51-36B 172205-MB	J- (all detects) UJ (all non-detects)	Р
172392-LCS	Hexachlorobutadiene	74 (75-125)	SA51009-10B SA51-25B 172392-MB	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 R0905331	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 SA151-39B and SA151009-39B and samples SA51-10B and SA51009-10B were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concentration (ug/Kg)		222	D.W.		
Compound	SA151-39B	SA151009-39B	RPD (Limits)	Difference (Limits)	Flags	A or P
2-Butanone	2.0	0.99		1.01 (≤14)	-	-
Acetone	10	23U	_	13 (≤23)	-	-
Chloroform	6.5	90	-	83.5 (≤6.9)	J (all detects)	Α
Toluene	6.9U	0.38	-	6.52 (≤6.9)	-	-

	Concentration (ug/Kg)		222	D:#		
Compound	SA51-10B	SA51009-10B	RPD (Limits)	Difference (Limits)	Flags	A or P
2-Butanone	1.4	11U	-	9.6 (≤11)	•	-
Acetone	1.5	21U	-	19.5 (≤21)	-	-
Chloroform	4.3	6.0	-	1.7 (≤5.3)	-	•

	Concentration (ug/Kg)		RPD	Difference		
Compound	SA51-10B	SA51009-10B	(Limits)	Difference (Limits)	Flags	A or P
Dichloromethane	0.61	5.3U	-	4.69 (≤5.3)	-	-
Toluene	0.77	5.3U	-	4.53 (≤5.3)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Data Qualification Summary - SDG R0905331

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905331	SA165-28B TB091709-SO1 TB091709-SO3	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	Α	Initial calibration (RRF) (c)
R0905331	SA165-0.5B SA165-10B SA151-0.5B SA151-10B SA151-25B SA151-39B SA151009-39B SA51-10B SA51-36B SA51009-10B SA51-25B	Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	А	Continuing calibration (%D) (c)
R0905331	SA51009-10B SA51-25B	Acetone	J+ (all detects)	А	Continuing calibration (%D) (c)
R0905331	SA165-28B TB091709-SO1 TB091709-SO3	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Continuing calibration (RRF) (c)
R0905331	SA165-10B	Hexachlorobutadiene	J (all detects) UJ (all non-detects)	А	Matrix spike/Matrix spike duplicates (%R)(RPD) (m,ld)
R0905331	SA165-0.5B SA165-10B SA151-0.5B SA151-10B SA151-25B SA151-39B SA151009-39B SA51-10B SA51-36B SA51009-10B SA51-25B	Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905331	SA165-0.5B SA165-10B SA165-28B SA151-0.5B SA151-10B SA151-25B SA151-39B SA151009-39B SA51-10B SA51009-10B SA51-25B SA51-36B TB091709-SO1 TB091709-SO3	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0905331	SA151-39B SA151009-39B	Chloroform	J (all detects)	А	Field duplicates (Difference) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Laboratory Blank Data Qualification Summary - SDG R0905331

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905331	SA165-28B	2-Butanone	120U ug/Kg	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Trip Blank Data Qualification Summary - SDG R0905331

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Field Blank Data Qualification Summary - SDG R0905331

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905331	SA165-0.5B	Toluene	0.40U ug/Kg	А	bf
R0905331	SA165-10B	Toluene	0.38U ug/Kg	А	bf
R0905331	SA151-0.5B	Toluene	0.41U ug/Kg	А	bf
R0905331	SA151-10B	Toluene	0.48U ug/Kg	A	bf
R0905331	SA151-25B	Acetone	6.8U ug/Kg	А	bf

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905331	SA151009-39B	Toluene	0.38U ug/Kg	А	bf
R0905331	SA51-10B	Acetone Toluene	1.5U ug/Kg 0.77U ug/Kg	А	bf
R0905331	SA51-25B	Acetone Toluene	1.9U ug/Kg 0.34U ug/Kg	А	bf

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

SDG #: R0905331	Stage 2B
Laboratory: Columbia Analytical Services	_

LDC #: 21991J1

Page: of Reviewer: WG 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: 9/17/09
H.	GC/MS Instrument performance check	A	
191.	Initial calibration	SW	7 RSP +~
IV.	Continuing calibration/JCV	ML	COV = 25 Z
V,	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	MZ	
IX.	Regional Quality Assurance and Quality Control	N	
Χ.	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	$D_1 = 7.8$ $D_2 = 9.10$ TB = 13.14 $FB = FB 072909-50$ (from R0904.
XVII.	Field blanks	SM	+TB = 13, 14 FB = FB072909-50 (from R09)04.

A = Acceptable Note:

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

							<u> </u>		
1 [SA165-0.5B	S	113	SA51-25B	ح	<u>一</u> 1	17 2205- MB	31	
2 1	SA165-10B		12 1	SA51-36B	<u>J</u>	† 22	171659 -SMB	32	
3 7	SA165-28B		13 ¢	TB091709-SO1	W	23 3	172392-MB	33	
4	SA151-0.5B		14 4	TB091709-SO3		24 4	171659 - WMB	34	
5 I	SA151-10B		15	SA165-10BMS	5	25		35	
6 I	SA151-25B		16	SA165-10BMSD		26		36	
7 1	SA151-39B	01	17			27		37	
8	SA151009-39B	D,	18			28		38	
9	SA51-10B	D	19			29		39	
10 >	SA51009-10B	D ₁	20_			30		40	

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

A Chlomethane*	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. Methylone chlonde	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG. Acrytonitrile
F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN. 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
G. Carbon disutifde	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachloroethane	000. 1,3,5-Trichlorobenzene	IIII. teobutyl alcohol
H. 1,1-Dichloroethene**	BB. 1,1,2,2-Tetrachloroethane*	VV. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
1. 1,1-Dichloroethane*	CC. Toluene**	WW. Bromobenzene	QQQ. ds-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. Chlorofom**	EE. Ethylbenzane**	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-Chloroethyfvinyl 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. Methyf-tert-butyf ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohol	TTTT.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-tsopropyttoluene	AAAA. Ethyl tert-butyl ether	ບນບບ.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB, tert-Arry/ methyl ether	ww.

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

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VALIDATION FINDINGS WURNSHEET Initial Calibration

Reviewer: 2nd Reviewer: ר מעה.

AETHOD: 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".

NA NA

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? Were percent relative standard deviation? $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$

X N N/A

Were all %RSDs and RRFs within the validation criteria of ${\le}30$ %RSD and ${\ge}0.05$ RRF ? Did the initial calibration meet the acceptance criteria? N/A N/A

	Standard ID	Compound	Finding %RSD (Limit: <30.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	1CA1_	NNN		850,0	3, 19,14 171659-5MB	5/W (c)
					171659- WMB	
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SDG #: See Coney LDC#: 219917

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? Y N N/A

Dete	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
6/27/6		7773		0,027	3, 13, 14, 171659-5MB	5/45/A (c)
					171659-WMB	
•		(
9/24/09	9 H1166	117	30,8		1,2,4-9,12,15,16	₹ 70/~7 ·
/					172205-MB	
9 /29 /09	1 1190	(+) <u>1</u>	27.5		10.11 172392-NP	J+dets A
		(1) L11	28.4			4-1N-1
•						

SDG #: See Cun LDC#: 2/96/J

VALIDATION FINDINGS WORKSHEET

Blanks

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?
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see dus	
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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? N N/A

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

Blank analysis date: $\frac{9}{25}/69$

Conc. units:

3

	Sample Identification						
ples:	Samp						
Associated Samples:							
٩		2	1 30 /M	/			
		aw:					
`	Blank ID	171659-5 MB	80				
Conc. units: 49/kg	Compound		M				

Blank analysis date:

Conc. units:

Associated Samples:

Blank ID Sample Identification	-		T		T	T	
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Blank ID							nple Identification
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pur		<u> </u>					<u>a</u>
Сомро							Compound

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VALIDATION FINDINGS WORKSHEET Field Blanks

2nd Reviewer: Q Page: of) Reviewer:_

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

Y) N /N/A

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

0,34/4 J AI 50:12 17/4 O 1.5.1 σ 10.38/4 Sample Identification Associated Samples: 6.8/4 0.48/4 0. 4 Field blank type: (circle one) Field Blank Rinsate / Trip Blank / Other:

Compound Blank ID Blank ID 10.78/4 0.40 1/20/00/ 0,30 (V) p '0 Sampling Date m

Associated sample units: Blank units:

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

Associated Samples:

-	-	į					
Compound	Blank ID	Blank ID		Sample Identification	ntification		
Sampling Date							

LDC#: 21 49 | J |
SDG#: C+c 6m->

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Page: 1 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".

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?

							_
# Date	QI QSW/SW	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	91/51	Sprenay	come ounds	have 21/4	nn (2 RPD)	ر ر	No sare
	,	at so	ontsile things but	Wt 202 201	in Caxust 212	(7)	
			(see anta	_	\neg		
			()		()		
		717	(20-130)	(20-130)	(04) 05	4	5/45/4 (m
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			()] (()		
	Compound	punc	QC Limit	Limits (Soll)	RPD (Soil)	QC Limits (Water)	RPD (Water)
Ĭ	1,1-Dichloroethene		59-172%	.2%	< 22%	61-145%	< 14%
S)	Trichloroethene		62-137%	37%	< 24%	71-120%	< 14%
>	Benzene		66-142%		< 21%	76-127%	< 11%
	Toluene		59-139%	%68	< 21%	76-125%	< 13%
da	Chlorobenzene		60-133%	33%	< 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: R0905331
Date Collected: 9/17/09
Date Received: 9/18/09

Date Received: 9/18/09 Date Analyzed: 9/28/09

Matrix Spike Summary Volatile Organic Compounds by GC/MS

Sample Name:

SA165-10B

Lab Code:

R0905331-002

Units: µg/Kg
Basis: Dry

Analytical Method: 8260B

	Sample		Latrix Spike Q0909187-0				cate Matrix Q0909187-0		% Rec		RPD
Analyte Name	Result	Result	Amount	% Rec		Result	Amount	% Rec	Limits	RPD	Limit
1,1,1,2-Tetrachloroethane	ND	39.5	51.3	77		47.7	59.3	81	70 - 130	19	30
1,1,1-Trichloroethane (TCA)	ND	46.5	51.3	91		54.0	59.3	91	70 - 130	15	30
1,1,2,2-Tetrachloroethane	ND	40.1	51.3	78		47.4	59.3	80	70 - 130	17	30
1,1,2-Trichloroethane	ND	39.9	51.3	78		48.2	59.3	81	70 - 130	19	30
1,1-Dichloroethane (1,1-DCA)	ND	45.5	51.3	89		52.2	59.3	88	70 - 130	14	30
1,1-Dichloroethene (1,1-DCE)	ND	41.3	51.3	81		46.5	59.3	78	70 - 130	12	30
1,1-Dichloropropene	ND	41.0	51.3	80		49.3	59.3	83	70 - 130	18	30
1,2,3-Trichlorobenzene	ND	27.5	51.3	54	*	39.9	59.3	67	* 70 - 130	37 '	* 30
1,2,3-Trichloropropane	ND	38.7	51.3	75		47.6	59.3	80	70 - 130	21	30
1,2,4-Trichlorobenzene	ND	27.3	51.3	53	*	39.2	59.3	66	* 70 - 130	36 '	* 30
1,2,4-Trimethylbenzene	ND	35.1	51.3	69	*	45.9	59.3	77	70 - 130	27	30
1,2-Dibromo-3-chloropropane (DBC	ND	39.1	51.3	76		48.5	59.3	82	50 - 150	21	30
1,2-Dibromoethane	ND	40.0	51.3	78		47.8	59.3	81	70 - 130	18	30
1,2-Dichlorobenzene	ND	35.9	51.3	70		46.7	59.3	79	70 - 130	26	30
1,2-Dichloroethane	ND	42.0	51.3	82		49.2	59.3	83	70 - 130	16	30
1,2-Dichloropropane	ND	42.3	51.3	82		50.7	59.3	85	70 - 130	18	30
1,3,5-Trimethylbenzene	ND	35.9	51.3	70		47.0	59.3	79	70 - 130	27	30
1,3-Dichlorobenzene	ND	36.7	51.3	72		46.2	59.3	78	70 - 130	23	30
1,3-Dichloropropane	ND	39.7	51.3	77		46.3	59.3	78	70 - 130	15	30
1,4-Dichlorobenzene	ND	37.5	51.3	73		47.2	59.3	80	70 - 130	23	30
2,2-Dichloropropane	ND	45.8	51.3	89		53.4	59.3	90	70 - 130	15	30
2-Butanone (MEK)	0.87	47.6	51.3	91		55.2	59.3	92	50 - 150	15	30
2-Chlorotoluene	ND	37.8	51.3	74		47.2	59.3	80	70 - 130	22	30
2-Hexanone	ND	37.6	51.3	73		48.1	59.3	81	70 - 130	24	30
2-Methyl-2-propanol	ND	915	1030	89		1080	1190	91	50 - 150	17	30
4-Chlorotoluene	ND	38.8	51.3	76		49.5	59.3	83	70 - 130	24	30
4-Isopropyltoluene	ND	34.7	51.3	68	*	46.5	59.3	78	70 - 130	29	30
4-Methyl-2-pentanone	ND	40.4	51.3	79		49.5	59.3	83	70 - 130	20	30
Acetone	ND	58.7	51.3	114		73.4	59.3	124	50 - 150	22	30
Веплепе	ND	39.7	51.3	77		46.5	59.3	78	70 - 130	16	30
Bromobenzene	ND	37.7	51.3	73		47.5	59.3	80	70 - 130	23	30
Bromochloromethane	ND	41.9	51.3	82		49.4	59.3	83	70 - 130	16	30
Bromodichloromethane	ND	42.7	51.3	83		49.6	59.3	84	70 - 130	15	30

Matrix Spike Summary

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Project: Northgate Environmental

Tronox LLC Henderson/2027.001

Sample Matrix:

Soil

Service Request: R0905331 Date Collected: 9/17/09 Date Received: 9/18/09 Date Analyzed: 9/28/09

Matrix Spike Summary Volatile Organic Compounds by GC/MS

Sample Name: Lab Code:

SA165-10B R0905331-002 Units: µg/Kg Basis: Dry

Analytical Method: 8260B

	Sample		Tatrix Spike Q09 <mark>0</mark> 9187-03		D	uplicate Matrix RQ0909187-0		% Rec		RPD
Analyte Name	Result	Result	Amount	% Rec	Res	ult Amount	% Rec	Limits	RPD	Limit
Bromoform	ND	41.4	51.3	81	49	.8 59.3	84	70 - 130	19	30
Bromomethane	ND	32.8	51.3	64	36	.9 59.3	62	50 - 150	12	30
Carbon Tetrachloride	ND	44.6	51.3	87	55	.0 59.3	93	70 - 130	21	30
Chlorobenzene	ND	38.5	51.3	75	46	.6 59.3	79	70 - 130	19	30
Chloroethane	ND	38.3	51.3	75	43	.9 59.3	74	70 - 130	14	30
Chloroform	0.50	46.7	51.3	90	53	8 59.3	90	70 - 130	14	30
Chloromethane	ND	31.7	51.3	62	* 37	.8 59.3	64	* 70 - 130	18	30
Dibromochloromethane	ND	41.1	51.3	80	50	5 59.3	85	70 - 130	20	30
Dibromomethane	ND	40.9	51.3	80	47	8 59.3	81	70 - 130	16	30
Dichlorodifluoromethane (CFC 12)	ND	24.4	51.3	48	* 25	2 59.3	43	* 70 - 130	3	30
Dichloromethane	ND	41.8	51.3	82	47	0 59.3	79	70 - 130	12	30
Diisopropyl Ether	ND	45.0	51.3	88	51	4 59.3	87	70 - 130	13	30
Ethyl tert-Butyl Ether	ND	46.7	51.3	91	54	1 59.3	91	70 - 130	15	30
Ethylbenzene	ND	41.1	51.3	80	49	3 59.3	83	70 - 130	18	30
Hexachlorobutadiene	ND	26.6	51.3	52	* 39	6 59.3	67	* 70 - 130	40 3	¥ 30
Isopropylbenzene (Cumene)	ND	41.6	51.3	81	50	6 59.3	85	70 - 130	20	30
Methyl tert-Butyl Ether	ND	42.2	51.3	82	49	6 59.3	84	70 - 130	16	30
Naphthalene	ND	34.3	51.3	67	49	0 59.3	83	50 - 150	35 1	* 30
Styrene	ND	42.6	51.3	83	50	6 59.3	85	70 - 130	17	30
Tetrachloroethene (PCE)	ND	39.5	51.3	77	47	3 59.3	80	70 - 130	18	30
Toluene	0.38	39.6	51.3	76	47	0 59.3	79	70 - 130	17	30
Trichloroethene (TCE)	ND	42.5	51.3	83	49	8 59.3	84	70 - 130	16	30
Trichlorofluoromethane (CFC 11)	ND	41.5	51.3	81	48		81	70 - 130	15	30
Vinyl Chloride	ND	39.1	51.3	76	39.	0 59.3	66	* 70 - 130	0	30
cis-1,2-Dichloroethene	ND	43.1	51.3	84	50.	4 59.3	85	70 - 130	15	30
cis-1,3-Dichloropropene	ND	41.9	51.3	82	49.	2 59.3	83	70 - 130	16	30
m,p-Xylenes	ND	79.2	103	77	94.	5 119	80	70 - 130	18	30
n-Butylbenzene	ND	32.2	51.3	63	* 44.	2 59.3	74	70 - 130	31 *	* 30
n-Propylbenzene	ND	37.6	51.3	73	48.	7 59.3	82	70 - 130	26	30
o-Xylene	ND	40.1	51.3	78	47.	1 59.3	79	70 - 130	16	30
sec-Butylbenzene	ND	37.5	51.3	73	47.	5 59.3	80	70 - 130	24	30
tert-Amyl Methyl Ether	ND	44.7	51.3	87	52.	7 59.3	89	70 - 130	16	30
tert-Butylbenzene	ND	35.7	51.3	70	48.	2 59.3	81	70 - 130	30	30
trans-1,2-Dichloroethene	ND	41.1	51.3	80	45.	7 59.3	77	70 - 130	11	30

Comments:

DC#: 21991J

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".

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

	\mathcal{A}	\ _		\mathcal{Z}	\																		وببس	 71
Qualifications	1B J-/MJ/P (-		J-/MJ/P (•									
Associated Samples	1.2 4-9 12 17220st-MB			10 11 172392- MB																				
RPD (Limits)	()	()	()	()	()	()	()	,	()	()	()	()	()	()	()	()	()	()	()	()	()	()	())
LCSD %R (Limits)]()	()	()	()	()	()	()		()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	
LCS %R (Limits)	63 (75-126)	()	()	74 (1/)	()	()	(()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	
Compound	711			コフィ																				
TCS/LCSD ID	537-500241			172342-45																				
Derte	L										•													
**	ı	1		1	•	1		1				1			1				1		1	1		

LDC #:_	2199	15)
SDG #:	Su	Comer

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	<u></u> of	<u>)</u>
Reviewer:		NY
2nd reviewer.		

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

Y/NN	<u>/A</u>
NKK	<u>/A</u>

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

0 0.90	8	RPD	parend
0 0 0			
0,90	9 1.01	(£14D)	_
23	U 13	(£23D)	_
5 90	83,5	(46.9B)	Jdets
9 U O.	38 6,5	× V	
	5 90	5 90 83,5	23 N 13 (£23 D) 5 90 83,5 (£6.9 B)

		Concentrati	on ug Ag		Para
Compound		9	10	RPD	nhy
	M	1,4	11 11	9,6 (=11 D)	
	F	1.5	21 4	19.5 (4210)	1
	k	4.3	6,0	1.7 (45,30)	,
	E	0,61	5,34	4.69	,
	CC	0,77	5,34	4.53)

	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: September 18, 2009

LDC Report Date: December 6, 2009

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905348

Sample Identification

EB091809-SO1

SA117-0.5B

SA117-9B

SA117-25B

SA117-41B

SA161-0.5B

SA161-10B

SA161-25B

SA161-25BDL

SA161009-25B

SA161-37B

TB091809-SO1

TB091809-SO3

SA117-9BMS

SA117-9BMSD

Introduction

This data review covers 12 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 (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.

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
9/29/09	Acetone	27.5	SA117-0.5B SA117-9B SA117-25B SA117-41B SA161-0.5B SA161-10B 12392-MB	J+ (all detects)	A
9/29/09	Hexachlorobutadiene	28.4	SA117-0.5B SA117-9B SA117-25B SA117-41B SA161-0.5B SA161-10B 12392-MB	J- (all detects) UJ (all non-detects)	Α
9/30/09	Hexachlorobutadiene	29.7	SA117-9BMS SA117-9BMSD	J- (all detects) UJ (all non-detects)	А
10/1/09	tert-Butylbenzene sec-Butylbenzene p-Isopropyltoluene 1,2-Dibromo-3-chloropropane Hexachlorobutadiene	28.1 25.2 25.5 25.6 45.9	SA161-25B 172787-MB	J- (all detects) UJ (all non-detects)	A

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

V. Blanks

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

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
172495-MB	9/29/09	2-Butanone	110 ug/Kg	SA161-25BDL SA161009-25B SA161-37B

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
SA161-25BDL (135.5X)	2-Butanone	230 ug/Kg	230U ug/Kg
SA161009-25B (119.5X)	2-Butanone	220 ug/Kg	220U ug/Kg

Sample	Compound	Reported	Modified Final
	TIC (RT in minutes)	Concentration	Concentration
SA161-37B (105.5X)	2-Butanone	240 ug/Kg	240U ug/Kg

Samples TB091809-SO1 and TB091809-SO3 were identified as trip blanks. No volatile contaminants were found in these blanks.

Sample EB091809-SO1 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
EB091809-SO1	9/18/09	Acetone Dichloromethane	6.6 ug/L 0.27 ug/L	All soil samples in SDG R0905348

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
SA117-0.5B	Acetone	4.5 ug/Kg	4.5U ug/Kg
SA117-25B	Acetone	1.9 ug/Kg	1.9U ug/Kg
SA117-41B	Acetone	13 ug/Kg	13U ug/Kg
SA161-0.5B	Acetone	7.8 ug/Kg	7.8U ug/Kg
SA161-10B	Acetone	11 ug/Kg	11U ug/Kg
SA161-25B	Acetone	10 ug/Kg	10U ug/Kg

Sample FB072909-SO (from SDG R0904226) 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
FB072909-SO	7/29/09	Acetone Dichloromethane Toluene	3.5 ug/L 0.30 ug/L 0.44 ug/L	All soil samples in SDG R0905348

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
SA117-0.5B	Acetone	4.5 ug/Kg	4.5U ug/Kg
SA117-25B	Acetone	1.9 ug/Kg	1.9U ug/Kg
SA117-41B	Toluene	0.33 ug/Kg	0.33U ug/Kg
SA161-0.5B	Toluene	0.71 ug/Kg	0.71U ug/Kg
SA161-10B	Toluene	0.78 ug/Kg	0.78U 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 percent recoveries (%R) and MS/MSD relative percent differences (RPD) were not within QC limits for several compounds, the MSD percent recoveries (%R) were within QC limits and no data were qualified.

VIII. Laboratory Control Samples (LCS)

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

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
172495-LCS	Bromomethane	70 (75-125)	SA161-25BDL SA161009-25B SA161-37B 172495-MB	J- (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

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

Sample	Compound	Finding	Criteria	Flag	A or P
SA161-25B	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	
All samples in SDG R0905348	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	
SA161-25B	Chloroform	х	А	

Sample	Compound	Flag	A or P
SA161-25BDL	All TCL compounds except Chloroform	x	А

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

XVI. Field Duplicates

Samples SA161-25B and SA161009-25B and samples SA161-25BDL and SA161009-25B were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concentration (ug/Kg)		555	5.44		
Compound	SA161-25B	SA161009-25B	RPD (Limits)	Difference (Limits)	Flags	A or P
2-Butanone	2.8	220	-	217.2 (≤1600)	-	-
Acetone	10	3200U	-	3190 (≤3200)	-	-
Bromoform	5.8	790U	-	784.2 (≤790)	-	-
Chloroform	470	830	-	360 (≤790)	-	-
Dibromochloromethane	2.0	790U	-	788 (≤790)	-	-

	Concentration (ug/Kg)		DDD	D:#		
Compound	SA161-25BDL	SA161009-25B	RPD (Limits)	Difference (Limits)	Flags	A or P
2-Butanone	230	220	-	10 (≤1800)	-	-
Chloroform	630	830	-	200 (≤900)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Data Qualification Summary - SDG R0905348

SDG	0	0	Floor	A D	Bassas (Cada)
R0905348	Sample SA117-0.5B SA117-9B SA117-25B SA117-41B SA161-0.5B SA161-10B	Acetone	Flag J+ (all detects)	A or P	Reason (Code) Continuing calibration (%D) (c)
R0905348	SA117-0.5B SA117-9B SA117-25B SA117-41B SA161-0.5B SA161-10B	Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	А	Continuing calibration (%D) (c)
R0905348	SA161-25B	tert-Butylbenzene sec-Butylbenzene p-Isopropyltoluene 1,2-Dibromo-3-chloropropane Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	А	Continuing calibration (%D) (c)
R0905348	SA161-25BDL SA161009-25B SA161-37B	Bromomethane	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0905348	SA161-25B	Chloroform	J (all detects)	Α	Project Quantitation Limit (e)
R0905348	EB091809-SO1 SA117-0.5B SA117-9B SA117-25B SA117-41B SA161-0.5B SA161-10B SA161-25B SA161-25B SA161-25BDL SA161009-25B SA161-37B TB091809-SO1 TB091809-SO3	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0905348	SA161-25B	Chloroform	х	А	Overall assessment of data (o)
R0905348	SA161-25BDL	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 R0905348

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905348	SA161-25BDL (135.5X)	2-Butanone	230U ug/Kg	А	bl
R0905348	SA161009-25B (119.5X)	2-Butanone	220U ug/Kg	А	bl
R0905348	SA161-37B (105.5X)	2-Butanone	240U ug/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Trip Blank Data Qualification Summary - SDG R0905348

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Equipment Blank Data Qualification Summary - SDG R0905348

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905348	SA117-0.5B	Acetone	4.5U ug/Kg	А	be
R0905348	SA117-25B	Acetone	1.9U ug/Kg	А	be
R0905348	SA117-41B	Acetone	13U ug/Kg	А	be
R0905348	SA161-0.5B	Acetone	7.8U ug/Kg	А	be
R0905348	SA161-10B	Acetone	11U ug/Kg	А	be
R0905348	SA161-25B	Acetone	10U ug/Kg	А	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Field Blank Data Qualification Summary - SDG R0905348

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905348	SA117-0.5B	Acetone	4.5U ug/Kg	А	bf
R0905348	SA117-25B	Acetone	1.9U ug/Kg	А	bf

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905348	SA117-41B	Toluene	0.33U ug/Kg	А	bf
R0905348	SA161-0.5B	Toluene	0.71U ug/Kg	А	bf
R0905348	SA161-10B	Toluene	0.78U ug/Kg	Α	bf

Tronox Northgate Henderson

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LDC #:	21991K1	VALIDATION COMPLETENESS WORKSHEET
SDG #:_	R0905348	Stage 2B
Laborato	ry: Columbia	nalytical Services

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Reviewer:	27/6
2nd Reviewer:	Υ

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: 9/18/09
II.	GC/MS Instrument performance check	A	,
111.	Initial calibration	À	7. RSD rY
IV.	Continuing calibration/ICV	SM	CCN ≤ 25 }
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	Z W)	us
IX.	Regional Quality Assurance and Quality Control	N	
Χ.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	SIM	
XIII.	Tentatively identified compounds (TICs)	Ν	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	SW	$p_1 = 8_{10}$ $p_2 = 9_{10}$
XVII.	Field blanks	SW	$p_1 = 8 \cdot 10$ $p_2 = 9 \cdot 10$ $EB = 1 + TB = 12 \cdot 13$ $FB = FB \cdot 0729 \cdot 09 - 50$ Solution of the second of the

Note:

A = Acceptable N = Not provided/applicable

SW = See worksheet

YND = No compounds detected R = Rinsate

FB = Field blank

D = Duplicate TB = Trip blank

EB = Equipment blank

Validated Samples: Water + Soil

	0101	- 1	-0//			
7 1	EB091809-SO1 W	114	SA161-37B S	21	1720f3-111B	31 (9 155)
2 7	SA117-0.5B	- 12	TB091809-SO1	22 Y	17 2392-	(1246)
3 7	SA117-9B	131	TB091809-SO3	23 3	172787-	33 (4) 54)
4 >	SA117-25B	14 7	SA117-9BMS 5	24 4	172495-+	(9248) 34
5 7	SA117-41B	15 🗸	SA117-9BMSD	25	, , , , , , , , , , , , , , , , , , ,	35
6 ¥	SA161-0.5B	16		26		36
7 7	SA161-10B	17		27		37
8 3	SA161-25B 01	18		28		38
9 4	SA161-25BDL Dy	19		29		39
10 4	SA161009-25B D, DY V	20		30		40

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

A Chlomethane*	11 1 1 2-Trichlomethane	OO. 2.2-Dichloroproane	III. n-Butylbenzene	CCCC.1-Chlorohexane
B. Bromomethane	V. Benzene		JJJ. 1,2-Dichlorobenzene	DDDD. Isopropyi alcohol
C. Viny 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. Methylane 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-Dkchloroethene**	BB. 1,1,2,2-Tetrachloroethane*	VV. Isopropylbenzene	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. Chloraform**	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-propanel
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000
N. 1,1,1-Trichloroethane	HH. Vinyt acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyttoluene	рррр.
O. Carbon tetrachloride	II. 2-Chloroethytvinyl ether	CCC. tert-Buty/benzene	www. Ethanol	0000
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
Q. 1,2-Dichloropropane**	KK. Trichlorofluoromethane	EEE. sec-Buty/benzene	YYY. tert-Butanol	SSSS.
R. cts-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-lsopropyftoluene	AAAA. Ethyl tert-butyl ether	טטטט.
T. Dibromochioromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	ww.

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

SDG #: Bu Cm LDC#: 21 901 K/

VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page: 2nd Reviewer: Reviewer.

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

N N/A N/A N/A

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

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

r:			T	7	_					·				Π	Ī	Γ	Γ				T	
Qualifications	13/A (C-	T *			1 4			I /A				->										
Qualif	J+ 10t5/A	J- /NJ			J-/nJ			8 J-/NJ					•									
Associated Samples	172392-MB				ار اح			172787-MB														
Associat	2-7				4			8	,													
Finding RRF (Limit: >0.05)																						
Finding %D (Limit: <25.0%)	27,5	78.4			29.7			28./	25,2	52,5	25.6	45,9										
Compound	(+) ±	(-) 717			(-) 177			(-) 222	FEE C	(-) 599	(-) WW	(-) 717										
Standard ID	H1190			-	#1211			41236														
Date	9/29/09	1.			9/06/6	, ,		10/01/01														
*																						

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LDC #:	SDG #:

VALIDATION FINDINGS WORKSHEET

of

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Blanks	

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?

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

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

(79) = 16 Sample Identification Associated Samples: KS:SOL) 220 (x5.261) 230 Blank ID 172495-MB 120 Σ Compound Conc. units:

Blank analysis date: Conc. units:

Compound Blank ID Sample Identification

SDG # Jee Cony LDC # 21991 KI

VALIDATION FINDINGS WORKSHEET

Field Blanks

Page: lof / 2nd Reviewer:_ Reviewer:_

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

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

Were target compounds detected in the field blanks?

*Blank units: Work Associated sample units: Work Associated Sample Units:

(p e)								
A11 501/5								
	ıntification	8	10/4		EA)			
Associated Samples:_	Sample Identification	7	n/ =		others either ND or >			
Assoc		9	7.8/4		ther N			
ther: £B		7	13/4		Thers e			
rip Blank / O		4	1.9/4		(A1) 0			
ple units: '	BlankTD	2	4.5/4					
ociated sam e) Field Blanl	Blank ID	9/8/69	6.5	6.27				
Blank units: でクノー Associated sample units: パラノバタ Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: EA	Compound	Sampling Date 9 1/8/69	4	E				

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

							(2)			
ntification	7			0.78/4	<u> </u>		7 7			
Sample Ide)			0,71/4			ND			
	S			0.33/4			either			
	4	1.9/4					thers			
	2	4.5/4					(m)			
SO Blank ID										
F & 572509- Blank ID		3'8	06,30	0.44						
Compound	Sampling Date	#	E	2)						
	F D 372967- So Sample Identification Sample Identification	F-5,725,01-50 Blank ID Blank ID S 4 5	Fb 573507-50 Blank ID Blank ID 2 4 5 5 5 5 5 5 5 5 5 5	Fb 573907-50 Blank ID Blank ID 2 4 5 5 Filter Date 7/29/64 2 4 5/4 1.9/4 5 5 5 5 5 5 5 5 5	Fb 573501-50 Blank ID 2 4	Fb 573707-50 Blank ID 2 4 5 5 Elling Date 7/29/69 2 4 5 5 Elling Date 7/29/69 4.5/4 1.9/4 5 E	Fb 572501-50 Blank ID 2 4	Fb 572501-50 Blank ID 2 4	Fb 572501-50 Blank ID 2 4	F6 572501-50 Blank ID 2 4

SDG#: 21991 K1

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1 Reviewer: 5VC 2nd Reviewer: 0

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

# Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
⊩	14/15	Sewerd	compounds)	have (2 R)it	£	٤	No mul (MSD
		entride	de (hmits)	and (2 RPD		•	
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			()	()	()		
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			()		()		
			()	()	()		
			()	()	()		
			()	()	()		
	Comp	Compound	QC Lim	Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
H	1,1-Dichloroethene		59-1	59-172%	< 22%	61-145%	< 14%
S.	Trichloroethene		62-1	62-137%	< 24%	71-120%	< 14%
٧.	Benzene		-99	66-142%	< 21%	76-127%	< 11%
CC.	Toluene		59-1	59-139%	< 21%	76-125%	< 13%
.00	Chlorobenzene		-09	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: R0905348

Date Collected: 9/18/09

Date Received: 9/19/09

Date Analyzed: 9/30/09

Matrix Spike Summary Volatile Organic Compounds by GC/MS

Sample Name:

SA117-9B

Lab Code:

R0905348-003

Units: μg/Kg Basis: Dry

Analytical Method: 8260B

	Sample		Latrix Spike Q0909236-0:				ate Matrix Q0909236-0		% Rec		RPD
Analyte Name	Result	Result	Amount	% Rec	:	Result	Amount	% Rec	Limits	RPD	Limit
1,1,1,2-Tetrachloroethane	ND	35.7	52.9	68	*	47.5	58.3	81	70 - 130	28	30
1,1,1-Trichloroethane (TCA)	ND	44.6	52.9	84		57.0	58.3	98	70 - 130	24	30
1,1,2,2-Tetrachloroethane	ND	37.4	52.9	71		51.7	58.3	89	70 - 130	32 *	
1,1,2-Trichloroethane	ND	35.9	52.9	68	*	47.7	58.3	82	70 - 130	28	30
1,1-Dichloroethane (1,1-DCA)	ND	42.6	52.9	80		53.1	58.3	91	70 - 130	22	30
1,1-Dichloroethene (1,1-DCE)	ND	42.2	52.9	80		55.7	58.3	96	70 - 130	28	30
1,1-Dichloropropene	ND	43.3	52.9	82		52.7	58.3	90	70 - 130	19	30
1,2,3-Trichlorobenzene	ND	33.6	52.9	63	*	49.9	58.3	86	70 - 130	39 *	
1,2,3-Trichloropropane	ND	35.0	52.9	66	*	47.3	58,3	81	70 - 130	30	30
1,2,4-Trichlorobenzene	ND	37.3	52.9	71		53.2	58.3	91	70 - 130	35 *	30
1,2,4-Trimethylbenzene	ND	40.2	52.9	76		53.0	58.3	91	70 - 130	28	30
1,2-Dibromo-3-chloropropane (DBC	ND	34.3	52.9	65		48.9	58.3	84	50 - 150	35 *	
1,2-Dibromoethane	ND	36.9	52.9	70		47.7	58.3	82	70 - 130	26	30
1,2-Dichlorobenzene	ND	37.0	52.9	70		50.4	58.3	86	70 - 130	31 *	
1,2-Dichloroethane	ND	39.1	52.9	74		50.0	58.3	86	70 - 130	25	30
1,2-Dichloropropane	ND	39.1	52.9	74		49.8	58.3	85	70 - 130	24	30
1,3,5-Trimethylbenzene	ND	40.8	52.9	77		53.9	58.3	92	70 - 130	28	30
1,3-Dichlorobenzene	ND	39.9	52.9	75		52.8	58.3	90	70 - 130	28	30
1,3-Dichloropropane	ND	36.1	52.9	68	*	47.8	58.3	82	70 - 130	28	30
1,4-Dichlorobenzene	ND	40.6	52.9	77		53.5	58.3	92	70 - 130	27	30
2,2-Dichloropropane	ND	45.0	52.9	85		56.9	58.3	98	70 - 130	23	30
2-Butanone (MEK)	0.79	40.3	52.9	75		55,5	58.3	94	50 - 150	32 *	30
2-Chlorotoluene	ND	39.6	52.9	75		57.7	58.3	99	70 - 130	37 *	30
2-Hexanone	ND	36.3	52.9	69	*	48.3	58.3	83	70 - 130	28	30
2-Methyl-2-propanol	ND	809	1060	76		1050	1170	90	50 - 150	26	30
4-Chlorotoluene	ND	42.2	52.9	80		54.9	58.3	94	70 - 130	26	30
4-Isopropyltoluene	ND	41.8	52.9	79		55.5	58.3	95	70 - 130	28	30
4-Methyl-2-pentanone	ND	36.7	52.9	69	*	48.6	58.3	83	70 - 130	28	30
Acetone	ND	54.1	52.9	102		81.3	58.3	139	50 - 150	40 *	30
Benzene	ND	38.7	52.9	73		49.6	58.3	85	70 - 130	25	30
Bromobenzene	ND	37.3	52.9	70		50.3	58.3	86	70 - 130	30	30
Bromochloromethane	ND	38.1	52.9	72		49.1	58.3	84	70 - 130	25	30
Bromodichloromethane	ND	39.4	52.9	75		49.3	58.3	85	70 - 130	22	30

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Project:

Northgate Environmental

Tronox LLC Henderson/2027.001

Sample Matrix:

Soil

Service Request: R0905348
Date Collected: 9/18/09
Date Received: 9/19/09

Date Analyzed: 9/30/09

Matrix Spike Summary Volatile Organic Compounds by GC/MS

Sample Name: Lab Code: SA117-9B R0905348-003

Units: µg/Kg
Basis: Dry

Analytical Method: 8260B

	Sample		latrix Spike Q0909236-0			ate Matrix Q0909236-0		% Rec		RPD
Analyte Name	Result	Result	Amount	% Rec	Result	Amount	% Rec	Limits	RPD	Limit
Bromoform	ND	36.8	52.9	70	49.1	5 8.3	84	70 - 130	29	30
Bromomethane	ND	37.1	52.9	70	45.9	58.3	79	50 - 150	21	30
Carbon Tetrachloride	ND	46.8	52.9	89	57.9	58.3	99	70 - 130	21	30
Chlorobenzene	ND	37.8	52.9	71	49.4	58.3	85	70 - 130	27	30
Chloroethane	ND	40.0	52.9	76	48.8	58.3	84	70 - 130	20	30
Chloroform	ND	41.6	52.9	79	55.1	58.3	94	70 - 130	28	30
Chloromethane	ND	39.2	52.9	74	49.1	58.3	84	70 - 130	22	30
Dibromochloromethane	ND	37.5	52.9	71	48.8	58.3	84	70 - 130	26	30
Dibromomethane	ND	38.4	52.9	73	48.7	58.3	84	70 - 130	24	30
Dichlorodifluoromethane (CFC 12)	ND	33.9	52.9	64 *	42.7	58.3	73	70 - 130	23	30
Dichloromethane	ND	39.3	52.9	74	51.3	58.3	88	70 - 130	26	30
Diisopropyl Ether	ND	43.6	52.9	82	56.1	58.3	96	70 - 130	25	30
Ethyl tert-Butyl Ether	ND	44.4	52.9	84	58.2	58.3	100	70 - 130	27	30
Ethylbenzene	ND	41.1	52.9	78	53.0	58.3	91	70 - 130	25	30
Hexachlorobutadiene	ND	36.0	52.9	68 *	49.3	58.3	85	70 - 130	31 *	
Isopropylbenzene (Cumene)	ND	43.1	52.9	81	54.4	58.3	93	70 - 130	23	30
Methyl tert-Butyl Ether	ND	38.7	52.9	73	51.9	58.3	89	70 - 130	29	30
Naphthalene	ND	35.6	52.9	67	51.0	58.3	87	50 - 150	36 *	30
Styrene	ND	40.4	52.9	76	53.2	58.3	91	70 - 130	27	30
Tetrachloroethene (PCE)	ND	43.1	52.9	81	55.2	58.3	95	70 - 130	25	30
Toluene	ND	39.3	52.9	74	50.8	58.3	87	70 - 130	26	30
Trichloroethene (TCE)	ND	42.7	52.9	81	52.5	58.3	90	70 - 130	20	30
Trichlorofluoromethane (CFC 11)	ND	45.2	52.9	85	56,7	58.3	97	70 - 130	23	30
Vinyl Chloride	ND	41.2	52.9	78	50.6	58.3	87	70 - 130	20	30
cis-1,2-Dichloroethene	ND	38.9	52.9	74	54.2	58.3	93	70 - 130	33 *	30
cis-1,3-Dichloropropene	ND	40.0	52.9	76	51.8	58.3	89	70 - 130	26	30
m,p-Xylenes	ND	81.8	106	77	105	117	90	70 - 130	25	30
n-Butylbenzene	ND	43.2	52.9	82	58.2	58.3	100	70 - 130	30	30
n-Propylbenzene	ND	42.3	52.9	80	54.5	58.3	93	70 - 130	25	30
o-Xylene	ND	39.8	52.9	75	49.3	58.3	84	70 - 130	21	30
sec-Butylbenzene	ND	42.6	52.9	81	56.4	58.3	97	70 - 130	28	30
tert-Amyl Methyl Ether	ND	41.1	52.9	78	56.7	58.3	97	70 - 130	32 *	
tert-Butylbenzene	ND	40.9	52.9	77	52.3	58.3	90	70 - 130	25	30
trans-1,2-Dichloroethene	ND	41.7	52.9	79	53.0	58.3	91	70 - 130	24	30

Comments:

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Matrix Spike Summary

SuperSet Reference:

09-0000121394 rev 00

3C#: 21991 K)

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: Reviewer 2nd Reviewer:

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

lease 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?

CSD ID	Compound	%R _	LCS %R (LImits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
172495-45	g	22	(361-56))	J	1 9-11, 172495-MB	J-/MM (K)
	-		()	())	
			()	() [() [
72392-165	777	74	(52/-52)	() (1 2-7 172312-MB	3 No rud (MCD
			()	()) (0
			())) ()	
			^))	(
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			())) ()	
			,	,)	1	

LDC #: 21691 K/ SDG #: 54

VALIDATION FINDINGS WORKSHEET Compound Quantitation and CRQLs

Reviewer: 2nd 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? Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound? Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Qualifications	Jdor/4 (e)										
Associated Samples											
Finding	k > cd range										
Sample ID	8										
Date											
*										<u></u>	

Comments: See sample calculation verification worksheet for recalculations

SDG# 54 (m)

VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

ot	3/6	7
_ 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?

us	(0)	\	-							
Qualifications	×		1							
Associated Samples	1	8	4.)							
Finding	K > cu rayed		All except K							
Sample ID	8		6							
Date										ents:
*									 	Comments:

DC #:	2 99	<u>_</u>
3DG #:_	Su	Cm/

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_		of
Reviewer:		SVC
2nd reviewer:	Ø	

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

Y N N/A Y N N/A

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

		Concentrat	tion (US/Ly)		Prima
Compound		8	10	RPD	ny
	М	ع, 8	220	217.2 (=1600)	_
	F_	10	3200 U	3190 (= 3200D)	-
	X	5,8	790 y	784,2 (= 790D)	_
	K	470	830	360	_
	+	٥. ٥	790 U	788	-

		Concentration	on (ug/kg)		Pares
Compound		9	10	RPD	my
	M	230	220	10 (£1800 D)	
	K	630	8 30	200 (£ 900 b)	
·		****			
					·

	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: September 21, 2009

LDC Report Date: December 6, 2009

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905387

Sample Identification

SA32-0.5B TB092109-SO2

SA32-9B

SA32-25B

SA32009-25B

SA32-37B

SA66-0.5B

SA66-0.5BDL

SA66009-0.5B

SA66009-0.5BDL

SA66-10B

SA66-10BRE

SA66-28B

SA129-10B

SA129-29B

RSAT4-0.5B

RSAT4-10B

RSAT4-25B

RSAT4-10B

RSAT4-53B

TB092109-SO1

Introduction

This data review covers 19 soil samples and 2 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
9/18/09	2-Methyl-2-propanol	0.028 (≤0.05)	SA66-0.5BDL SA66009-0.5BDL SA66-10BRE TB092109-SO1 TB092109-SO2 172107-WMB 172107-SMB 173080-MB	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
9/30/09	Hexachlorobutadiene	29.7	SA32-0.5B SA32-9B SA32-25B SA32-37B 172602-MB	J- (all detects) UJ (all non-detects)	А
10/1/09	tert-Butylbenzene sec-Butylbenzene p-Isopropyltoluene 1,2-Dibromo-3-chloropropane Hexachlorobutadiene	28.1 25.2 25.5 25.6 45.9	SA32009-25B SA66-0.5B SA66009-0.5B SA66-10B 172787-MB	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
9/28/09	2-Methyl-2-propanol	0.029 (≥0.05)	SA66-10BRE TB092109-SO1 TB092109-SO2 172107-WMB 172107-SMB	J (all detects) UJ (all non-detects)	А
10/2/09	2-Methyl-2-propanol	0.027 (≥0.05)	SA66-0.5BDL SA66009-0.5BDL 173080-MB	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
172107-SMB	9/28/09	2-Butanone	53 ug/Kg	SA66-28B
173080-MB	10/2/09	2-Butanone	79 ug/Kg	SA66009-0.5BDL

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
SA66009-0.5BDL	2-Butanone	590 ug/Kg	590U ug/Kg

Samples TB092109-SO1 and TB092109-SO2 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
TB092109-SO1	9/21/09	Acetone	5.3 ug/L	SA32-0.5B SA32-9B SA32-25B SA32009-25B SA32-37B

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

Samples FB072909-SO (from SDG R0904226) and FB080309-SO (from SDG R0904279) were identified as field blanks. No volatile contaminants were found in these blanks with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072909-SO	7/29/09	Acetone Dichloromethane Toluene	3.5 ug/L 0.30 ug/L 0.44 ug/L	SA32-0.5B SA32-9B SA32-25B SA32009-25B SA32-37B SA66-0.5B SA66-0.5BDL SA66009-0.5B SA66009-0.5BDL SA66-10B SA66-10B SA66-10BRE SA66-28B SA129-10B SA129-29B
FB080309-SO	8/3/09	Acetone Toluene	2.1 ug/L 0.30 ug/L	RSAT4-0.5B RSAT4-10B RSAT4-25B RSAT4-10B RSAT4-53B

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
SA32-0.5B	Toluene	0.50 ug/Kg	0.50U ug/Kg
SA32-9B	Toluene	0.69 ug/Kg	0.69U ug/Kg
SA66009-0.5B	Acetone	6.7 ug/Kg	6.7U ug/Kg
SA129-29B	Acetone	3.7 ug/Kg	3.7U ug/Kg
RSAT4-0.5B	Toluene	0.57 ug/Kg	0.57U 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
SA66-10BRE	Dibromofluoromethane	67 (70-130)	All TCL compounds	J- (all detects) UJ (all non-detects)	А

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. Although the LCSD percent recoveries (%R) were not within QC limits for some compounds, the LCS percent recoveries (%R) were within QC limits and no data were qualified.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

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

Sample	Compound	Finding	Criteria	Flag	A or P
SA66-0.5B SA66009-0.5B	1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects)	A

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0905387	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
SA66-0.5B SA66009-0.5B	1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene	×	А
SA66-0.5BDL SA66009-0.5BDL	All TCL compounds except 1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene	х	А

Sample	Compound	Flag	A or P
SA66-10BRE	All TCL compounds	Х	Α

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

XVI. Field Duplicates

Samples SA32-25B and SA32009-25B, samples SA66-0.5B and SA66009-0.5B, and samples SA66-0.5BDL and SA66009-0.5BDL were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concentrat	ion (ug/Kg)	222	D!#		
Compound	SA32-25B	SA32009-25B	RPD (Limits)	Difference (Limits)	Flags	A or P
2-Butanone	3.5	2.4	-	1.1 (≤14)	-	-
Chloroform	38	18	-	20 (≤7.2)	J (all detects)	А
Toluene	1.2	1	-	0.2 (≤7.2)	-	-

	Concentrati	on (ug/Kg)	555	D!#		
Compound	SA66-0.5B	SA66009-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P
1,2,3-Trichlorobenzene	490	650	28 (≤50)	-	-	-
1,2,4-Trichlorobenzene	920	1500	48 (≤50)	-	-	-
1,2-Dichlorobenzene	10	33	-	23 (≤6.2)	J (all detects)	А
1,3-Dichlorobenzene	4.9	17	-	12.1 (≤6.2)	J (all detects)	А
1,4-Dichlorobenzene	12	38	-	26 (≤6.2)	J (all detects)	А
2-Butanone	11U	1.7	-	9.3 (≤11)	-	-
2-Chlorotoluene	5.3U	1.9	-	3.4 (≤5.3)	-	-
2-Hexanone	1.8	12U	-	10.2 (≤12)	-	-
Acetone	21U	6.7	-	14.3 (≤21)	-	-

	Concentrat	ion (ug/Kg)	222	D'''		
Compound	SA66-0.5B	SA66009-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P
Chlorobenzene	5.6	10	-	4.4 (≤6.2)	-	-
Chloroform	4.8	3.7	-	1.1 (≤6.2)	-	
Hexachlorobutadiene	30	90	100 (≤50)	-	J (all detects)	А
Toluene	5.3U	5.6	-	0.3 (≤5.3)	-	-
Trichloroethene	0.44	6.2U	-	5.76 (≤6.2)	-	-

	Concentrat	ion (ug/Kg)	500	D:#		
Compound	SA66-0.5BDL	SA66009-0.5BDL	RPD (Limits)	Difference (Limits)	Flags	A or P
1,2,3-Trichlorobenzene	6900	22000	104 (≤50)	-	J (all detects)	А
1,2,4-Trichlorobenzene	12000	39000	106 (≤50)	-	J (all detects)	А
1,2-Dichlorobenzene	88	260	-	172 (≤6.2)	J (all detects)	А
1,4-Dichlorobenzene	130	400	-	270 (≤1300)	-	
2-Butanone	200	590	-	390 (≤2600)	-	-
Chloroform	290	2000	-	1710 (≤1300)	J (all detects)	А
Hexachlorobutadiene	930	3000	-	2070 (≤1300)	J (all detects)	Α
Tetrachloroethene	550U	220	-	330 (≤550)	-	+
Toluene	550U	150	-	400 (≤550)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Data Qualification Summary - SDG R0905387

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905387	SA66-0.5BDL SA66009-0.5BDL SA66-10BRE TB092109-SO1 TB092109-SO2	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Initial calibration (RRF) (c)
R0905387	SA32-0.5B SA32-9B SA32-25B SA32-37B	Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	А	Continuing calibration (%D) (c)
R0905387	SA32009-25B SA66-0.5B SA66009-0.5B SA66-10B	tert-Butylbenzene sec-Butylbenzene p-Isopropyltoluene 1,2-Dibromo-3-chloropropane Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	А	Continuing calibration (%D) (c)
R0905387	SA66-0.5BDL SA66009-0.5BDL SA66-10BRE TB092109-SO1 TB092109-SO2	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Continuing calibration (RRF) (c)
R0905387	SA66-10BRE	All TCL compounds	J- (all detects) UJ (all non-detects)	А	Surrogate spikes (%R) (s)
R0905387	SA66-0.5B SA66009-0.5B	1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene	J (all detects) J (all detects)	А	Project Quantitation Limi (e)
R0905387	SA32-0.5B SA32-9B SA32-25B SA32009-25B SA32-37B SA66-0.5B SA66-0.5BDL SA66009-0.5B SA66009-0.5BDL SA66-10B SA66-10BRE SA66-10BRE SA66-28B SA129-10B SA129-29B RSAT4-0.5B RSAT4-0.5B RSAT4-10B RSAT4-25B RSAT4-10B RSAT4-25B RSAT4-10B RSAT4-53B TB092109-SO1 TB092109-SO2	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limi (sp)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905387	SA66-0.5B SA66009-0.5B	1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene	X X	А	Overall assessment of data (o)
R0905387	SA66-0.5BDL SA66009-0.5BDL	All TCL compounds except 1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene	×	A	Overall assessment of data (o)
R0905387	SA66-10BRE	All TCL compounds	×	Α	Overall assessment of data (0)
R0905387	SA32-25B SA32009-25B	Chloroform	J (all detects)	А	Field duplicates (Difference) (fd)
R0905387	SA66-0.5B SA66009-0.5B	1,2-Dichlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene	J (all detects)	А	Field duplicates (Difference) (fd)
R0905387	SA66-0.5B SA66009-0.5B	Hexachlorobutadiene	J (all detects)	A	Field duplicates (RPD) (fd)
R0905387	SA66-0.5BDL SA66009-0.5BDL	1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene	J (all detects) J (all detects)	А	Field duplicates (RPD) (fd)
R0905387	SA66-0.5BDL SA66009-0.5BDL	1,2-Dichlorobenzene Chloroform Hexachlorobutadiene	J (all detects) J (all detects) J (all detects)	A	Field duplicates (Difference) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Laboratory Blank Data Qualification Summary - SDG R0905387

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905387	SA66009-0.5BDL	2-Butanone	590U ug/Kg	Α	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Trip Blank Data Qualification Summary - SDG R0905387

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Field Blank Data Qualification Summary - SDG R0905387

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905387	SA32-0.5B	Toluene	0.50U ug/Kg	А	bf
R0905387	SA32-9B	Toluene	0.69U ug/Kg	А	bf
R0905387	SA66009-0.5B	Acetone	6.7U ug/Kg	А	bf
R0905387	SA129-29B	Acetone	3.7U ug/Kg	Α	bf
R0905387	RSAT4-0.5B	Toluene	0.57U ug/Kg	А	bf

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Reviewer: 2nd Reviewer:

Laboratory: Columbia Analytical Services

LDC #: 21991L1 SDG #:___R0905387

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	Å	Sampling dates: 9/21/69
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	SW	2 RSD rr
IV.	Continuing calibration/IDV	ζM	COV 4 25 ?
V	Blanks	SW	
VI.	Surrogate spikes	SN)	
VII.	Matrix spike/Matrix spike duplicates	N	client spec
VIII.	Laboratory control samples	ZW	Client Spec US 10
IX.	Regional Quality Assurance and Quality Control	N	
Χ.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	SW	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	SM	$D_1 = 3.4$ $D_2 = 6.8$ $D_3 = 7.9$
XVII.	Field blanks	SN	TB-20, 21 FB = FB 672969-50 Arm = FB080309-50 Arm Rog

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
	انعد		

	۷	. 01		··wrey		
† 1	SA32-0.5B	S	114	SA66-10BDERE S	21 5 TB092109-SO2 W 31 1 172602_ MB	
† 2	SA32-9B		12	SA66-28B	22 32 × 172 787 - MB	
+ 3	SA32-25B D ₁		13 4	SA129-10B	23 33 3 17 30 80 - MB	
+ 4	SA32009-25B D		14 4	SA129-29B	24 34 172989-	
† 5	SA32-37B		15 4	RSAT4-0.5B	25 35 172107 - WM	В
<i>ک</i>	SA66-0.5B P _y		16 4	RSAT4-10B	26 366 172107-SMB	_
₇	SA66-0.5BDL) ,	17 4	RSAT4-25B	27 37	
8 7	SA66009-0.5B ₺/		18 F	RSAT4-10B	28 38	
9 >	SA66009-0.5BDL	03	19 🖠	RSAT4-53B	29 39	
10 3	SA66-10B	\bigvee	20 5	TB092109-SO1 W	30 40	

TARGET COMPOUND WORKSHEET

WETHOD: 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-Methyf-2-pentanone	SS. 1,3-Dichloropropane	MMM, Naphthalene	GGGG. Acrytonitrile
F. Acetone	Z. 2-Hexanone	TT, 1,2-Dibromoethane	NNN. 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
G. Carbon disutfide	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachloroethane	000. 1,3,5-Trichlorobenzene	IIII. teobutyl 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. Ethylbenzane**	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-Trichlonoethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	рррр.
O. Carbon tetrachloride	II. 2-Chloroethyfvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	0000.
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
Q. 1,2-Dichloropropane**	KK. Trichlorofluoromethane	EEE. sec-Buty/benzene	YYY, tert-Butanol	SSSS.
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Buty/ alcohol	TTTT.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-isopropyltoluene	AAAA. Ethyl tert-butyl ether	ບນບບ.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	ww.

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

>	VALIDATION FINDINGS WORNSHEET	Initial Calibration
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r aye. ____ Reviewer:_ 2nd Reviewer:

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

SDG# So Corey .DC #: -1 -1 LI

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

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

Note that initial calibration meet the acceptance criteria?

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? $\frac{\Gamma^2 \geq 0}{2}$ $\frac{4}{9}$

	Qualifications	(1) A tu/[
	Associated Samples	120211 97
criteria or ≤30 %RSD and ≥0.05 KRF ?	Finding RRF (Limit: >0.05)	0000
اہ	Finding %RSD (Limit: <30.0%)	
KFs within the valida	Compound	NAN
Were all %RSDs and RRFs within the validation	Standard ID	16.41
M/A	Date	17 176
Z >	#	

#	Date	Standard ID	Compound	Finding %RSD (Limit: <30.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	69/81/6	ICAL	MNNN		0.028	12,02,11 9,7	J/45 A (C)
						172107-WMB	
						172/07-5MB	
						173080-MB	

TDC #: 21 441 [

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".

N N N X X

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?

	(3)	1	1		\Box				1	4				Z							
Qualifications	J-/43/A								>		J/MJ/A										
Associated Samples	1-3 5, 172602-NB			4 6, 8 10 172787-MB							11, 20 21, 172107- WAR	172107-SMB		7, 9, 173080-1115			,				
Finding RRF (Limit: >0.05)											0,029			0,027							
Finding %D (Limit: <25.0%)	29.7	/ ,		28,1	25,2	Ŋ	25,6	45.9													
Compound	(C-) 111			(-) 222	EFE C	ı	C-) MW	(-) 111			NNN			2222							
Standard ID	H 1211			H1236							C1047			06117							
Date	9/20/69	\		10/01/04			,				64/85/6		•	10/00/91							
*																					

LDC #: 2 [191 L] SDG #:

VALIDATION FINDINGS WORKSHEET <u>Blanks</u>

Page:

2nd Reviewer: Reviewer:_

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? X/N N/A

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: 9/28/6? N/N N/A

(aN)

4

Associated Samples:

Conc. units:

7 9 Sample Identification Sample Identification 9 Associated Samples (x++t) 2 500 172107-5 MB 173080-MB Blank ID Blank ID 23 Blank analysis date: 10 /02/04 Conc. units: NG /KM \mathbf{z} Z Compound Compound

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#	#
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LDC #:_	3DC #:

VALIDATION FINDINGS WORKSHEET Field Blanks

2nd Reviewer:_ Page:_ Reviewer:

(m)

1-5

Associated Samples:

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

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

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

Blank units: "9 / kg

Associated sample units: "9 / kg

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

Sample Identification Associated Samples: Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other. ng Acq Associated sample units:_ Blank ID 9/21/69 Blank ID20 5,3 Sampling Date. Blank units: 149 12 Compound

	Compound	F & 0 7 2 9 0 4	Blank-fo				Sample Identification		
	Samuling Date	7/29/69		7	8	4/			
<u> </u>	u_	5'8			1.7 7.3	3,7/4			
<u> </u>	11.	0,30				,			_

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Sample Identification					\warphi				
					JN				
	14	3.7/4			es ther				
	8	h/ L'8 h/ L'3			thers				
	7			1/63.0	C A11 0				
Blapk-to				0.50/W					-
Blank ID '	7/24 69	3,5	0,30	0,44					
Compound	Sampling Date	4	רת	3					
	establish	•		<u> </u>	 		-i	1	

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2/99	ď
.DC #:	SDG #:

VALIDATION FINDINGS WORKSHEET Field Blanks

Page of Y 2nd Reviewer: Reviewer:

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

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

Were target compounds detected in the field blanks?

Blank units: Mg /kg

Field blank Rinsate / Trip Blank / Other: Blank units:

Associated Samples:

15- 19

TB Sample Identification 5 S - Der others 0.57 /U /₩ F BO80304 SO Blank ID Blank ID 40/40/8 30 0 Sampling Date 9 Compound

Associated sample units: Blank units:

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

		1	T	$\overline{\Gamma}$	-	T	T		
ı									
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: Associated Samples:									
es:	ntification								
ited Samples	Sample Identification								
Associa									
Slank / Other									
Trip E									
/ Rinsate /	Blank ID								
Field Blank	Blank ID								
ircle one)		Sampling Date	-						
lank type: (ci	Compound	Sampl							
Field b									·

SDG #: Sec Gran LDC #: 21411

VALIDATION FINDINGS WORKSHEET Surrogate Spikes

(Jo 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 | Were all surrogate %R within QC limits?
| Y | N/A | Were all surrogate %R within QC limits?
| Y | N/A | Were all surrogate %R within QC limits?
| Y | N/A | Were all surrogate %R within QC limits?

	T / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 /													
%Bacovery (Limits)	67 (70-130)			()					(()	())	()	
Surrogata	DFM													
Data Sample ID	1/													
*			1											

QC Limits (Soil) 81-117 74-121 80-120 80-120 SMC1 (TOL) = Toluene-48
SMC2 (BFB) = Bromofluorobenzene
SMC3 (DCE) = 1,2-Dichloroethane-44
SMC4 (DFM) = Dibromofluoromethane

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

LDC# 2/99/ LJ SDG #:

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

of Page: Reviewer: 2nd Reviewer:

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

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

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

	7		—					>	r	—				,,,,,,, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,										
Qualifications								\																
Associated Samples	9 172989-1MB							7																
Associate	11. 13-19	() [) [) () [() [) [) [()											
RPD (Limits)))))))))))))))	()	((()	(()	(())
LCSD %R (Limits)	74 (75-125)	7) () //	72 ()	() 89	74 ()	() 57	() 72	10 1 10	())	()	()	()	()	()	()	()	()	()	()	()	()	()	
LCS %R (Limits)	()	()	()	()	()	()	()		()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	
Compound	nn	I	XX	mm	22	71	himy	222																
TCS/FCSD ID	9/5M-68peL1																							
Date																								
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VALIDATION FINDINGS WORKSHEE! Compound Quantitation and CRQLs

rage: Reviewer:

2nd Reviewer:

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

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

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

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

**	Date	Sample ID	Finding	Associated Samples	Qualifications
		\ \forall \ \gamma \ \gamma \ \gamma \ \ \ \ \ \ \ \ \ \ \ \ \qqq \qqq \qqq \qqq \qqq \qqq \qqq \qqq \qqq \q	NNN KKK > CA	ra	J Mets (A) (E)
		8			
Somm	nents: See	Somments: See sample calculation verification worksheet for recalculations	sheet for recalculations		

LDC #: 24 (49) L)
SDG #: 54 (4~)

VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page: of Deviewer: DVC

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?

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	#	Date		Finaing	Associated Samples	- 11	
			8 9	NNN KKK > CA	rongo	∀ ×	(%)
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LDC#: 21991L1a SDG#:See cover

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:	\ of <u> </u>
Reviewer:	JV6
2nd Reviewer:	

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

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

Compound Name	Conc (ug/Kg)	RPD	Diff	Diff Limits	Quals
Compound Name	3	4	RPD (≤50%)	Dill		(Parent Only)
2-Butanone	3.5	2.4		1.1	≤ 14	-
Chloroform	38	18		20	≤7.2	Jdets/A (fd)
Toluene	1.2	1.0		0.2	≤7.2	-

Compound Name	Conc (ug/Kg)	RPD	Diff	Diff Limits	Quals
Compound Name	6	8	(≤ 50%)	Dill	DITEIRES	(Parent Only)
1,2,3-Trichlorobenzene	490	650	28			-
1,2,4-Trichlorobenzene	920	1500	48			-
1,2-Dichlorobenzene	10	33		23	≤6.2	Jdets/A (fd)
1,3-Dichlorobenzene	4.9	17		12.1	≤6.2	Jdets/A (fd)
1,4-Dichlorobenzene	12	38		26	≤6.2	Jdets/A (fd)
2-Butanone	11U	1.7		9.3	≤11	-
2-Chlorotoluene	5.3U	1.9		3.4	≤ 5.3	-
2-Hexanone	1.8	12U		10.2	≤12	-
Acetone	21U	6.7		14.3	≤21	-
Chlorobenzene	5.6	10		4.4	6.2	-
Chloroform	4.8	3.7		1.1	× 6.2	-
Hexachlorobutadiene	30	90	100			Jdets/A (fd)
Toluene	5.3U	5.6		0.3	≤ 5.3	-
Trichloroethene	0.44	6.2U		5.76	≤6.2	

Compound Name	Conc (ıg/Kg)	RPD Diff		Diff Limits	Quals
Compound Name	7	9	(≤ 50%)	Dill	Dill Emilis	(Parent Only)
1,2,3-Trichlorobenzene	6900	22000	104			Jdets/A (fd)
1,2,4-Trichlorobenzene	12000	39000	106			Jdets/A (fd)
1,2-Dichlorobenzene	88	260		172	< 6.2	Jdets/A (fd)

LDC#: 21991L1a SDG#:See cover

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	γ _{of} γ
Reviewer:	579
2nd Reviewer:	

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

Y N NA Were field duplicate pairs identified in this SDG?

Y N NA Were target analytes detected in the field duplicate pairs?

Compound Name	Conc (ug/Kg)	RPD	Diff	Diff Limits	Quals
Compound Name	7	9	(≤50%)	Diii	Dill Lilling	(Parent Only)
1,4-Dichlorobenzene	130	400		270	≤ 1300	-
2-Butanone	200	590		390	≤ 2600	- ,
Chloroform	290	2000		1710	≤ 1300	Jdets/A (fd)
Hexachlorobutadiene	930	3000		2070	≤1300	Jdets/A (fd)
Tetrachloroethene	550U	220		330	≤ 550	-
Toluene	550U	150		400	≤ 550	-

V:\FIELD DUPLICATES\21991L1a.wpd

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date: September 24 through September 25, 2009

LDC Report Date: December 6, 2009

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905464

Sample Identification

SA121-25BRE SA205-0.5B SA121-44B SA205-10B SA208-0.5B SA205-25B SA205-41B SA208-7B TB092509-SO1 SA84-0.5B TB092509-SO2 SA84-10B SA84009-10B TB092509-SO3 SA101-0.5BMS SA84-25B SA101-0.5BMSD SA84-43B

TB092409-SO1 EB092509-SO1A2 EB092509-SO2A4

SA101-0.5B SA101-10B SA101-25B SA101-42B SA121-0.5B SA121009-0.5B SA121-10B SA121-25B

Introduction

This data review covers 23 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^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
9/18/09	2-Methyl-2-propanol	0.028 (≤0.05)	All water samples in SDG R0905464	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
10/5/09 (C1217)	Acetone 2-Butanone	25.3 26.9	TB092409-SO1 EB092509-SO1A2 EB092509-SO2A4 TB092509-SO1 173360-MB	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	А
10/4/09	Acetone	28.7	SA205-0.5B SA205-10B SA205-25B 173191-MB	J- (all detects) UJ (all non-detects)	А
10/5/09 (H1369)	Acetone	35.5	SA205-41B SA84-0.5B SA84-10B SA84009-10B SA84-25B SA84-43B SA101-0.5B SA101-10B SA101-25B SA101-42B SA121-0.5B SA101-0.5BMS SA101-0.5BMSD 173307-MB	J+ (all detects)	A
10/5/09 (H1369)	1,2,3-Trichloropropane tert-Butylbenzene 1,2-Dibromo-3-chloropropane Hexachlorobutadiene Naphthalene	25.6 27.3 28.7 33.8 27.1	SA205-41B SA84-0.5B SA84-10B SA84009-10B SA84-25B SA84-43B SA101-0.5B SA101-10B SA101-25B SA101-42B SA121-0.5B SA101-0.5BMS SA101-0.5BMS	J- (all detects) UJ (all non-detects)	A
10/6/09	Hexachlorobutadiene	35.2	SA121009-0.5B SA121-10B SA121-25B SA121-44B SA208-0.5B SA208-7B 173430-MB	J- (all detects) UJ (all non-detects)	A
10/9/09	Hexachlorobutadiene	31.6	SA121-25BRE 174051-MB	J- (all detects) UJ (all non-detects)	Α

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
10/2/09	2-Methyl-2-propanol	0.027 (≥0.05)	TB092509-SO2 TB092509-SO3 173080-MB	J (all detects) UJ (all non-detects)	A
10/5/09 (C1217)	2-Methyl-2-propanol	0.024 (≥0.05)	TB092409-SO1 EB092509-SO1A2 EB092509-SO2A4 TB092509-SO1 173360-MB	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
174051-MB	10/9/09	Dichloromethane	1.6 ug/Kg	SA121-25BRE

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
SA121-25BRE	Dichloromethane	1.8 ug/Kg	1.8U ug/Kg

Samples TB092409-SO1, TB092509-SO1, TB092509-SO2, and TB092509-SO3 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
TB092409-SO1	9/24/09	Acetone	1.7 ug/L	SA205-0.5B SA205-10B SA205-25B SA205-41B SA84-0.5B SA84-10B SA84009-10B SA84-25B SA84-43B

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
TB092509-SO1	9/25/09	Bromoform Dibromochloromethane	3.4 ug/L 1.6 ug/L	EB092509-SO2A4 SA101-0.5B SA101-10B SA101-25B SA101-42B SA121-0.5B SA121-0.5B SA121-0.5B SA121-10B SA121-25B SA121-25B SA121-25B SA121-25B SA121-44B
TB092509-SO3	9/25/09	Bromoform	0.32 ug/L	EB092509-SO2A4 SA101-0.5B SA101-10B SA101-25B SA101-42B SA121-0.5B SA121-0.5B SA121-10B SA121-10B SA121-25B SA121-25B SA121-25B SA121-44B

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

Sample	Compound	Reported Concentration	Modified Final Concentration
SA205-25B	Acetone	3.2 ug/Kg	3.2U ug/Kg

Samples EB092509-SO1A2 and EB092509-SO2A4 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
EB092509-SO1A2	9/25/09	Acetone Chloroform	3.7 ug/L 0.26 ug/L	SA208-0.5B SA208-7B

Equipment Blank ID	Sampling Date	Compound	Concentration	Associated Samples
EB092509-SO2A4	9/25/09	Acetone Chloroform	4.3 ug/L 0.23 ug/L	SA205-0.5B SA205-10B SA205-25B SA205-41B SA84-0.5B SA84-0.5B SA84-10B SA84-25B SA84-25B SA84-25B SA101-0.5B SA101-0.5B SA101-25B SA101-25B SA121-0.5B SA121-0.5B SA121-0.5B SA121-0.5B SA121-0.5B SA121-0.5B

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

Sample	Compound	Reported Concentration	Modified Final Concentration
SA208-7B	Acetone	6.6 ug/Kg	6.6U ug/Kg
SA205-0.5B	Acetone	5.1 ug/Kg	5.1U ug/Kg
SA205-25B	Acetone	3.2 ug/Kg	3.2U ug/Kg
SA205-41B	Acetone	7.3 ug/Kg	7.3U ug/Kg
SA84-0.5B	Acetone	6.8 ug/Kg	6.8U ug/Kg
SA84-25B	Acetone	4.4 ug/Kg	4.4U ug/Kg
SA101-0.5B	Acetone	4.7 ug/Kg	4.7U ug/Kg
SA101-42B	Acetone	3.3 ug/Kg	3.3U ug/Kg
SA121009-0.5B	Acetone	8.3 ug/Kg	8.3U ug/Kg

Samples FB072909-SO (from SDG R0904226) and FB080309-SO (from SDG R0904279) were identified as field blanks. No volatile contaminants were found in these blanks with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072909-SO	7/29/09	Acetone Dichloromethane Toluene	3.5 ug/L 0.30 ug/L 0.44 ug/L	SA208-0.5B SA208-7B
FB080309-SO	8/3/09	Acetone Toluene	2.1 ug/L 0.30 ug/L	SA205-0.5B SA205-10B SA205-25B SA205-41B SA84-0.5B SA84-10B SA84-09-10B SA84-25B SA84-43B SA101-0.5B SA101-10B SA101-25B SA101-25B SA121-0.5B SA121-0.5B SA121-0.5B SA121-0.5B SA121-0.5B

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
SA208-7B	Acetone Toluene	6.6 ug/Kg 0.40 ug/Kg	6.6U ug/Kg 0.40U ug/Kg
SA205-0.5B	Toluene	0.38 ug/Kg	0.38U ug/Kg
SA205-25B	Acetone	3.2 ug/Kg	3.2U ug/Kg
SA84-25B	Acetone	4.4 ug/Kg	4.4U ug/Kg
SA101-0.5B	Acetone	4.7 ug/Kg	4.7U ug/Kg
SA101-42B	Acetone	3.3 ug/Kg	3.3U ug/Kg
SA121-0.5B	Toluene	0.57 ug/Kg	0.57U ug/Kg
SA121-44B	Toluene	0.56 ug/Kg	0.56U 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
SA121-25B	Bromofluorobenzene	63 (70-130)	All TCL compounds	J- (all detects) UJ (all non-detects)	A
SA121-25BRE	Bromofluorobenzene	65 (70-130)	All TCL compounds	J- (all detects) UJ (all non-detects)	Α

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
SA101-0.5BMS/MSD (SA101-0.5B)	Hexachlorobutadiene	38 (70-130)	40 (70-130)	-	J- (all detects) UJ (all non-detects)	А

VIII. Laboratory Control Samples (LCS)

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

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
173191-LCS	1,2,3-Trichloropropane 1,2-Dibromo-3-chloropropane Hexachlorobutadiene tert-Butylbenzene	70 (75-125) 62 (75-125) 65 (75-125) 74 (75-125)	SA205-0.5B SA205-10B SA205-25B 173191-MB	J- (all detects) UJ (all non-detects)	Р
173360-LCS	Isopropylbenzene	126 (75-125)	TB092409-SO1 EB092509-SO1A2 EB092509-SO2A4 TB092509-SO1 173360-MB	J+ (all detects)	Р

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
173307-LCS	Hexachlorobutadiene	62 (75-125)	SA205-41B SA84-0.5B SA84-0.5B SA84-009-10B SA84-25B SA84-43B SA101-0.5B SA101-10B SA101-25B SA101-42B SA121-0.5B 173307-MB	J- (all detects) UJ (all non-detects)	Р
174051-LCS	Acetone	139 (75-125)	SA121-25BRE 174051-MB	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
SA121-25B	Pentafluorobenzene	103752 (258285-1033140)	Chloromethane Bromomethane Vinyl chloride Chloroethane Dichloromethane Acetone 1,1-Dichloroethene 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 Ethyl-tert-butyl ether tert-Amyl-methyl ether 2-Methyl-2-propanol	J (all detects) R (all non-detects)	A

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
SA121-25B	1,4-Dichlorobenzene-d4	125113 (205219-820874)	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 sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	A

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
SA121-25BRE	Pentafluorobenzene 1,4-Dichlorobenzene-d4	147116 (236617-946466) 144505 (188329-753316)	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 2-Methyl-2-propanol 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Bromobenzene 1,2,3-Trichloropropane 1,2,3-Trichloropropane 1,2,4-Trimethylbenzene 4-Chlorotoluene tert-Butylbenzene 1,2,4-Trimethylbenzene 1,2-Dichlorobenzene 1,4-Dichlorobenzene 1,2-Dichlorobenzene 1,2-Tichlorobenzene 1,2-Trichlorobenzene 1,2-Trichlorobenzene 1,2-Trichlorobenzene 1,2-Trichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	A

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0905464	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

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
SA121-25B	All TCL compounds	×	Α

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

XVI. Field Duplicates

Samples SA84-10B and SA84009-10B and samples SA121-0.5B and SA121009-0.5B were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concentrat	ion (ug/Kg)	DDD	D:#		
Compound	SA84-10B	SA84009-10B	RPD (Limits)	Difference (Limits)	Flags	A or P
2-Butanone	12U	1.5	-	10.5 (≤12)	-	-

	Concentral	tion (ug/Kg)	555	D.W		
Compound	SA101-42B	SA121-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P
2-Butanone	0.91	1.6	-	0.69 (≤11)	-	-
Dichloromethane	0.34	5.6U	-	5.26 (≤5.6)	-	-
Toluene	0.57	0.66	-	0.09 (≤5.6)	-	
Acetone	18U	8.3	-	9.7 (≤18)	•	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Data Qualification Summary - SDG R0905464

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905464	TB092409-SO1 EB092509-SO1A2 EB092509-SO2A4 TB092509-SO1 TB092509-SO2 TB092509-SO3	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Initial calibration (RRF)
R0905464	TB092409-SO1 EB092509-SO1A2 EB092509-SO2A4 TB092509-SO1	Acetone 2-Butanone	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	А	Continuing calibration (%D) (c)
R0905464	SA205-0.5B SA205-10B SA205-25B	Acetone	J- (all detects) UJ (all non-detects)	А	Continuing calibration (%D) (c)
R0905464	SA205-41B SA84-0.5B SA84-10B SA84009-10B SA84-25B SA84-43B SA101-0.5B SA101-10B SA101-25B SA101-42B SA121-0.5B	Acetone	J+ (all detects)	А	Continuing calibration (%D) (c)
R0905464	SA205-41B SA84-0.5B SA84-10B SA84009-10B SA84-25B SA84-43B SA101-0.5B SA101-10B SA101-25B SA101-42B SA121-0.5B	1,2,3-Trichloropropane tert-Butylbenzene 1,2-Dibromo-3-chloropropane Hexachlorobutadiene Naphthalene	J- (all detects) UJ (all non-detects)	А	Continuing calibration (%D) (c)
R0905464	SA121009-0.5B SA121-10B SA121-25B SA121-44B SA208-0.5B SA208-7B SA121-25BRE	Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	A	Continuing calibration (%D) (c)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905464	TB092409-SO1 EB092509-SO1A2 EB092509-SO2A4 TB092509-SO1 TB092509-SO2 TB092509-SO3	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Continuing calibration (RRF) (c)
R0905464	SA121-25B SA121-25BRE	All TCL compounds	J- (all detects) UJ (all non-detects)	А	Surrogate spikes (%R) (s)
R0905464	SA101-0.5B	Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	Α	Matrix spike/Matrix spike duplicates (%R) (m)
R0905464	SA205-0.5B SA205-10B SA205-25B	1,2,3-Trichloropropane 1,2-Dibromo-3-chloropropane Hexachlorobutadiene tert-Butylbenzene	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0905464	TB092409-SO1 EB092509-SO1A2 EB092509-SO2A4 TB092509-SO1	Isopropylbenzene	J+ (all detects)	Р	Laboratory control samples (%R) (I)
R0905464	SA205-41B SA84-0.5B SA84-10B SA84009-10B SA84-25B SA84-43B SA101-0.5B SA101-10B SA101-25B SA101-42B SA121-0.5B	Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0905464	SA121-25BRE	Acetone	J+ (all detects)	Р	Laboratory control samples (%R) (l)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905464	SA121-25B	Chloromethane Bromomethane Vinyl chloride Chloroethane Dichloromethane Acetone 1,1-Dichloroethane Chloroform 2-Butanone 1,1,1-Trichloroethane Dichlorodifluoromethane Trichlorofluoromethane Trichlorofluoromethane 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) R (all non-detects)	A	Internal standards (area) (i)
R0905464	SA121-25B	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 sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	Α	Internal standards (area) (i)

	Compound	Flag	A or P	Reason (Code)
R0905464 SA121-25BRE	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 Di-isopropyl ether Ethyl-tert-butyl ether 2-Methyl-2-propanol 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 1,2-Dichlorobenzene 1,2-Dichlorobenzene 1,2-Dichlorobenzene 1,2-Tethorobenzene 1,2-Tethorobenzene 1,2-Trichlorobenzene 1,2-Trichlorobenzene 1,2-Trichlorobenzene 1,2-Trichlorobenzene 1,2-Trichlorobenzene 1,2-Trichlorobenzene	J (all detects) UJ (all non-detects)	A or P	Reason (Code) Internal standards (area) (i)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905464	SA205-0.5B SA205-10B SA205-25B SA205-41B SA84-0.5B SA84-10B SA84-09-10B SA84-25B SA84-25B SA84-43B TB092409-SO1 EB092509-SO2A4 SA101-0.5B SA101-10B SA101-25B SA101-25B SA121-0.5B SA121-0.5B SA121-25B SA121-25B SA121-25B SA121-25B SA121-25B SA121-25B SA121-25B SA121-25B SA121-25B SA121-25B SA121-25B SA121-25B SA121-25B SA121-25B SA121-25B SA121-30B S	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0905464	SA121-25B	All TCL compounds	х	A	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Laboratory Blank Data Qualification Summary - SDG R0905464

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905464	SA121-25BRE	Dichloromethane	1.8U ug/Kg	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Trip Blank Data Qualification Summary - SDG R0905464

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905464	SA205-25B	Acetone	3.2U ug/Kg	Α	bt

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Equipment Blank Data Qualification Summary - SDG R0905464

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905464	SA208-7B	Acetone	6.6U ug/Kg	Α	be
R0905464	SA205-0.5B	Acetone	5.1U ug/Kg	Α	be
R0905464	SA205-25B	Acetone	3.2U ug/Kg	Α	be
R0905464	SA205-41B	Acetone	7.3U ug/Kg	А	be
R0905464	SA84-0.5B	Acetone	6.8U ug/Kg	А	be
R0905464	SA84-25B	Acetone	4.4U ug/Kg	Α	be
R0905464	SA101-0.5B	Acetone	4.7U ug/Kg	А	be
R0905464	SA101-42B	Acetone	3.3U ug/Kg	Α	be
R0905464	SA121009-0.5B	Acetone	8.3U ug/Kg	А	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Field Blank Data Qualification Summary - SDG R0905464

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905464	SA208-7B	Acetone Toluene	6.6U ug/Kg 0.40U ug/Kg	А	bf
R0905464	SA205-0.5B	Toluene	0.38U ug/Kg	А	bf
R0905464	SA205-25B	Acetone	3.2U ug/Kg	А	bf
R0905464	SA84-25B	Acetone	4.4U ug/Kg	А	bf
R0905464	SA101-0.5B	Acetone	4.7U ug/Kg	А	bf
R0905464	SA101-42B	Acetone	3.3U ug/Kg	А	bf
R0905464	SA121-0.5B	Toluene	0.57U ug/Kg	Α	bf

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905464	SA121-44B	Toluene	0.56U ug/Kg	Α	bf

Tronox Northgate Henderson

LDC #:	21991N1	VALIDATION COMPLETENESS WORKSHEET
SDG#:_	R0905464	Stage 2B
Laborato	ry: Columbia Analytica	al Services

Date: 13/62/0	9
Page: _of	
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		Commen	ts
l.	Technical holding times	A	Sampling dates: 9/24 - 25 /09	
II.	GC/MS Instrument performance check	. A		
111.	Initial calibration	ZW	2 KSD m	
IV.	Continuing calibration/ICV	ZW.	COV = 25 b	
V.	Blanks	SM		
VI.	Surrogate spikes	SW		
VII.	Matrix spike/Matrix spike duplicates	SW		
VIII.	Laboratory control samples	SW	LCS	
IX.	Regional Quality Assurance and Quality Control	N		
Χ.	Internal standards	WZ		
XI.	Target compound identification	N		
XII.	Compound quantitation/CRQLs	2		
XIII.	Tentatively identified compounds (TICs)	N		
XIV.	System performance	N		
XV.	Overall assessment of data	SM		
XVI.	Field duplicates	SW	$D_1 = 6.7$ $D_2 :$	= 17,18
XVII.	Field blanks	SW)	$V_1 = 6.7$ $V_2 = 10.25,26.27$ $EB = 11.25$,12 FB = FB072909-50 (M.

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

Validat	ted Samples:	soil	+ l	Vater							
1 2	SA205-0.5B	2	11 3	EB092509-SO1A2	W	21	SA121-25BDL RF	S	31	173080-MB	(1910)
2	SA205-10B		12	EB092509-SO2A4		22 22	SA121-44B		32 Y	[7319]-	9453)
3 2	SA205-25B		13	SA101-0.5B	S	23 \$	SA208-0.5B		- 33 3	173360-	(14 60)
4	SA205-41B		14	SA101-10B		24 24	SA208-7B		34 4	173307-	9500)
5 f	SA84-0.5B		15 4	SA101-25B		+ 3 25	TB092509-SO1	W	- 35 5	173430-	15397
6	SA84-10B <i>D</i> ,		16	SA101-42B		26	TB092509-SO2	1	366	174051-	(827)
7 7	SA84009-10B D	,	17	SA121-0.5B		57 1	TB092509-SO3		37		
8 4	SA84-25B		18 18	SA121009-0.5B D _Y		28 4	SA101-0.5BMS	ς	38		
9 *	SA84-43B		19	SA121-10B		29	SA101-0.5BMSD		39		
10 3	TB092409-SO1	W	20 20	SA121-25B	V	30			40	· · ·	

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

A Chlomethane*	U. 1.1.2-Trichloroethane	OO. 2.2-Dichloropropane	W. n.Butubonzene	CCCC.1-Chlorohexane
B. Bromomethane	V. Benzene	PP. Bromochloromethane	J.J. 1,2-Denomberizor®	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. Hexachforbutedoes	FFFF, Acrolein
E. Methylene Chonde	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MAMA. Nephitoleng	GGGG. Acrycontrile
F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN. 1,2,3-Trichlendennage	HHHH. 1,4-Dioxane
G. Carbon disulfide	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachloroethane	000. 1,3,5-Trichlorobenzene	IIII. 1sobutyl alcohol
H. 1,1-Dichloroethene**	86: 1,1,2,2 Tetralchioroethane	W. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
I. 1,1-Dichloroethane*	CC. Toluena**	WW: Bransbergere	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
J. 1,2-Dichloroethene, total	DD. Chlorobenzene*	XX 1.2.3-Trichlaropropage	RRR. m.p-Xylenes	LLLL. Ethyl ether
K. Chloroform**	EE. Ethylbenzane**	Yis wentyberzene	SSS. o-Xylene	MMMM. Benzyl chloride
L. 1,2-Dichloroethane	FF. Styrene	ZZ. Schlantokenę	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN. 2-Methyl-2-propanol
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5.Fismelly/benzene	UUU. 1,2-Dichlorotetrafluoroethane	0000.
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. Adhterotatione	VVV. 4-Ethyltoluene	рррр.
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	GEST COMPLYABORISONS	WWW. Ethanol	0000 .
P. Bromodichioromethane	JJ. Dichlorodifluoromethane	DBB: 4,8,4-Trimethylbenzese	XXX. Di-isopropyl ether	RRRR.
Q. 1,2-Dichloropropane**	KK. Trichlorofluoromethane	EEE weethyberzens »	YYY. tert-Butanol	SSSS.
R. da-1,3-Dichloropropene	LL. Methy-tert-butyf ether	FPP. sparacherocenzent	ZZZ. tert-Butyl alcohol	TITT.
S. Trichloroethene	MM. 1,2-Dibremo-Gefforoproperfe	GGO:sprincepytokana.	AAAA. Ethyl tert-butyl ether	ບບບບ.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHM: 1,4-Statemate nzene	BBBB. tert-Amyl methyl ether	ww.

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

PFB

4 DCB

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DC #: "	DG#:

;DG #:

VALIDATION FINDINGS WORNSHEET **Initial Calibration**



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

Hease 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? $\frac{\Gamma^2 - 20}{10}$.

Did the initial calibration meet the acceptance criteria?

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		5/45/A																		
	Associated Samples	All water + 172080-MB	173360-MB																	
\SD and ≥0.05 RRF?	Finding RRF (Limit: >0.05)	0.028																		
on criteria of ≤30 %F	Finding %RSD (Limit: <30.0%)																			
Res within the validati	Compound	77 72																		
Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF?	Standard ID	ICA1																		
Y N'NA V	<u>و</u>	9/18/6	1 / 2 / 2 / 2																	
×	*	:		1		_	. 1	\perp	1_	<u> </u>	_		_	 <u></u>	<u> </u>	_	 <u> </u>		<u>L</u>	1

LDC #: 21491 N) SDG #:

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 ?

Were all %D and RRFs within the validation criteria of <25 %D and >0.05 RRF?

N N N X/N N/A

*	Date	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications	
	10/5/06	1 190	N N N		0.027	PM-080671 72 35	3/NJ A (C.	
	1 2/2/2					l		
	10/65/69	C 1217	(S) 4	25.3		10-12,25 173360-118	18 J-145A	
	,,,,,,		Z (Z)	6.92			ſ	
			マススこ		0,024	_	J/113 A	
								I
				7				
	10/04/09	H1330	F (-)	28,2		1-3 173191-M&	J-/45 A	1
								I
								I
	10/05/01	41369	(+) ¥	5'58		4-9 13-17 28 29.	3+ 10ts A	\Box
			(-) XX	9:52		172307 - MB	J-145A	
			(3000	27,3				\Box
	,		(-) WW	28.7				I
<u> </u>			(-) 111	33.X				
			C-J MWW	1.7.				
								Ţ
	•						ı	1
	10/06/09	H 1403	(-) 717	35,2		18-20 22-24	コーカコイ	7
						173420-MB		耳
								7
	·			Ī		ı		Ţ
	10/09/01	H 1504	(5) 777	21.0		21 174051-MB	J-/12/7	7
								T

LDC #: 2141 N)

SDG #:

VALIDATION FINDINGS WORKSHEET

Blanks

Reviewer:_ 2nd Reviewer.

_
8260B
Method
846
S
(EPA
VOA
GC/MS
ETHOD:

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? Y N/A

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

Blank analysis date:_ V N N/A

Conc. units:

7 Associated Samples:

	=		,	_	_	, : -	 	 -
ration	cation							
Sample Identification	ample Identili							
U.								
			;					
		/د	1.8/y					
Blank ID		174051-MB	1.6				:	
punc			m					
Compound								

Blank analysis date: Conc. units:

Associated Samples:

		1	T -	 1	T-	T	-	1	_
									-
	n.								
	Sample Identification								
	San								
Associated Samples.									
Asso									
	Blank ID								
	Compound								

LDC #: 2/991 N)

VALIDATION FINDINGS WORKSHEET

Field Blanks

Page: 1 of 3 Reviewer: 176 2nd Reviewer:__

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Associated Samples:

Sample Identification			s either No 17 2 TB)				"9 /kg $^{\prime\prime}$ Associated Samples: $(2-32)$						
		h/	7				; "3/kg pk/ Other:		4				
Blank ID	3	M/2,8	(All others				ug / L ole units: / Rinsate (Trip Bla	Blank ID 27		0.92			
Blank ID 10	9/24/69	1.7					Associated sample units: e one) Field Blank / Rinsate	Blank ID 25	4/25/64-	3.4	- 6		
Compound	Sampling Date	4					Blank units: 4 Associated sample units: Field blank type: (circle one) Field Blank / Rinsate (Trip Blank) Other:	Compound	Sampling Date	×	\		

LDC # 21 591 N) SDG #:__

VALIDATION FINDINGS WORKSHEET

Field Blanks

Page: Yof 3 Reviewer: W 2nd Reviewer:_

> Associated Samples: t B More target compounds detected in the field blanks?
>
> Associated sample units: 45 / kg
>
> Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other. METHOD: GC/MS VOA (EPA SW 846 Method 8260B)
>
> Y N /N/A Were field blanks identified in this SDG? Y N /N/A

44

23

	Compound	Blank ID 11	Blank ID				Sample Id	Sample Identification			
	Sampling Date	9/25/09		24							
+	4	3,7		6.6/4							
7	¥	0.26		,							
			3	CAIl others	either	either No nr >	FB)				
						į					
	Blank units: $40/L$ Associated sample units: $45/E_S$ Field Blank / Rinsate / Trip Blank / Other: EB	ociated samp) Field Blank	ole units: M./	5 /كرم rip Blank / Oth	ier. EB	Assoc	Associated Samples:_	1 1	1-9 13-22	9)	(be)
	Compound	Riant ID 12	\				in the state of	9			

ſ	_	_			 		 	·	,
		1.8	8.3/4						
		16	3,3/4						
	entification	(3	47/4						
	Sample Identification	8	4,2/4 4,2/4 3,3/4 8,3/4						
		S	h/8.9		7 53				
		4	4/8.9 WET W		with No m > EB)				
		3	3,2/4						
	Blankto)	5,1/4	-	(All others				-
	Blank ID 12	9/25/09	4.3	0,23					
	Compound	Sampling Date 9/25/69	1	K					
_			19						

2199181	7
FDC #:	SDG #:

VALIDATION FINDINGS WORKSHEET Field Blanks

Reviewer: T/C Page: 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?

Blank units:

Associated sample units:

Associated sample units:

Field blank type: (circle one) field Blank | Other:

23,24

щ	Field blank type: (circle one) Field Blank/ Rinsate / Trip Blank	Field Blank	y Rinsate / Tr	ip Blank / Other:	ner:	Assoc	Associated Samples:		, ,	-	
	Compound	FS072909-10 Blank ID Blank ID	o Blank ID				Sample Id	Sample Identification			
لتنسب	Sampling Date.	7/29/69		24							
<u> </u>	4	3,5		6.6 /y							
	tt.	0.30									
~	22	0,44		W.40/V							
			CAII	e there	either	ND or	> FB)				
						:					
	Blank units: Mg/L Assone Field blank type: (circle one	Associated sample units: e one)(Field Blank) Rinsate	ple units: "V	سم الحج Trip Blank / Otl	ner:	Assoc	Associated Samples:	1-9,	13-22	(<i>t</i> 9)	
<u> </u>	Compound FA 08 03 04 - SO Blank ID Blank ID	FA 08 03 04-5 Blank ID	0 Blapk-to				Sample Id	Sample Identification			
	Sampling Date	6/63/8		3	8	13	91	17	22		
٦.	11_	2.1		3.2/4	4.4 /4	4.7/4	3.3/4				
ی	. 35	0,30	h/ 8¢'a					0,57 /y	P. 52/4		
•											
		!	·								
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SDG #: CA CAN LDC #: 31 491 N

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". XANANA. Were all surrogate %R within QC limits?

N/A

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

# Data Sample ID	Surrogate			
30	019	SIGN TO SE	1	Qualifications
	ATB	63 (70	(70-130)	1-121 A12-1
)	^	
*	_	, S Ø		1
)	^	
			î	
)	ì	
			(
)	-	
		,		
			-	
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SMC1 (TOL) = Toluene-d8 SMC2 (BFB) = Bromofluorobenzene SMC3 (DCE) = 1,2-Dichloroethane-d4 SMC4 (DFM) = Dibromofluoromethane

QC Limits (Water)

81-117 74-121 80-120 80-120

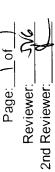
QC Limits (Soil)

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

SIID 1CB

See Cont 21991 NJ LDC #:_ SDG #:

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates



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".

You may be 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? N N/A

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

F	-				L	10-00	_			
#	Date	MS/MSD ID	Compound	MS %R (Limits)		MSD %R (Limits)		RPD (Limits)	Associated Samples	Qualifications
		28/29	li l	compounds	name	ľ		RPD ()	3	No gual
			\sim	ontride limits b	but e		dsW/	or LCS in		<i>5</i>
					attagded	d sammary	(m	()		
			717	38 (70-130	(01	40 (20-130)	(a.	()	_	5-Ms A (m)
)	^)	<u> </u>	()		
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) [)		()		
		Compound	puno	Ö	QC Limits (Soil)	(Soil)		RPD (Soil)	QC Limits (Water)	RPD (Water)
	I	1,1-Dichloroethene			59-172%	%		< 22%	61-145%	< 14%
Ç	S.	Trichloroethene			62-137%	%		< 24%	71-120%	< 14%
1	V.	Benzene			66-142%	%		< 21%	76-127%	< 11%
Ö	CC.	Toluene			59-139%	%		< 21%	76-125%	< 13%
٥	DD.	Chlorobenzene	į		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: R0905464
Date Collected: 9/25/09
Date Received: 9/26/09

Date Analyzed: 10/5/09 - 10/6/09

Matrix Spike Summary Volatile Organic Compounds by GC/MS

Sample Name:

SA101-0.5B

Lab Code:

R0905464-013

Units: µg/Kg Basis: Dry

Analytical Method: 8260B

	Sample		Tatrix Spike Q0909500-0:				ate Matrix Q0909500-0			% Rec		RPD
Analyte Name	Result	Result	Amount	% Rec	:	Result	Amount	% Re	С	Limits	RPD	Limit
1,1,2-Tetrachloroethane	ND	39.3	55.9	70		38.7	55.9	69	4	* 70 - 130	1	30
1,1,1-Trichloroethane (TCA)	ND	52.2	55.9	94		50.6	55.9	91		70 - 130	3	30
1,1,2,2-Tetrachloroethane	ND	40.2	55.9	72		39.6	55.9	71		70 - 130	1	30
1,1,2-Trichloroethane	ND	43.4	55.9	78		44.0	55.9	79		70 - 130	1	30
1,1-Dichloroethane (1,1-DCA)	ND	49.4	55.9	88		48.9	55.9 '	88		70 - 130	ì	30
1,1-Dichloroethene (1,1-DCE)	ND	47.0	55.9	84		44.6	55.9	80		70 - 130	5	30
1,1-Dichloropropene	ND	46.0	55.9	82		47.1	55.9	84		70 - 130	2	30
1,2,3-Trichlorobenzene	ND	28.5	55.9	51	*	30.4	55.9	54	*	70 - 130	7	30
1,2,3-Trichloropropane	ND	38.5	55.9	69	*	40.4	55.9	72		70 - 130	5	30
1,2,4-Trichlorobenzene	ND	27.9	55.9	50	*	30.0	55.9	54	*	70 - 130	7	30
1,2,4-Trimethylbenzene	ND	30.2	55.9	54	*	31.1	55,9	56		70 - 130	3	30
1,2-Dibromo-3-chloropropane (DBC	ND	38.2	55.9	68		38.9	55.9	70		50 - 150	2	30
1,2-Dibromoethane	ND	43.6	55.9	78		43.0	55.9	77		70 - 130	1	30
1,2-Dichlorobenzene	ND	32.1	55.9	58	*	34,4	55.9	62	*	70 - 130	7	30
1,2-Dichloroethane	ND	47.7	55.9	85		48.0	55.9	86		70 - 130	i	30
1,2-Dichloropropane	ND	46.9	55.9	84		48.1	55.9	86		70 - 130	2	30
1,3,5-Trimethylbenzene	ND	30.3	55.9	54	*	31.3	55.9	56	*	70 - 130	3	30
1,3-Dichlorobenzene	ND	30.5	55.9	55	*	31.8	55.9	57		70 - 130	4	30
1,3-Dichloropropane	ND	42.9	55.9	77		43.9	55.9	79		70 - 130	2	30
1,4-Dichlorobenzene	ND	31.4	55.9	56	*	32.3	55.9	58	*	70 - 130	3	30
2,2-Dichloropropane	ND	51.6	55.9	92		46.5	55.9	83		70 - 130	10	30
2-Butanone (MEK)	1.0	57.5	55.9	101		51.7	55.9	91		50 - 150	11	30
2-Chlorotoluene	ND	31.8	55.9	57	*	35,4	55.9	63	*	70 - 130	11	30
2-Hexanone	ND	42.9	55,9	7 7		44.8	55.9	80		70 - 130	4	30
2-Methyl-2-propanol	ND	1110	1120	99		988	1120	88		50 - 150	11	30
4-Chlorotoluene	ND	31.9	55.9	57	*	33.4	55.9	60	*	70 - 130	5	30
4-Isopropyltoluene	ND	28,3	55.9	51	*	29.2	55.9	52		70 - 130	3	30
4-Methyl-2-pentanone	ND	44.4	55.9	80		46.4	55.9	83		70 - 130	4	30
Acetone	4.7	74.6	55.9	125		88.3	55.9	150		50 - 150	17	30
Benzene	ND	42.4	55.9	76		44.0	55,9	79		70 - 130	4	30
Bromobenzene	ND	34.0	55.9		*	35.6	55.9	64	*	70 - 130	5	30
Bromochloromethane	ND	42.5	55.9	76		45.0	55.9	81		70 - 130	6	30

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:

Northgate Environmental

Project:

Tronox LLC Henderson/2027.001

Sample Matrix:

Soil

Service Request: R0905464 Date Collected: 9/25/09 Date Received: 9/26/09 Date Analyzed: 10/5/09 -

10/6/09

Matrix Spike Summary Volatile Organic Compounds by GC/MS

Sample Name:

SA101-0.5B

Lab Code:

R0905464-013

Units: µg/Kg Basis: Dry

Analytical Method: 8260B

	Sample		Iatrix Spike Q0909500-0:				ate Matrix (% Rec		RPD
Analyte Name	Result	Result	Amount	% Rec		Result	Amount	% Rec	Limits	RPD	Limit
Bromodichloromethane	ND	45.8	55.9	82		47.2	55.9	84	70 - 130	3	30
Bromoform	ND	43.0	55.9	77		44.6	55.9	80	70 - 130	4	30
Bromomethane	ND	8.75	55.9	16	*	36.3	55,9	65	50 - 150	122 3	
Carbon Tetrachloride	ND	51,4	55.9	92		50.6	55.9	91	70 - 130	2	30
Chlorobenzene	ND	37.0	55.9	66	*	38.6	55.9		* 70 - 130	4	30
Chloroethane	ND	40.5	55.9	73		40.5	55.9	72	70 - 130	0	30
Chloroform	ND	50.5	55.9	90		50.4	55.9	90	70 - 130	Ö	30
Chloromethane	ND	56.8	55.9	102		44.9	55.9	80	70 - 130	23	30
Dibromochloromethane	ND	42.1	55.9	75		44.5	55.9	80	70 - 130	6	30
Dibromomethane	ND	43.6	55.9	78		45.2	55.9	81	70 - 130	3	30
Dichlorodifluoromethane (CFC 12)	ND	37.3	55.9	67	*	35.3	55.9		* 70 - 130	5	30
Dichloromethane	0.48	46.6	55.9	83		45.4	55.9	80	70 - 130	3	30
Diisopropyl Ether	ND	55.3	55.9	99		53.7	55.9	96	70 - 130	3	30
Ethyl tert-Butyl Ether	ND	56.3	55.9	101		56.5	55.9	101	70 - 130	0	30
Ethylbenzene	ND	38.5	55.9	69	*	37.1	55.9		* 70 - 130	4	30
Hexachlorobutadiene	ND	21.3	55.9	38	*	22.3	55.9		* 70 - 130	5	30
Isopropylbenzene (Cumene)	ND	38.6	55.9	69	*	38,3	55.9		* 70 - 130	1	30
Methyl tert-Butyl Ether	ND	49.8	55.9	89		47.6	55.9	85	70 - 130	5	30
Naphthalene	ND	33.9	55.9	61		36.4	55.9	65	50 - 150	7	30
Styrene	ND	40.2	55.9	72		40.1	55.9	72	70 - 130	0	30
Tetrachloroethene (PCE)	ND	40.4	55.9	72		39.2	55.9	70	70 - 130	3	30
Toluene	0.51	40.1	55.9	71		40.2	55.9	71	70 - 130 70 - 130	0	30
Trichloroethene (TCE)	ND	45.9	55.9	82		46.7	55.9	84	70 - 130	2	30
Trichlorofluoromethane (CFC 11)	ND	49.4	55.9	88		48.5	55.9	87	70 - 130	2	30
Vinyl Chloride	ND	46.8	55.9	84		39.4	55.9	71	70 - 130	17	30
cis-1,2-Dichloroethene	ND	46.1	55.9	82		45.4	55.9	81	70 - 130 70 - 130	17	30
cis-1,3-Dichloropropene	ND	46.4	55,9	83		46.7	55.9	84	70 - 130	1	30
m,p-Xylenes	ND	73.5	112		*	71.5	112		* 70 - 130 * 70 - 130	3	30
n-Butylbenzene	ND	25.6	55.9		*	26.7	55.9		* 70 - 130 * 70 - 130	4	30
n-Propylbenzene	ND	31.1	55.9		*	32.3	55.9		* 70 - 130 * 70 - 130	4	30
o-Xylene	ND	36.7	55.9		*	38.1	55.9		* 70 - 130 * 70 - 130	4	30
sec-Butylbenzene	ND	30,6	55.9		*	31.8	55.9		* 70 - 130	4	30 30
tert-Amyl Methyl Ether	ND	53.0	55.9	95		50.1	55.9	90	70 - 130	6	30

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Project: Northgate Environmental

Sample Matrix:

Tronox LLC Henderson/2027.001

Soil

Service Request: R0905464
Date Collected: 9/25/09

Date Received: 9/26/09
Date Analyzed: 10/5/09 -

10/6/09

Matrix Spike Summary
Volatile Organic Compounds by GC/MS

Sample Name: Lab Code: SA101-0.5B

R0905464-013

Units: µg/Kg Basis: Dry

Analytical Method: 8260B

	Sample		I <mark>atrix Spi</mark> ke Q0909500-0:		-	ate Matrix Q0909500-0	-	% Rec		RPD
Analyte Name	Result	Result	Amount	% Rec	Result	Amount	% Rec	Limits	RPD	Limit
tert-Butylbenzene	ND	30.1	55.9	54 *	30.5	55.9	55	* 70 - 130	1	30
trans-1,2-Dichloroethene	ND	45.0	55.9	81	42.6	55.9	76	70 - 130	6	30
trans-1,3-Dichloropropene	ND	41.9	55.9	75	43.4	55.9	78	70 - 130	3	30

Comments:	

LDC #: 21 441 N)

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

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".

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

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•	Cl	,		7			(\mathcal{I})				(MS/Ms.	(1)	\		(1)									
Qualifications	5-145			7			J+dets/F				No sure (_ ~			J+ dcts/2	-								
slated Samples	3 173191-MB			→	,		25. 17 3960-MB				13-17 170 307MB	, 1			174051-MB									
A880	1-3						71 - 01				4-91	,			21.1	-								
Î))	`	`)	1	(1	`	()	,)	1	`)	^	(((((()
RPD (Limits))))))))	,))))))))	~))	•	•	<u> </u>))
1) [`	,) [Â	1	(7	^	(<u></u>	`) (()) [^	((^	^	<u> </u>	^) [
LCSD %R (Limits))))))))	,)))))))))))	`)))
	(37/	() (Î	((_	ſ.		_)) [^	1	ſ,	^	(^	^	^	î	^	^
LCS %R (Limits)	301-52)))	J)	~	J	~	_	7))	_))	_	_))	_	_	_)
	و <i>ل</i> ا	₹9 	51	1 74			27.				761	67			139	_								
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res/resp ib	173191-165						827-0948 21				173207- VCS				174051- LCS									
Date																							,	
**				L		<u> </u>	L																	

VALIDATION FINDINGS WORKSHEET

|--|

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

SDG #:_

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

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

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

75	Date	Sample ID	Internal Standard	Area (Limits)	RT (I imits)	Oualifications
~		20	P≠B	103752 (258285	16891	5/R/A (i)
~			4DCB	125113 (205219		1/W/ A
		اح	PFB	147116 (236617	() 4 5 4 6 6)	· * 3/5
			4 pcB		- 753216)	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
					`	
						C Pleas cer TCL .
						for association
						1 1

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

(FBZ) = Fluorobenzene

V(PFB) = Pentafluorobenzene V(4DCB) = 1,4-Dichlorobenzene-d4 (₹DCB) = 17€-Dichlorobenzene-d4

LDC#: 21991 W) SDG#: See Gran

VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page: 1 of A Reviewer: N/6 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.

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

#	Date	Sample ID	Finding	Associated Samples	Qualifications	
		26	IS & Sur ontside	limits		(s)
						\
S	Comments:					

LDC #:	2/90/	_N /
	Sec	_

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	
Reviewer:	JV6_
2nd reviewer:	

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

Y	N	N/A
\overline{Y}	Ŋ	N/A

Were field duplicate pairs identified in this SDG?

Were target compounds detected in the field duplicate pairs?

	Concentration (45 /kg)		Pare
Compound	6	7	RPD
M	12 11	1.5	105 (E D) -

	Concentration (45/5)			Paren
Compound	17	18	RPD	ny
M	0.91	1.6	0.69 (= 11 0)	
E	0,34	5,6 U	5.26(45,60)	
CC	0,57	0.66	0.09	_
F	18 V	8.3	9.7 (= 18D)	_
	'			

	Concentration ()	
Compound		RPD

	Concentration ()	
Compound		RPD