

LABORATORY DATA CONSULTANTS, INC.

7750 El Camino Real, Suite 2L Carlsbad, CA 92009 Phone: 760/634-0437 Fax: 760/634-0439

Northgate Environmental Management, Inc. 1100 Quail Street Ste. 102

January 28, 2010

Newport Beach, CA 92660 ATTN: Ms. Cindy Arnold

SUBJECT: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada, Data Validation

Dear Ms. Arnold.

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on December 17, 2009. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 22285:

SDG#

Fraction

R0906056/K0910677, R0906081 R0906191, R0906270, R0906403 R0906477

Volatiles, Semivolatiles, Chlorinated Pesticides, Polychlorinated Biphenyls, Metals, Wet Chemistry, TPH as Extractables

The data validation was performed under Stage 2B/4 guidelines. The analyses were validated using the following documents, as applicable to each method:

- Standard Operating Procedures (SOP) 40, Data Review/Validation,
- Quality Assurance Project Plan Tronox LLC Facility, Henderson Nevada, June 2009
- NDEP Guidance, May 2006
- USEPA, Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, June 2008
- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004

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

Sincerely,

Erlinda T. Rauto

Operations Manager/Senior Chemist

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LDC #: 22285

SDG #: R0906056/K0910677, R0906081, R0906191 R0906270, R0906403, R0906477 Page: 1 of 1
Reviewer: JE
2nd Reviewer: BC

Tronox Northgate Henderson Worksheet

EDD Area	Yes	No	NA	Findings/Comments
Is there an EDD for the associated Tronox validation report?	X			
II. EDD Qualifier Population Were all qualifiers from the validation report populated into the EDD?	V	1336-1		A PERSONAL PROPERTY OF THE PRO
III. EDD Lab Anomalies	X			
Were EDD anomalies identified? If yes, were they corrected or documented for the client?	X			See EDD_discrepancy_
IV. EDD Delivery	X		ar s	form_LDC22285_011510.doc
Was the final EDD sent to the client?	X			

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Data Validation Reports LDC #22285

Volatiles



Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

October 21 through October 26, 2009

LDC Report Date:

January 11, 2010

Matrix:

Soil

Parameters:

Volatiles

Validation Level:

Stage 4

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906056

Sample Identification

SA52-15BSPLP3

SA52-28BSPLP3 RSAQ8-10BSPLP3

RSAQ8-31BSPLP3

SA34-10BSPLP3

SA34-31BSPLP3

Introduction

This data review covers 6 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 with the following exceptions:

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
11/7/09	2-Methyl-2-propanol	0.015 (≥0.05)	All samples in SDG R0906056	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.

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
11/10/09	2-Methyl-2-propanol	0.015 (≥0.05)	All samples in SDG R0906056	J (all detects) UJ (all non-detects)	Α

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
178668-MB	11/10/09	1,2,3-Trichlorobenzene Naphthalene	0.49 ug/L 0.43 ug/L	All samples in SDG R0906056

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

No field blanks were identified in this SDG.

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

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:

Finding	Flag	A or P
All compounds reported below the PQL.	J (all detects)	А
_		All compounds you shall be at the same

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 R0906056

SDG	Sample	Compound	Flag	A or P	Reason (Code)	
R0906056	SA52-15BSPLP3 SA52-28BSPLP3 RSAQ8-10BSPLP3 RSAQ8-31BSPLP3 SA34-10BSPLP3 SA34-31BSPLP3	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Initial calibration (RRF) (c)	
R0906056	906056 SA52-15BSPLP3 SA52-28BSPLP3 RSAQ8-10BSPLP3 RSAQ8-31BSPLP3 SA34-10BSPLP3 SA34-31BSPLP3		J (all detects) UJ (all non-detects)	A	Continuing calibration (RRF) (c)	
R0906056	SA52-15BSPLP3 SA52-28BSPLP3 RSAQ8-10BSPLP3 RSAQ8-31BSPLP3 SA34-10BSPLP3 SA34-31BSPLP3	All compounds reported below the PQL.	J (all detects)	А	Project Quantitation Limit (PQL) (sp)	

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Laboratory Blank Data Qualification Summary - SDG R0906056

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Field Blank Data Qualification Summary - SDG R0906056

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #:_	22285A1	
SDG #:	R0906056	

Stage 4

Date:	12/31/09
Page:_	<u>l</u> of_l
Reviewer:	346

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
I.	Technical holding times	A	Sampling dates: 10 /2/ _ 26 /09
11.	GC/MS Instrument performance check	A	
III.	Initial calibration	SW	2 KSD rv
IV.	Continuing calibration/JCV	SW	CN = 25 }
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N)	Client spec
VIII.	Laboratory control samples	A	Client spec USD
IX.	Regional Quality Assurance and Quality Control	N	
Х.	Internal standards	A	
XI.	Target compound identification	À	
XII.	Compound quantitation/CRQLs	À	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	A	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	7	

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

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2	SA52-28BSPLP3	12	178668-MB SPUP BIK	22	32	
3	RSAQ8-10BSPLP3	13		23	33	
4	RSAQ8-31BSPLP3	14		24	34	
5	SA34-10BSPLP3	15		25	35	1
6	SA34-31BSPLP3	16		26	36	
7		17		27	37	
8		18		28	38	
9		19		29	39	
10	·	20		30	40	1

LDC #: 22285 A)
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: 100
2nd Reviewer: 100

Method: Volatiles (EPA SW 846 Method 8260B)

Method: Volatiles (EPA SW 846 Method 8260B)				
Validation Area	Yes	No	NA	Findings/Comments
J. Technical holding times				
All technical holding times were met.	_			
Cooler temperature criteria was met.	_			
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?				
Were all percent relative standard deviations (%RSD) \leq 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. Surragate 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	t			
Was an LCS analyzed for this SDG?				

LDC #: 72785 A)
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: N
2nd Reviewer: __

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per analytical batch?	_			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?				
IX Regional Quality Assurance and Quality Control			F	
Were performance evaluation (PE) samples performed?		-		
Were the performance evaluation (PE) samples within the acceptance limits? x. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	/			
Were retention times within + 30 seconds of the associated calibration standard?		1		
XI Target compound identification	- -	ł —	Π	
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	1	 	+	
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	 			
Were chromatogram peaks verified and accounted for?		<u> </u>	<u> </u>	
XII. Compound quantitation/CRGLs	Ī	T T	T	
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?	1			
XIII Tentatively identified compounds (TICs)				1
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?			<u> </u>	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?			1	
XIV. System performance	Т 7	т. Т	Т	T
System performance was found to be acceptable.	<u> </u>			
XV. Overall assessment of data	Т	J -	Т-	T
Overall assessment of data was found to be acceptable.				
XVI. Field duplicates	т-	т-	7	T
Field duplicate pairs were identified in this SDG.	1	1/	4_	
Target compounds were detected in the field duplicates.				
XVII Field blanks	т-	Т-		T
Field blanks were identified in this SDG.		1	4	
Target compounds were detected in the field blanks.				1

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

				0000 1 Oktober 10000
A. Chloromethane*	U. 1,1,2-Trichloroethane	OO. 2,2-Dichloropropane	III. n-Butylbenzene	
8 Bromomethane	V. Benzene	PP, Bromochloromethane	JJJ. 1,2-Dichlorabenzene	DDDD. Isopropyi alcohol
C. Mark chondett	W. trans-1.3-Dichloropropene	QQ. 1,1-Dichloropropene	KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
C. vinyi chomos	X Romoform*	RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF. Acrolein
D. Chiorenane	V 4 Methyl, 2 pentanone		MMM. Naphthalene	GGGG. Acrylonitrile
E. Metrykene G noriue	2.2-Hexanone		NNN. 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
r. Addina	AA Tetrachloroethene	UU. 1,1,1,2-Tetrachioroethane	000. 1,3,5-Trichlorobenzene	IIII. tsobutyl alcohol
G. Carbon discinde	BB. 1.1.2.2-Tetrachloroethane*		PPP, trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
Ti. I I Tolding Common	CC Tolumba**	WW. Bromobenzene	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
1. 1,1-Dichloreurane	OC. Talombanzana*	XX. 1,2,3-Trichloropropane	RRR. m,p-Xylenes	LLLL. Ethyl ether
J. 1,2-Diction delice, rocal	EE Ethylbenzene**	YY, n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
K. Chlordform	EE. Eulyibolizate	ZZ 2-Chlomtoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN. 2-Methyl-2-propanel
L. 1,2-Dichloroethane	rr. Styrene		I I I 1 2-Dichlomtetrafluomethane	0000
M. 2-Butanone	GG. Xylenes, total	AAA: 1,3,5-1 nmeunyibenzene		
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB, 4-Chlorotoluene	VVV. 4-Ethyltoluene	dddd
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC, tert-Buty/benzene	www. Ethanol	aaaa.
D Damodichlomathana	J.J. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
r. promodicionomana	KK Trichlomfluonmethane	EEE: sec-Butylbenzene	YYY. tert-Butanol	SSSS.
Q. 1,Z-Dichlopenie		TTT 4.0 Picklembares	777 ted-Buty akohoi	1111 .
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	TTT. 1,5-DIGIRODGIIZGIIG		***
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-isopropyitoluene	AAAA, Ethyl tert-butyl ether	OCCO.
T Dibomochlommethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	ww.
I. DIDIOIIEMINATIONIMIA				

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

(A 2228 #) SDG #:

VALIDATION FINDINGS WORKSHEET Initial Calibration

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

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

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

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

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

	Ousifications
validation criteria of ≤30 %RSD and ≥0.05 RRF?	Finding RRF
lion criteria of ≤30 %	Finding %RSD
RFs within the validar	
Were all %RSDs and RRFs within the validation criteria of	
Y (N) N/A	

# Date Standard ID Compound (Limit-20.0%) Frinding RNF Associated Samples Qualifications 11/77/4	X	Y (N)N/A	Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 rx.	KRFs within the Validati	OII Ciliteria OI SOU 701			
11/57/49 (CAL-MSE WANN) 0.015 All + B/KS J/A/J/A (*	400	Standard ID	Compound	Finding %RSD (Limit: <30.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
11/47/44 (CAL-ASS NONNW 11/47/	<u> </u>	╬	$\ $			7100	411 + B.1KS	/N3/A (
		11/67/6		CNNN		٥,٥	1	
	<u> </u>							
	<u> </u>							

22285A) LDC#: SDG#

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".

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 ?

Standard ID Compound (Limit: 45.0%) Finding RRF Associated Samples F 4 2 1 C N M M					Qualifications
Finding %D				A11 + 13/KS	Associated Samp
and Decompound (Limit: <25.0%) Compound (Limit: <25.0%) Compound (Limit: <25.0%)				5.015	Finding RRF (Limit: >0.05)
and ID Compound					Finding %D (Limit: <25.0%)
				NNNA	Compound
Standing Sta				F4216	Standard ID
# Date				1	Date

<u>.</u>...

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2285	Ŋ
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LDC#:	SDG #

VALIDATION FINDINGS WORKSHEET

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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 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: 11 16 169

(4N) Sample Identification $\bar{\downarrow}$ Associated Samples: 8W-299821 0.49 0.43 Blank ID 2 2 Z ママス Conc. units: ೬೧ Compound

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

1 A 28000 SDG #: See Cover 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:

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

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

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

					Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
#	Standard ID	Calibration Date	Compound	Compound (Reference Internal Standard)	RRF (S) std)	RRF (🖰 std)	Average RRF (initial)	Average RRF (initial)	%RSD	%RSD
-		, , ;	0	(1st internal standard)	0.387	0,387	88 c '0	886'0	8.€	3.4
	145	60160/11	5	(2nd internal standard)	6.269	630.0	0,280	0.280	7.6	28
	ms 8		AA	(3rd internal standard)	0.326	926'0	0,339	0.339	4.2	4,7
2			88	(1st internal standard)	6.38.0	0,383	6.416	0. 416	2.0	4%
				(2nd internal standard)						
				(3rd internal standard)						
3				(1st internal standard)						
				(2nd internal standard)						
				(3rd internal standard)						
4				(1st internal standard)						
				(2nd 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.

(3rd internal standard)

(サムダイケ SDG #: Sec Cover LDC #:

Continuing Calibration Results Verification VALIDATION FINDINGS WORKSHEET

Page: 1 of Reviewer: 2nd Reviewer:

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

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

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

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

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

*	Standard ID	Calibration Date	Compour	Compound (Reference internal Standard)	Average RRF	Reported RRF (CC)	Recalculated RRF	Reported %D	Recalculated %D
-	F+216	1	J		0,388	6.347	0.367	5.4	2.2
		10/01/10	\sim	(2nd internal standard)	0,280	0.247	0.347	4.6	4.5
			AA	(3rd internal standard)	0.339	per. 0	p160	<u>-</u> بد	۵,۱
7			22	(1st internal standard)	0. 916	0.387	6.387	7.0	7.1
		-		(2nd internal standard)					
			-	(3rd internal standard)					
3				(1st internal standard)					
				(2nd internal standard)					
				(3rd internal standard)					
4				(1st internal standard)					
				(2nd internal standard)					
		-		(3rd internal standard)					0

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 #: 22785 A) SDG #: See Cover

VALIDATION FINDINGS WORKSHEET **Surrogate Results Verification**

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

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	54.73	109	109	0
Bromofluorobenzene		54.63	108	108	
1,2-Dichloroethane-d4					
Dibromofluoromethane	4	53.75	108	108	1

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					ļ
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				<u> </u>	
Dibromofluoromethane					<u> </u>

Sample ID:

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

(AZYSTY SDG #: See Coner LDC #:

Laboratory Control Sample Results Verification VALIDATION FINDINGS WORKSHEET

Page: 1 of 1 Reviewer:

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 = Spiked sample concentration SA = Spike added

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

899861 LCS ID:

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

	Š	ike	Spiked	Sample	SDI	S	I CSD	ď	USD I CS/I CSD	csn
Compound	Р (и д	Added () ()	Concentration $(n \leq \lambda)$	itration L)	Percent Recovery	ecovery	Percent Recovery	ecovery	RI	RPD
	1.08	1 CSD	SDT	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recatculated
1,1-Dichloroethene	52, 0	58, 0	57. 4	55,0	(03	201	र।।	94		
Trichloroethene	-		49.6	51,3	99	66	E4)	103	23	3
Benzene			48,0	49.9	26	76	(10)	(w)	A	4
Toluene			56,9	52.9	107	101	201	227	ナ	4
Chlorobenzene	>	Y	865	57.3	امه	(w)	40)	601	a	8
										•
		·								

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

LDC #:_	アン	285	A	
SDG #:	See	Core	1	

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:	1 of 1
Reviewer:	SV
2nd reviewer	W

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

N/A N N/A

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

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

Concentration =

 $(A_x)(I_x)(DF)$

(A_{is})(RRF)(V_o)(%S)

Area of the characteristic ion (EICP) for the 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)

or grams (g).

Dilution factor. Df

Percent solids, applicable to soils and solid matrices %S

Example:

Sample I.D. F

Conc. = (156) (50)()()()

= 2.450 ~ 2.5 mg/L

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

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

October 22 through October 23, 2009

LDC Report Date:

January 11, 2010

Matrix:

Soil/Water

Parameters:

Volatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906081

Sample Identification

EB102209-SO1A3 SA112-0.5B SA112-10B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-0.5BRE RSAQ8-10B RSAQ8-22B RSAQ8-31B RSAR8-20B RSAR8-34B RSAP8-0.5B RSAP8-10B RSAP8-25B RSAP8-40B TB102309-SO1

RSAR8-34BMS RSAR8-34BMSD

RSAQ8-34B TB102209-SO1

TB102209-SO3

SA132-0.5B

SA132-10B

SA132009-10B

SA132-20B

SA132-34B RSAR8-0.5B

RSAR8-10B

Introduction

This data review covers 25 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.
- P 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
10/27/09	2-Methyl-2-propanol	0.017 (≥0.05)	EB102209-SO1A3 TB102209-SO1 TB102209-SO3 177161-MB	J (all detects) UJ (all non-detects)	А
10/31/09	2-Methyl-2-propanol	0.028 (≥0.05)	TB102309-SO1 178301-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
10/30/09 (F3812)	Chloromethane Bromomethane	26.2 28.5	EB102209-SO1A3 TB102209-SO1 TB102209-SO3 177161-MB	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	А
10/30/09 (H2030)	Chloromethane Acetone	26.9 35.9	SA112-0.5B SA112-10B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-10B 177136-MB	J+ (all detects) J+ (all detects)	А
10/30/09 (H2030)	Hexachlorobutadiene	26.1	SA112-0.5B SA112-10B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-10B 177136-MB	J- (all detects) UJ (all non-detects)	А
10/31/09	Bromomethane Hexachlorobutadiene	28.4 35.9	RSAQ8-0.5BRE RSAQ8-22B RSAQ8-31B RSAQ8-34B SA132-0.5B SA132-10B SA132009-10B SA132-20B SA132-34B RSAR8-0.5B RSAR8-34B RSAR8-34B RSAR8-34BMS RSAR8-34BMSD 177288-MB	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	A
11/1/09	Acetone	31.3	RSAR8-10B RSAR8-20B RSAP8-0.5B RSAP8-10B RSAP8-25B RSAP8-40B 177311-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
10/30/09 (F3812)	2-Methyl-2-propanol	0.017 (≥0.05)	EB102209-SO1A3 TB102209-SO1 TB102209-SO3 177161-MB	J (all detects) UJ (all non-detects)	A
11/6/09 (C2086)	2-Methyl-2-propanol	0.025 (≥0.05)	TB102309-SO1 178301-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
177161-MB	10/30/09	1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene	0.31 ug/L 0.27 ug/L 0.28 ug/L	EB102209-SO1A3 TB102209-SO1 TB102209-SO3
177136-MB	10/30/09	Dichloromethane	0.94 ug/Kg	SA112-0.5B SA112-10B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-10B
178301-MB	11/6/09	Hexachlorobutadiene	0.32 ug/L	TB102309-SO1

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
SA112-10B	Dichloromethane	0.93 ug/Kg	0.93U ug/Kg
RSAQ8-10B	Dichloromethane	1.1 ug/Kg	1.1U ug/Kg

Samples TB102209-SO1, TB102209-SO3, and TB102309-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
TB102209-SO3	10/22/09	Acetone Methylene chloride Toluene	1.8 ug/L 0.23 ug/L 0.23 ug/L	EB102209-SO1A3 SA112-0.5B SA112-10B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-0.5BRE RSAQ8-1.0B RSAQ8-22B RSAQ8-31B RSAQ8-34B
TB102309-SO1	10/23/09	Acetone	5.6 ug/L	SA132-0.5B SA132-10B SA132-209-10B SA132-20B SA132-34B RSAR8-0.5B RSAR8-10B RSAR8-20B RSAR8-34B RSAP8-0.5B RSAP8-10B RSAP8-10B RSAP8-10B

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
EB102209-SO1A3	Acetone	3.1 ug/L	3.1U ug/L
RSAQ8-0.5B	Toluene	0.44 ug/Kg	0.44U ug/Kg
SA132-20B	Acetone	9.4 ug/Kg	9.4U ug/Kg
RSAR8-20B	Acetone	2.1 ug/Kg	2.1U ug/Kg
RSAP8-10B	Acetone	8.3 ug/Kg	8.3U ug/Kg

Sample EB102209-SO1A3 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
EB102209-SO1A3	10/22/09	Acetone	3.1 ug/L	SA112-0.5B SA112-10B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-0.5BRE RSAQ8-10B RSAQ8-22B RSAQ8-31B RSAQ8-34B

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

Sample FB082809-SO (from SDG R0904894) 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
FB082809-SO	8/28/09	Acetone Toluene	9.2 ug/L 0.44 ug/L	All soil samples in SDG R0906081

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
SA112-0.5B	Acetone	16 ug/Kg	16U ug/Kg
SA112-10B	Toluene	0.62 ug/Kg	0.62U ug/Kg
RSAQ8-0.5B	Acetone Toluene	9.6 ug/Kg 0.44 ug/Kg	9.6U ug/Kg 0.44U ug/Kg
RSAQ8-0.5BRE	Acetone Toluene	14 ug/Kg 0.57 ug/Kg	14U ug/Kg 0.57U ug/Kg
RSAQ8-10B	Toluene	0.55 ug/Kg	0.55U ug/Kg
RSAQ8-31B	Toluene	0.74 ug/Kg	0.74U ug/Kg
SA132-20B	Acetone	9.4 ug/Kg	9.4U ug/Kg
RSAR8-10B	Toluene	0.40 ug/Kg	0.40U ug/Kg

Sample	Compound	Reported Concentration	Modified Final Concentration
RSAR8-20B	Acetone Toluene	2.1 ug/Kg 0.52 ug/Kg	2.1U ug/Kg 0.52U ug/Kg
RSAR8-34B	Toluene	0.80 ug/Kg	0.80U ug/Kg
RSAP8-10B	Acetone	8.3 ug/Kg	8.3U ug/Kg

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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
RSAR8-34BMS/MSD (RSAR8-34B)	Hexachlorobutadiene	36 (70-130)	29 (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
177288LCS	Hexachlorobutadiene	68 (75-125)	RSAQ8-0.5BRE RSAQ8-22B RSAQ8-31B RSAQ8-34B SA132-0.5B SA132-10B SA132009-10B SA132-20B SA132-34B RSAR8-0.5B RSAR8-34B 177288-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 with the following exceptions:

			T		1
Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
RSAQ8-0.5B	1,4-Dichlorobenzene-d4	146546 (188206-752822)	Bromoform 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene Bromobenzene 1,2,3-Trichloropropane n-Propylbenzene 2-Chlorotoluene 1,3,5-Trimethylbenzene 4-Chlorotoluene tetr-Butylbenzene 1,2,4-Trimethylbenzene sec-Butylbenzene 1,3-Dichlorobenzene p-Isopropyltoluene 1,4-Dichlorobenzene n-Butylbenzene 1,2-Dichlorobenzene 1,2-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J (all detects) UJ (all non-detects)	A
RSAQ8-0.5BRE	1,4-Dichlorobenzene-d4	102219 (163197-652786)	Bromoform 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene 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-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 R0906081	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
RSAQ8-0.5BRE	All TCL compounds	Х	А

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

XVI. Field Duplicates

Samples SA132-10B and SA132009-10B were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concentration (ug/Kg)					
Compound	SA132-10B	SA132009-10B	RPD (Limits)	Difference (Limits)	Flags	A or P
Chloroform	1.1	0.59	-	0.51 (≤6.1)	-	•

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Data Qualification Summary - SDG R0906081

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906081	EB102209-SO1A3 TB102209-SO1 TB102209-SO3 TB102309-SO1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Initial calibration (RRF) (c)
R0906081	EB102209-SO1A3 TB102209-SO1 TB102209-SO3	Chloromethane Bromomethane	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	А	Continuing calibration (%D) (c)
R0906081	SA112-0.5B SA112-10B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-10B	Chloromethane Acetone	J+ (all detects) J+ (all detects)	А	Continuing calibration (%D) (c)
R0906081	SA112-0.5B SA112-10B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-10B	Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	А	Continuing calibration (%D) (c)
R0906081	RSAQ8-0.5BRE RSAQ8-22B RSAQ8-31B RSAQ8-34B SA132-0.5B SA132-10B SA132-10B SA132-20B SA132-20B SA132-34B RSAR8-0.5B RSAR8-34B	Bromomethane Hexachlorobutadiene	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	А	Continuing calibration (%D) (c)
R0906081	RSAR8-10B RSAR8-20B RSAP8-0.5B RSAP8-10B RSAP8-25B RSAP8-40B	Acetone	J- (all detects) UJ (all non-detects)	А	Continuing calibration (%D) (c)
R0906081	EB102209-SO1A3 TB102209-SO1 TB102209-SO3 TB102309-SO1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Continuing calibration (RRF) (c)
R0906081	RSAR8-34B	Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R) (m)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906081	RSAQ8-0.5BRE RSAQ8-22B RSAQ8-31B RSAQ8-34B SA132-0.5B SA132-10B SA132-10B SA132-20B SA132-20B SA132-34B RSAR8-0.5B RSAR8-34B	Hexachiorobutadiene	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0906081	RSAQ8-0.5B RSAQ8-0.5BRE	Bromoform 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene 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	Internal standards (area)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906081	EB102209-SO1A3 SA112-0.5B SA112-10B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-0.5BRE RSAQ8-10B RSAQ8-22B RSAQ8-31B RSAQ8-31B RSAQ8-34B TB102209-SO1 TB102209-SO3 SA132-0.5B SA132-10B SA132-10B SA132-20B SA132-20B SA132-34B RSAR8-0.5B RSAR8-10B RSAR8-10B RSAR8-10B RSAR8-10B RSAR8-20B RSAR8-20B RSAR8-34B RSAR8-20B RSAR8-34B RSAR8-20B RSAR8-34B RSAR8-20B RSAR8-34B RSAP8-0.5B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (PQL) (sp)
R0906081	RSAQ8-0.5BRE	All TCL compounds	X	А	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Laboratory Blank Data Qualification Summary - SDG R0906081

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0906081	SA112-10B	Dichloromethane	0.93U ug/Kg	А	bl
R0906081	RSAQ8-10B	Dichloromethane	1.1U ug/Kg	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Trip Blank Data Qualification Summary - SDG R0906081

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0906081	EB102209-SO1A3	Acetone	3.1U ug/L	А	bt
R0906081	RSAQ8-0.5B	Toluene	0.44U ug/Kg	А	bt

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0906081	SA132-20B	Acetone	9.4U ug/Kg	A	bt
R0906081	RSAR8-20B	Acetone	2.1U ug/Kg	А	bt
R0906081	RSAP8-10B	Acetone	8.3U ug/Kg	Α	bt

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Equipment Blank Data Qualification Summary - SDG R0906081

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Field Blank Data Qualification Summary - SDG R0906081

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0906081	SA112-0.5B	Acetone	16U ug/Kg	A	bf
R0906081	SA112-10B	Toluene	0.62U ug/Kg	A	bf
R0906081	RSAQ8-0.5B	Acetone Toluene	9.6U ug/Kg 0.44U ug/Kg	А	bf
R0906081	RSAQ8-0.5BRE	Acetone Toluene	14U ug/Kg 0.57U ug/Kg	А	bf
R0906081	RSAQ8-10B	Toluene	0.55U ug/Kg	А	bf
R0906081	RSAQ8-31B	Toluene	0.74U ug/Kg	А	bf
R0906081	SA132-20B	Acetone	9.4U ug/Kg	А	bf
R0906081	RSAR8-10B	Toluene	0.40U ug/Kg	А	bf
R0906081	RSAR8-20B	Acetone Toluene	2.1U ug/Kg 0.52U ug/Kg	А	bf
R0906081	RSAR8-34B	Toluene	0.80U ug/Kg	А	bf
R0906081	RSAP8-10B	Acetone	8.3U ug/Kg	А	bf

Tronox Northgate Henderson LDC #: 22285B1 VALIDATION COMPLETENESS WORKSHEET

SDG #:	R0906081	
aboratory	r: Columbia Analytical Services	

Stage 2B

Reviewer: 300 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	<i>A</i>	Sampling dates: 10 /22 - 23/69
II.	GC/MS Instrument performance check	A	,
III.	Initial calibration	Sh)	2 RSD YY
IV.	Continuing calibration/LGV	WZ	2 RSD YY CW = 25 %
V.	Blanks	sh)	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	VS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	W2	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	SW	D = 15,16
XVII.	Field blanks	ZW	EB = 1 TB = 12, 13, 27 FB = FB 08 2809-50 (RO 90 4894)
			(RO904894)

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:

	W	uter		+ 501)							
1 /	EB102209-SO1A3	'n	11 *	RSAQ8-34B	S	21	RSAR8-20B	S	1 /	177161-M	В
2 3	SA112-0.5B	2	12	TB102209-SO1	W	22	RSAR8-34B		32	178301-	
3 3	SA112-10B		+ 1 13	TB102209-SO3	Ĵ	23 5	RSAP8-0.5B		₹3 ३	177136-	
4 3	SA112-20B		14 4	SA132-0.5B	۶	24 5	RSAP8-10B		- 34 4	177 288-	
5	SA112-34B		15 4	SA132-10B	<i>p</i>]	25	RSAP8-25B		35 \$	177311-	$\sqrt{}$
6 3	RSAQ8-0.5B		16	SA132009-10B	D	26	RSAP8-40B	/	36		
7 4	RSAQ8-0.5BBL RE		17 4	SA132-20B		۲ ×	TB102309-SO1	W	37		
8 3	RSAQ8-10B		18	SA132-34B		28	RSAR8-34BMS	5	38		
9 4	RSAQ8-22B		19 4	RSAR8-0.5B		29 4	RSAR8-34BMSD	<u> </u>	39		
10 9	RSAQ8-31B	<i>\</i>	20 5	RSAR8-10B	J	30			40		

SDG #: Ce Cr. (4 58 ccc :# DOT

VALIDATION FINDINGS WORKSHEET Initial Calibration

Page: Reviewer:_ 2nd Reviewer:__

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

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

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

YN 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? $\frac{r^2}{r^2}$ o, $\frac{9}{7}$

		(3)	1	7							T				
	Qualifications	5/45/A	 												
aluation? 1 2 0, 9 9	Associated Samples	1, 12, 18, 1771 61-MB	27 178301-MB												
Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF?	Finding RRF (Limit: >0.05)	ć, 017	0.628	1 1											
rnat was tne acceptar e criteria? tion criteria of ≤30 %I	Finding %RSD (Limit: <30.0%)													,	
revaluation? If yes, we meet the acceptance RFs within the validates.	Compound	7777	7227												
Vere all %RSDs and F	Standard ID	1CAL-1AS8	1CAL - MS/D												
N/A N/A	Date	10/27/69	10/21/00	,											
	#														

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. Isopropyf 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-Dloxane
G. Carbon disuffide	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachloroethane	000. 1,3,5-Trichlorobenzene	IIII. Isobutyf 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. cls-1,2-Dichloroethene	KKKK. Propionitrile
J. 1,2-Dichloroethene, total	DD. Chlorobenzene*	XX. 1,2,3-Trichloropropane	RRR. m,p-Xylenes	LLLL. Ethyl ether
K. Chloroform⁺	EE. Ethylbenzene**	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
L. 1,2-Dichloroethane	FF. Styrene	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. Vinyi acetate	BBB, 4-Chlorotoluene	VVV. 4-Ethyltoluene	dddd
O. Carbon tetrachloride	II. 2-Chioroethylvinyl ether	CCC, tert-Butylbenzene	WWW. Ethanol	aaca.
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	TTT.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-lsopropyttoluene	AAAA. Ethyl tert-butyl ether	UUUU.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	

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

4pcB

Se Gre 1228527 SDG#: LDC #:

VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page: Reviewer: 2nd Reviewer:

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

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

	()													1		Ī		
Qualifications	5-10		J/115/4		5+005A	7 71/7	47,577	J-/N3 /4			J-M3 A			C/W X				
Associated Samples	1 12 13 177161-1118		\ \	9	7-6,8 1771%-MB			7 9-11 14-19.22.	28,29, 177288-MB	-	20.21.23-26,	177311-1113	- 1	27, 17870-NB				
Finding RRF (Limit: >0.05)			0. 617											0,025				
Finding %D (Limit: <25.0%)	26.2	58,8		9) (26.7	28.1		28,4	35,9	1	31,3							
Compound	A C	(-) 🕏	スススス	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		1777		B (F)	(-) 777		(<u>-</u>)	×		2 2 2 2				
Standard ID	F 3812			112030	2021			H 2070			H2099		, , , ,	74030				
Date	10/06/01			10/3: //				50/16/a.			11/0/1/69		- [50/00/				
*																		

LDC #: 22285 b SDG #:

VALIDATION FINDINGS WORKSHEET

Page: c	Reviewer: N	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? N N N N N N

Y N N/A 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.

Conc. units:

12, 13 Associated Samples:

tlon							(89)	tion					
Sample Identification							8 '9-2	Sample Identification					
							Associated Samples:			'и			
							روط		m	0,93/4 1.1/			
Blank ID	177161-MB	16.0	0, 27	0, 28			10/36/	Blank ID	24-281611	b. 94			
Compound		NNN	KKK	וור			Blank analysis date: 49/kg 10/26/69	Compound		ťη			

LDC #: 2 2785 b) SDG #:

VALIDATION FINDINGS WORKSHEET

Blanks

Reviewer:_ Page: 2nd Reviewer:

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

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". 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 confamination in the method blanks? If yes, please see the qualifications below. Y/N N/A

Blank analysis date: 11/66 169 Conc. units:

Associated Samples:

(42

27

Sample Identification 178301-ME 0.32 Blank ID Compound

date:	
lysis	;
ana	9
Blank	640

Conc. units:		Associated Samples:
Compound	Blank ID	

VALIDATION FINDINGS WORKSHEET LDC #: 2225 B)

SDG #:

Field Blanks

10 P

Page: Reviewer:_ 2nd Reviewer:__

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

N N/A Were target compounds detected in the field blanks? Blank units: W5/L Associated sample units: N1/8 Y N/N/A

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

2-11

43 Sample Identification Associated Samples: ٤ estre 四四 results 114 Blank ID_ 10 /22/69 Blank ID **60** Sampling Date Compound

Sample Identification 4 Associated Samples: ٨ 5 QN N Sither 0.44/4 e All others Field blank type: (circle one) Field Blank / Rinsate / Trip Blank Other Blank ID Blank ID 13 10/25/00 0.23 6,23 ., ∞ Sampling Date Compound

0.46

45/tz

Associated sample units:

Blank units: 49 /L

22285 B) SDG#:

VALIDATION FINDINGS WORKSHEET Field Blanks

Reviewer: 3/6 2nd Reviewer: 1

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

(p t) 9 Associated Samples: 14 -Sample Identification E NB either 2.1 Ø 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: 419
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank Other: 1 others Blank ID Blank ID 27 10/23/09 Sampling Date Compound

t9 A11 501/5 Associated Samples: Blank units: 149 /L Associated eample units: 145 /K g Field blank type: (circle on€) Field <u>Blank</u> ⊅Rinsate / Trip Blank / Other: 15 As

		F80 8 28 04-	¢2								
	Compound	Blank ID Blank ID	Blank ID				Sample 1d	Sample Identification			
	Sampling	8/28/64		7	3	9	7	80	10	17	20
4.8	4	9.2		16/4		h/ 9.b	14/4			9.9/4	
20	25	0,44			0.62/4 0.44 /4		1/ +LO 1/25/0 11/65.0	0,55/U	0.74/4		4/02:0
,						l .					
				CAN other	(A) others wither NB or > FB)	N N	۶ ۸	FE			
	CROL										

/9 >8cc # 307 SDG#:

VALIDATION FINDINGS WORKSHEET Field Blanks

Page:___ Reviewer:_ 2nd Reviewer:_

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

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

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

Blank units: H3 / Associated sample units: H9 / Associated sample units:

A11 soils (bf) Associated Samples:

Sample Identification FB ٨ ٤ 5 8.3/M es the 0.8 2 All of d 4 9,2 Setanalina Date S Compound

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

Associated Samples:

Sample Identification Blank ID Blank ID Compound CROL

10C#: 22085 B/ SDG #:

Matrix Spike/Matrix Spike Duplicates VALIDATION FINDINGS WORKSHEET

Page: 2nd Reviewer: Reviewer:_

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

Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

MS/MSD. Soil / Water. Y)N N/A

Y)N N/A

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

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		28/29	Several	compounds) butside	butside him/ts	()	22	No med
		/	Che	4	sh minant)	()		leither MS/MSD m
						()		105 m)
			771	(041-02) 98	1 29 (70-130)	()		J-/NJ/A (m)
			•	()	()	()		
				(()	()		
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				()	()	()		
				(()	()		
		Compound	punc	ac Li	QC Limits (Soil)	RPD (Soll)	QC Limits (Water)	RPD (Water)
	Ĭ	1,1-Dichloroethene		69	59-172%	< 22%	61-145%	< 14%
	S.	Trichloroethene		62	62-137%	< 24%	71-120%	< 14%
	>	Benzene		99	66-142%	< 21%	76-127%	< 11%
	CC.	Toluene		89	59-139%	< 21%	76-125%	< 13%
	DD.	Chlorobenzene		09	60-133%	< 21%	75-130%	< 13%
			The state of the s	THE PERSON NAMED IN COLUMN TWO IS NOT THE OWNER, THE PERSON NAMED IN COLUMN TWO IS NOT THE OWNER, THE PERSON NAMED IN COLUMN TWO IS NOT THE OWNER, THE PERSON NAMED IN COLUMN TWO IS NOT THE OWNER, THE PERSON NAMED IN COLUMN TWO IS NOT THE OWNER, THE PERSON NAMED IN COLUMN TWO IS NOT THE OWNER, THE PERSON NAMED IN COLUMN TWO IS NOT THE OWNER, THE PERSON NAMED IN COLUMN TWO IS NOT THE OWNER, THE PERSON NAMED IN COLUMN TWO IS NOT THE OWNER, THE PERSON NAMED IN COLUMN TWO IS NOT THE OWNER, THE PERSON NAMED IN COLUMN TWO IS NOT THE OWNER, THE PERSON NAMED IN COLUMN TWO IS NOT THE OWNER, THE OW	CHANGE STREET, WHITE THE CONTROL OF THE PROPERTY OF THE PARTY OF THE P	TO A SECURE AND ASSESSMENT OF THE PROCESS OF THE PR	WINCOMO THE RESIDENCE TO SECURE THE PROPERTY OF THE PERSON	

QA/QC Report

Client:

Northgate Environmental

Project:

Tronox LLC Henderson/2027.001

Sample Matrix:

Soil

Service Request: R0906081

Date Collected: 10/23/09

Date Received: 10/24/09
Date Analyzed: 11/1/09

Matrix Spike Summary Volatile Organic Compounds by GC/MS

Sample Name:

RSAR8-34B

Lab Code:

R0906081-024

Units: μg/Kg Basis: Dry

Analytical Method: 8260B

	Sample		Iatrix Spike Q0910704-0:				cate Matrix (Q0910704-0		% Rec		RPD
Analyte Name	Result	Result	Amount	% Re	C	Result	Amount	% Rec	Limits	RPD	Limit
1,1,1,2-Tetrachloroethane	ND	45.8	71.4	64	*	45.1	70.0	64	* 70 - 130	2	30
1,1,1-Trichloroethane (TCA)	ND	58.9	71.4	82		56.8	70.0	81	70 - 130	4	30
1,1,2,2-Tetrachloroethane	ND	52.5	71.4	73		48.4	70.0	69	* 70 - 130	8	30
1,1,2-Trichloroethane	ND	47.7	71.4	67	*	49.7	70.0	71	70 - 130	4	30
1,1-Dichloroethane (1,1-DCA)	ND	55.7	71.4	78		55.7	70.0	80	70 - 130	0	30
1,1-Dichloroethene (1,1-DCE)	ND	54.0	71.4	76		52.8	70.0	75	70 - 130	2	30
1,1-Dichloropropene	ND	53.5	71.4	75		51.2	70.0	73	70 - 130	4	30
1,2,3-Trichlorobenzene	ND	33.7	71.4	47	*	29.5	70.0	42	* 70 - 130	14	30
1,2,3-Trichloropropane	ND	47 .9	71.4	67	*	45.7	70.0	65	* 70 - 130	5	30
1,2,4-Trichlorobenzene	ND	36.3	71.4	51	*	29.8	70.0	43	* 70 - 130	20	30
1,2,4-Trimethylbenzene	ND	39.5	71.4	55	*	34.0	70.0	49	* 70 - 130	15	30
1,2-Dibromo-3-chloropropane (DBC	ND	46.6	71.4	65		44.4	70.0	63	50 - 150	5	30
1,2-Dibromoethane	ND	49.2	71,4	69	*	49.4	70.0	71	70 - 130	1	30
1,2-Dichlorobenzene	ND	41.6	71.4	58	*	37.8	70.0	54	* 70 - 130	9	30
1,2-Dichloroethane	ND	54.8	71.4	77		54.3	70.0	78	70 - 130	1	30
1,2-Dichloropropane	ND	52.2	71.4	73		49.2	70,0	70	70 - 130	6	30
1,3,5-Trimethylbenzene	ND	42.1	71.4	59	*	34.8	70.0	50	* 70 - 130	19	30
1,3-Dichlorobenzene	ND	42.5	71.4	59	*	36.9	70.0	53	* 70 - 130	14	30
1,3-Dichloropropane	ND	49.4	71.4	69	*	49,9	70.0	71	70 - 130	1	30
1,4-Dichlorobenzene	ND	41.0	71.4	57	*	36.1	70,0	52	* 70 - 130	13	30
2,2-Dichloropropane	ND	54 .6	71,4	76		51.6	70.0	74	70 - 130	6	30
2-Butanone (MEK)	2.8	52,4	71.4	69		53,7	70.0	73	50 - 150	3	30
2-Chlorotoluene	ND	43.5	71.4	61	*	40.1	70.0	57	* 70 - 130	8	30
2-Hexanone	ND	37.1	71.4	52	*	39.3	70.0	56	* 70 - 130	6	30
2-Methyl-2-propanol	ND	1140	1430	80		1090	1400	78	50 - 150	5	30
4-Chlorotoluene	ND	44.4	71,4	62	*	38.1	70.0	54	* 70 - 130	15	30
4-Isopropyltoluene	ND	38.8	71.4	54	*	32.8	70.0	47	* 70 - 130	17	30
4-Methyl-2-pentanone	ND	50.6	71.4	71		51.1	70,0	73	70 - 130	1	30
Acetone	23	89.2	71.4	93		87.4	70.0	92	50 - 150	2	30
Benzene	ND	48.9	71.4	68	*	49.8	70.0	71	70 - 130	2	30
Bromobenzene	ND	44.3	71.4	62	*	39,3	70.0	56	* 70 - 130	12	30
Bromochloromethane	ND	51.8	71.4	73		48.9	70.0	70	70 - 130	6	30
Bromodichloromethane	ND	51.4	71.4	72		51.2	70.0	73	70 - 130	0	30
Bromoform	ND	48.3	71.4	68	*	48.0	70.0	69	* 70 - 130	1	30

QA/QC Report

Client:

Northgate Environmental

Project:

Soil

Tronox LLC Henderson/2027.001

Service Request: R0906081 Date Collected: 10/23/09 Date Received: 10/24/09 Date Analyzed: 11/1/09

Matrix Spike Summary Volatile Organic Compounds by GC/MS

Sample Name: Lab Code:

Sample Matrix:

RSAR8-34B

R0906081-024

Units: µg/Kg Basis: Dry

Analytical Method: 8260B

	Sample		Iatrix Spike Q0910 7 04-03				ate Matrix Q0910704-0		% Rec		RPD
Analyte Name	Result	Result	Amount	% Rec	;	Result	Amount	% Rec		RPD	Limit
Bromomethane	ND	37.5	71.4	53		39.1	70.0	5 6	50 - 150	4	30
Carbon Tetrachloride	ND	56.2	71.4	79		56.7	70.0	81	70 - 130	1	30
Chlorobenzene	ND	44,4	71.4	62	*	41.8	70.0	60	* 70 - 130	6	30
Chloroethane	ND	53.2	71.4	74		50.8	70.0	73	70 - 130	5	30
Chloroform	ND	57.2	71.4	80		56.3	70.0	80	70 - 130	2	30
Chloromethane	ND	64.9	71.4	91		62.4	70.0	89	70 - 130	4	30
Dibromochloromethane	ND	50.7	71.4	71		49.8	70.0	71	70 - 130	2	30
Dibromomethane	ND	50.1	71.4	70		48.3	70.0	69	* 70 - 130	4	30
Dichlorodifluoromethane (CFC 12)	ND	40.1	71.4	5 6	*	40.5	70.0	58	* 70 - 130	1	30
Dichloromethane	1.3	54.7	71.4	75		54.1	70.0	75	70 - 130	1	30
Diisopropyl Ether	ND	53.1	71.4	74		53.8	70.0	77	70 - 130	1	30
Ethyl tert-Butyl Ether	ND	53.0	71.4	74		52.9	70.0	76	70 - 130	0	30
Ethylbenzene	ND	46.2	71.4	65	*	43.1	70.0	62	* 70 - 130	7	30
Hexachlorobutadiene	ND	25.9	71.4	36	*	20,2	70.0	29	* 70 - 130	25	30
Isopropylbenzene (Cumene)	ND	46.7	71.4	65	*	42.0	70.0	60	* 70 - 130	11	30
Methyl tert-Butyl Ether	ND	55.8	71.4	78		52,4	70,0	75	70 - 130	6	30
Naphthalene	ND	39,4	71.4	55		38.3	70.0	55	50 - 150	3	30
Styrene	ND	46.6	71.4	65	*	43.4	70.0	62	* 70 - 130	7	30
Tetrachloroethene (PCE)	ND	46.3	71.4	65	*	44,9	70.0	64	* 70 - 130	3	30
Toluene	0.80	48,6	71.4	67	*	47.8	70.0	67	* 70 - 130	2	30
Trichloroethene (TCE)	ND	50.6	71.4	71		48.5	70.0	69	* 70 - 130	4	30
Trichlorofluoromethane (CFC 11)	ND	58.8	71.4	82		56.1	70,0	80	70 - 130	5	30
Vinyl Chloride	ND	56.2	71.4	79		53.8	70.0	77	70 - 130	4	30
cis-1,2-Dichloroethene	ND	53.0	71.4	74		50.6	70.0	72	70 - 130	5	30
cis-1,3-Dichloropropene	ND	49.4	71,4	69	*	50.0	70.0	71	70 - 130	ì	30
m,p-Xylenes	ND	88.7	143	62	*	81.3	140	58	* 70 - 130	9	30
n-Butylbenzene	ND	37.3	71.4	52	*	30.8	70.0	44	* 70 - 130	19	30
n-Propylbenzene	ND	42.3	71.4	59	*	36,5	70.0	52	* 70 - 130	15	- 30
o-Xylene	ND	45.4	71.4	64	*	40.6	70.0	58	* 70 - 130	11	30
sec-Butylbenzene	ND	41.3	71.4	58	*	34.0	70.0	49	* 70 - 130	19	30
tert-Amyl Methyl Ether	ND	53.1	71.4	74		52,4	70.0	75	70 - 130	ĺ	30
tert-Butylbenzene	ND	40.9	71.4	57	*	34.8	70.0	50	* 70 - 130	16	30
trans-1,2-Dichloroethene	ND	51.4	71.4	72		49.6	70.0	71	70 - 130	3	30
trans-1,3-Dichloropropene	ND	49.1	71.4	69	*	50.2	70.0	72	70 - 130	2	30

LDC# 222 45 8) SDG #:

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

2nd Reviewer: Page: Reviewer:

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

X ANNA

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

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

B)	Jak.
28540	2
LDC #:	SDG #:

VALIDATION FINDINGS WORKSHEET Internal Standards

2nd Reviewer: Page: Reviewer:_

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

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

| Y | N | N | 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?

#	Dafe	Ol elumeS	Internal	Area (Limits)	RT (l imits)	Oualifications
		9	4PCB	(228/22-302881) sts 241		J/N5/A (1)
				,		
		7	_	102219 (163197-63	652,786)	→
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						Csee Tel for
						assaided gods)
			A THE REAL PROPERTY OF THE PRO			

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

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

(FBZ) = Fluorobenzene

LDC#: 22285 B) SDG#: 3 (m

VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page: of Architecture Sud Reviewer:

sment of Data

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?

15 which with 6	2 # W	Date	Sample ID	Finding	Associated Samples	Qualifications	
15 wrende Units	is wreal Unit			Confirmation and) # M	$^{\prime} $	
				15 wrende Umits			

LDC #:_	72285 31
SDG #:	See Com

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	of
Reviewer:_	N
2nd reviewer:_	10

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

/	Υ	N	N/A
_	Y/	N	N/A

	Concentration	ing kgs	
Commonad	15	16	RPD
Compound			
<u>k</u>	1,1	0.59	0,5) (= 0.10)
nether the second control of the second cont			
	Consentation	- /	
	Concentration		
Compound			RPD
	Concentration	<u>n (</u>	
Compound			RPD
	Concentratio	n ()	
Compound		1	RPD
Compound			

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

October 28, 2009

LDC Report Date:

January 11, 2010

Matrix:

Soil/Water

Parameters:

Volatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906191

Sample Identification

RSAS8-0.5B

RSAS8-10B

RSAS8-25B

RSAS8-35B

TB102809-SO1

RSAS8-35BMS

RSAS8-35BMSD

Introduction

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

This review follows 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
11/10/09	1,1,2,2-Tetrachloroethane	27.0	All water samples in SDG R0906191	J- (all detects) UJ (all non-detects)	А

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

V. Blanks

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

Sample TB102809-SO1 was identified as a trip blank. No volatile contaminants were found in this blank.

Sample FB082809-SO (from SDG R0904894) 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
FB082809-SO	8/28/09	Acetone Toluene	9.2 ug/L 0.44 ug/L	All soil samples in SDG R0906191

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
RSAS8-0.5B	Acetone Toluene	5.9 ug/Kg 0.48 ug/Kg	
RSAS8-10B	Acetone	11 ug/Kg	11U 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
RSAS8-35BMS/MSD (RSAS8-35B)	Dichlorodifluoromethane	39 (70-130)	43 (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
178648LCS	Dichlorodifluoromethane	67 (75-125)	All soil samples in SDG R0906191	J- (all detects) UJ (all non-detects)	Р
178532LCS	Trichlorofluoromethane	129 (75-125)	All water samples in SDG R0906191	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.

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 R0906191	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

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Data Qualification Summary - SDG R0906191

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906191	TB102809-SO1	1,1,2,2-Tetrachloroethane	J- (all detects) UJ (all non-detects)	Α	Continuing calibration (%D) (c)
R0906191	RSAS8-35B	Dichlorodifluoromethane	J- (all detects) UJ (all non-detects)	А	Matrix spike/Matrix spike duplicates (%R) (m)
R0906191	RSAS8-0.5B RSAS8-10B RSAS8-25B RSAS8-35B	Dichlorodifluoromethane	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0906191	TB102809-SO1	Trichlorofluoromethane	J+ (all detects)	А	Laboratory control samples (%R) (I)
R0906191	RSAS8-0.5B RSAS8-10B RSAS8-25B RSAS8-35B TB102809-SO1	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 R0906191

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Trip Blank Data Qualification Summary - SDG R0906191

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Field Blank Data Qualification Summary - SDG R0906191

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0906191	RSAS8-0.5B	Acetone Toluene	5.9U ug/Kg 0.48U ug/Kg	А	bf
R0906191	RSAS8-10B	Acetone	11U ug/Kg	А	bf

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date:	12/29/09
Page:_	<u>lof_/</u>
Reviewer:	
2nd Reviewer:	\sim

Laboratory: Columbia Analytical Services

LDC #: 22285C1

SDG #: R0906191

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: 10 /28 /09
II.	GC/MS Instrument performance check	À	
III.	Initial calibration	A	2 RSD YV
IV.	Continuing calibration/	SW	CW = 25 }
V.	Blanks	<u> </u>	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW)	
VIII.	Laboratory control samples	SN)	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A_	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	\(\tau_{
XVII.	Field blanks	2M	TB = 5 FB = FB082809-50 (R091489)

Note:

A = Acceptable

N = Not provided/applicable SW = See worksheet

XND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

1502 Mater

		701	T	NATER		
1	RSAS8-0.5B	2	11	178648 - MB	21	31
2	RSAS8-10B		12	178648 - MB 178532 - 1	22	32
3	RSAS8-25B		13		23	33
4	RSAS8-35B	1	14		24	34
5 7	TB102809-SO1	W	15		25	35
6	RSAS8-35BMS	5	16		26	36
7	RSAS8-35BMSD		17		27	37
8			18		28	38
9			19		29	39
10			20		30	40

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

			III p.Butythenzene	CCCC.1-Chlorohexane
A. Chloromethane*	U. 1,1,2-Trichloroethane	OO. 2,2-Danooproparie		odoby Monor of Oddo
A Bromomethane	V. Benzene	PP. Bromochloromethane	JJJ. 1,2-Dichlorobenzene	DDD: 18th obj. month
	W trans-1.3-Dichlomoropene	QQ. 1,1-Dichloropropene	KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
C. Vinyi chonde		RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF. Acrolein
D. Chioroethane	A. BIGINGHII	ss 13.Dichlomomane	MMM. Naphthalene	GGGG. Acrylonitrile
E. Methylene Choride	Y, 4-Metnyl-z-pentanona		NNN 1.2.3-Trichlorobenzene	HHHH. 1,4-Dioxane
F. Acetone	Z. 2-Hexanone	11. 1,2-Dibitindeniand		ionole by your
G. Carbon disufide	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachloroethane	OOO. 1,3,5-Trichlorobenzene	Decoration (interest
L 1. Dichlomathane**	BB. 1,1,2,2-Tetrachioroethane*	VV. isopropylbenzene	Ppp. trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
	CC Tolune**	WW. Bromobenzene	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
I. 1,1-Dichloroemane		XX 103.Trichlomomogane	RRR. m.p-Xylenes	LLLL. Ethyl ether
J. 1,2-Dichloroethene, total	DD. Chlorobenzene		SCS O-X-done	MMMM. Benzyl chloride
K. Chloroform**	EE. Ethylbenzene**	ΥΥ. n-Propylbenzene	Sec. Cryptons	
i o o discharge	FF. Stynene	ZZ. 2-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN. 2 - III CTUHI- Z- Propane
L. 1,2-Digital delinate	inter court of the	AAA. 1.3.5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	.0000
M. 2-Butanone	GG. Aylenes, IOGal		A Principle	dddd
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB, 4-Chlorotoluene		0000
O. Carbon tetrachloride	II. 2-Chioroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	מממי
anethamonishin and a	J.j. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
T. Didition of the state of the	Charles and Charle	FFF sec-Butylbenzene	YYY, tert-Butanol	SSSS.
Q. 1,2-Dichloropropane**	KK. Inchlorolluorollieuralie		777 teg.Buth alcohol	TTTT.
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene		
S. Trichlomethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-isopropyttoluene	AAAA. Ethyl tert-butyl ether	
	Nin Mathyl eithyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	www.
T. Dibromochloromethane	IN. Mally and record			

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

LDC #: 22285 C)

SDG #:

VALIDATION FINDINGS WORKSHEET Continuing Calibration

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

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

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

Was a continuing calibration standard analyzed at least once every 12 hours for each instrument? Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ? Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF?	Finding %D Finding RRF Finding 10 Compound (Limit: 225.0%) (Limit: 20.05) Associated Samples	X571 BB (-7 37 8 S 178532-MB]-														
Was a continu Were percent Were all %D a	Standa	×	+													
V N/N/A V V V V V V V V V V V V V V V V V V V	Date	15	69/01/1													

SDG#: Les Com LDC #: 2225 C)

VALIDATION FINDINGS WORKSHEET

2nd Reviewer:

Reviewer:

Field Blanks

YN N/A Were target compounds detected in the field blanks? 始いた Associated sample units: もんと Associated sample units: もんと Field blank type: (circle one)を同時 Blank DRinsate / Trip Blank / Other: Were field blanks identified in this SDG?

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

Y N /N/A

(ta) 51:05 114 E E Sample Identification ٨ Associated Samples: S AV 2 ther others CAN 0.48/W F. 9 682809-58 Blank ID Blank ID 10/80/8 4 <u>2</u>. o' ϑ Compound

Blank units: Assoc	Associated sample units:	le units:				
/pe: (circ	Field Blank	/ Rinsate / Tri	p Blank / Other:	Associate	Associated Samples:	
Compound	Blank ID	Blank ID			Sample Identification	
Samiling Bale						
CRQL						

SDG #: 50 Ca-> LDC#: 2278CC/

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 NN N/A

MS/MSD. Soil / Water.

Y (N)N/A

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

#	Date	QI QSW/SW	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		6/7	Strend	3	out side liv	() St./w.!/	4	No que (165 in)
			235)	attached)	summer)	()		
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			75	39 (70-130)	43 (20-138)	()	\	J-/MI/A (m)
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		Compound	puno	QC Lim	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
	ř	1,1-Dichloroethene		69	59-172%	< 22%	61-145%	< 14%
	S.	Trichloroethene		29	62-137%	< 24%	71-120%	< 14%
	>	Benzene		-99	66-142%	< 21%	76-127%	< 11%
	55	Toluene		-63	59-139%	< 21%	76-125%	< 13%
	.00	Chlorobenzene		-09	60-133%	< 21%	75-130%	< 13%

QA/QC Report

Client:

Northgate Environmental

Project:

Tronox LLC Henderson/2027.001

Sample Matrix:

Soil

Service Request: R0906191 Date Collected: 10/28/09

Date Received: 10/29/09 Date Analyzed: 11/10/09

Matrix Spike Summary Volatile Organic Compounds by GC/MS

Sample Name:

RSAS8-35B

Lab Code:

R0906191-005

Units: μg/Kg Basis: Dry

Analytical Method: 8260B

	a 1		Tatrix Spike				ate Matrix Q0911201-0		% Rec		RPD
Analyte Name	Sample Result	Result	Q0911201-0 Amount	3 % Rea	2	Result	Amount	% Rec	Limits	RPD	Limit
1,1,1,2-Tetrachloroethane	ND	49.9	77.7	64	*	57.9	78.5	74	70 - 130	15	30
1,1,1,2-1 ettacinoloctilane 1,1,1-Trichloroethane (TCA)	ND	67.4	77.7	87		76.2	78.5	97	70 - 130	12	30
1,1,2,2-Tetrachloroethane	ND	51.4	77.7	66	*	57.8	78.5	74	70 - 130	12	30
1,1,2-Trichloroethane	ND	47.9	77,7	62	*	54.6	78.5	70	70 - 130	13	30
1,1-Dichloroethane (1,1-DCA)	ND	58.2	77.7	75		68.8	78.5	88	70 - 130	17	30
1,1-Dichloroethene (1,1-DCE)	ND	49.3	77,7	64	*	54.2	7 8,5	69	* 70 - 130	9	30
1,1-Dichloropropene	ND	50.1	77.7	64	*	57.2	78.5	73	70 - 130	13	30
1,2,3-Trichlorobenzene	ND	41.6	77.7	54	*	48.0	78,5	61	* 70 - 130	14	30
1,2,3-Trichloropropane	ND	44.1	77.7	57	*	51.6	78.5	66	* 70 - 130	16	30
1,2,4-Trichlorobenzene	ND	44.8	77.7	58	*	51.4	78.5	65	* 70 - 130	14	30
1,2,4-Trimethylbenzene	ND	52.6	77.7	68	*	60.4	78.5	77	70 - 130	14	30
1,2-Dibromo-3-chloropropane (DBC		41.1	<i>77.</i> 7	53		50.1	78.5	64	50 - 150	20	30
1,2-Dibromoethane	ND	46.7	77.7	60	*	53.1	78,5	68	* .70 - 130	13	30
1,2-Dichlorobenzene	ND	51,3	77.7	66	*	58.5	78.5	75	70 - 130	13	30
1,2-Dichloroethane	ND	52,6	77.7	68	*	62.0	78.5	79	70 - 130	16	30
1,2-Dichloropropane	ND	51.3	77.7	66	*	59.6	78.5	76	70 - 130	15	30
1,3,5-Trimethylbenzene	ND	52.8	77.7	68	*	61.2	78,5	78	70 - 130	15	30
1,3-Dichlorobenzene	ND	52.7	77.7	68	*	61.9	78.5	79	70 - 130	16	30
1,3-Dichloropropane	ND	46.0	77.7	59	*	53.8	78.5	69	* 70 - 130	16	30
1,4-Dichlorobenzene	ND	52.3	77.7	67	*	60.1	78.5	77	70 - 130	14	30
2,2-Dichloropropane	ND	65.2	77.7	84		72.2	78.5	92	70 - 130	10	30
2-Butanone (MEK)	ND	54.4	77.7	70		54.1	78.5	69	50 - 150	1	30
2-Chlorotoluene	ND	54.9	77.7	71		61.7	78.5	7 9	70 - 130	12	30
2-Hexanone	ND	32.1	77,7	41	*	37.8	78.5	48	* 70 - 130	16	30
2-Methyl-2-propanol	ND	1270	1550	82		1330	1570	85	50 - 150	4	30
4-Chlorotoluene	ND	57.2	77.7	74		65.8	78,5	84	70 - 130	14	30
4-Isopropyltoluene	ND	56.1	77.7	72		65.0	78.5	83	70 - 130	15	30
4-Methyl-2-pentanone	ND	42.5	77.7	55	*	51.8	78.5	66	* 70 - 130	20	30
Acetone	20	91.4	77.7	92		155	78.5	172	* 50 - 150	52	
Benzene	ND	47.6	77.7	61	*	56.0	78.5	71	70 - 130	16	30
Bromobenzene	ND	48.5	77.7	62	*	57.3	78.5	73	70 - 130	17	30
Bromochloromethane	ND	50.3	77.7	65	*	56,7	78.5	72	70 - 130	12	30
Bromodichloromethane	ND	56,2	77.7	72		63,4	78.5	81	70 - 130	12	30

QA/QC Report

Client:

Northgate Environmental

Project:

Tronox LLC Henderson/2027.001

Sample Matrix:

Soil

Service Request: R0906191

Date Collected: 10/28/09 Date Received: 10/29/09

Date Analyzed: 11/10/09

Matrix Spike Summary Volatile Organic Compounds by GC/MS

Sample Name:

RSAS8-35B

Lab Code:

R0906191-005

Units: µg/Kg Basis: Dry

Analytical Method: 8260B

			Iatrix Spike				ate Matrix				
	Sample	R	Q0911201-0	3			Q0911201 - 0		% Rec		RPD
Analyte Name	Result	Result	Amount	% Rec	:	Result	Amount	% Rec	Limits	RPD	Limit
Bromoform	ND	45.6	77.7	59	*	54.7	78.5	70	70 - 130	18	30
Bromomethane	ND	31.7	77.7	41	*	36.0	78,5	46	* 50 - 150	13	30
Carbon Tetrachloride	ND	57.6	77.7	74		69.4	78.5	88	70 - 130	19	30
Chlorobenzene	ND	48.4	77.7	62	*	54.2	78.5	69	* 70 - 130	11	30
Chloroethane	ND	45,4	77.7	58	*	46.8	78.5	60	* 70 - 130	3	30
Chloroform	ND	65.4	77.7	84		70.5	78.5	90	70 - 130	8	30
Chloromethane	ND	42.4	77.7	55	*	48.4	78.5	62	* 70 - 130	13	30
Dibromochloromethane	ND	50.0	77.7	64	*	57.4	78.5	73	70 - 130	14	30
Dibromomethane	ND	46.6	77.7	60	*	54.0	78.5	69	* 70 - 130	15	30
Dichlorodifluoromethane (CFC 12)	ND	30.3	77.7	39	*	33.9	78.5	43	* 70 - 130	11	30
Dichloromethane	ND	52.0	77.7	67	*	56.8	78.5	72	70 - 130	9	30
Diisopropyl Ether	ND	57.9	77.7	75		65.9	78.5	84	70 - 130	13	30
Ethyl tert-Butyl Ether	ND	61.9	77.7	80		66.8	78.5	85	70 - 130	7	30
Ethylbenzene	ND	53.4	77.7	69	*	63.4	78.5	81	70 - 130	17	30
Hexachlorobutadiene	ND	52.4	77.7	67	*	57.3	78,5	73	70 - 130	9	30
Isopropylbenzene (Cumene)	ND	57.4	77.7	74		66.0	78.5	84	70 - 130	14	30
Methyl tert-Butyl Ether	ND	55.0	77.7	71		64.0	78.5	82	70 - 130	15	30
Naphthalene	· ND	42.0	77.7	54		51.2	78.5	65	50 - 150	20	30
Styrene	ND	53.9	77,7	69	*	60.4	78.5	77	70 - 130	11	30
Tetrachloroethene (PCE)	ND	45.1	77.7	58	*	54.8	78.5	·70	70 - 130	19	30
Toluene	ND	48.6	77.7	63	*	55.2	78.5	70	70 - 130	13	30
Trichloroethene (TCE)	ND	48.4	77.7	62	*	57.0	78.5	73	70 - 130	16	30
Trichlorofluoromethane (CFC 11)	ND	55.8	77.7	72		61.7	78.5	79	70 - 130	10	30
Vinyl Chloride	ND	42.2	77.7	54	*	46.9	78.5	60	* 70 - 130	10	30
cis-1,2-Dichloroethene	ND	56.6	77.7	73		61.6	78.5	79	70 - 130	9	30
cis-1,3-Dichloropropene	ND	52.2	77.7	67	*	61,5	78.5	78	70 - 130	16	30
m,p-Xylenes	ND	99.4	155	64	*	117	157	74	70 - 130	16	30
n-Butylbenzene	ND	57.8	77.7	74		66.8	78.5	85	70 - 130	14	30
n-Propylbenzene	ND	57.8	77.7	74		67.4	78.5	86	70 - 130	15	30
o-Xylene	ND	ND	77.7	0	*	1 412	78.5	0	* 70 - 130	0	30
sec-Butylbenzene	ND	59.1	77.7	76		69.6	78.5	89	70 - 130	16	30
tert-Amyl Methyl Ether	ND	57.1	77.7	73		63.7	78.5	81	70 - 130	11	30
tert-Butylbenzene	ND	54.5	77.7	70		63.2	78.5	81	70 - 130	15	30
trans-1,2-Dichloroethene	ND	46.2	77.7	59	*	52.0	78.5	66	* 70 - 130	12	30

QA/QC Report

Client:

Northgate Environmental

Project:

Tronox LLC Henderson/2027.001

Sample Matrix:

Soil

Service Request: R0906191

Date Collected: 10/28/09 Date Received: 10/29/09

Date Analyzed: 11/10/09

Matrix Spike Summary Volatile Organic Compounds by GC/MS

Sample Name:

RSAS8-35B

Lab Code:

Units: µg/Kg Basis: Dry

R0906191-005

Analytical Method: 8260B

	Sample		Aatrix Spiko Q0911201-0			•	ate Matrix Q0911201-0	-	% Rec		RPD
Analyte Name	Result	Result	Amount	% Rec		Result	Amount	% Rec	Limits	RPD	Limit
trans-1,3-Dichloropropene	ND	51.2	77.7	66	*	60.0	78.5	76	70 - 130	16	30

LDC # 22 - 85 9 SDG # 500 60-

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Reviewer: Page:

2nd Reviewer: __

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

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

Y N 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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ualifications	(1) g (1)	No mad (MSD in			4/2 (1)																			
ĕ	5	l			J+ 00t/p																			
Associated Samples	AN Soils + 1786 48-MB				5, 178532-MB																			
RPD (Limits)		(())	(())	()	(((((((()	(
RPD ()))))													
LCSD %R (Limits)	, ,		(()	())	(())))))))
	-	, (1		^	<u> </u>	-	<u> </u>	-		_				-		_	<u> </u>	_	_	_	<u> </u>	Î
LCS %R (Limits)	761 367 67	72 (, ,		129 (<u> </u>)))))))))))))))
Compound	himod	Ι,			オス																			
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oteO	Dale																							
*	#																							

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

November 2, 2009

LDC Report Date:

January 11, 2010

Matrix:

Water

Parameters:

Volatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906270

Sample Identification

M-147B

M-147009B

EB110209-GWA3

TB110209-GWA3

Introduction

This data review covers 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.

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
11/7/09	2-Methyl-2-propanol	0.015 (≥0.05)	All samples in SDG R0906270	J (all detects) UJ (all non-detects)	А

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
11/11/09	2-Methyl-2-propanol	0.018 (≥0.05)	M-147B EB110209-GWA3 178949-MB	J (all detects) UJ (all non-detects)	А
11/12/09	2-Methyl-2-propanol	0.017 (≥0.05)	M-147009B TB110209-GWA3 179136-MB	J (all detects) UJ (all non-detects)	Α

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
178949-MB	11/11/09	1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene Naphthalene	0.29 ug/L 0.27 ug/L 0.31 ug/L	M-147B EB110209-GWA3
179136-MB	11/12/09	1,2,3-Trichlorobenzene Hexachlorobutadiene	0.34 ug/L 0.28 ug/L	M-147009B TB110209-GWA3

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

Sample TB110209-GWA3 was identified as a trip blank. No volatile contaminants were found in this blank.

Sample EB110209-GWA3 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
EB110209-GWA3	11/2/09	Acetone	4.0 ug/L	M-147B M-147009B

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

Sample PB102309-A3 (from SDG R0906095) was identified as a pump blank. No volatile contaminants were found in this blank with the following exceptions:

Pump Blank ID	Sampling Date	Compound	Concentration	Associated Samples
PB102309-A3	10/23/09	Acetone Chloroform	5.1 ug/L 0.28 ug/L	M-147B M-147009B

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) 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 R0906270	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 M-147B and M-147009B were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concentra	tion (ug/L)	DDD	D:#		
Compound	M-147B	M-147009B	RPD (Limits)	Difference (Limits)	Flags	A or P
Chloroform	43	41	5 (≤30)	-		-
Tetrachioroethene	0.48	0.55	-	0.07 (≤1.0)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Data Qualification Summary - SDG R0906270

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906270	M-147B M-147009B EB110209-GWA3 TB110209-GWA3	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	Α	Initial calibration (RRF) (c)
R0906270	M-147B M-147009B EB110209-GWA3 TB110209-GWA3	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Continuing calibration (RRF) (c)
R0906270	M-147B M-147009B EB110209-GWA3 TB110209-GWA3	All compounds reported below the PQL.	J (all detects)	А	Project Quantitation Limit (PQL) (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Laboratory Blank Data Qualification Summary - SDG R0906270

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Trip Blank Data Qualification Summary - SDG R0906270

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Equipment Blank Data Qualification Summary - SDG R0906270

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Pump Blank Data Qualification Summary - SDG R0906270

No Sample Data Qualified in this SDG

Tronox Northaate Henderson

LDC #:	22285D1	VALIDATION COMPLETENESS WORKSHEET	
SDG #:_	R0906270	Stage 2B	Pa
Laborato	ry: Columbia Analytica	al Services	Revie
			2nd Revie

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: 11/02/05	
11.	GC/MS Instrument performance check	A		
111.	Initial calibration	ŚW	2 RSD YY	
IV.	Continuing calibration/ICV	りか	COV = 252	
V.	Blanks	SN)		
VI.	Surrogate spikes	A		
VII.	Matrix spike/Matrix spike duplicates	N	Client Thec LCS	
VIII.	Laboratory control samples	A	ucs	
IX.	Regional Quality Assurance and Quality Control	N		
X.	Internal standards	A		
XI.	Target compound identification	N		
XII.	Compound quantitation/CRQLs	N		
XIII.	Tentatively identified compounds (TICs)	N		
XIV.	System performance	N		
XV.	Overall assessment of data	A		
XVI.	Field duplicates	SW	D = 1, 2	
XVII.	Field blanks	SW)	EB = 3 +TB = 4 PB = PB 102309-	-Ă

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 PB = Pump Blic

Validated Samples:

MIG Are

	ver		
1 M-147B D	11 178949 -MB	21	31
2 N _{M-147009B} b	12 179136-	22	32
3 EB110209-GWA3	13	23	33
4 2 TB110209-GWA3	14	24	34
5	15	25	35
6	16	26	36
7	17	27	37
8	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. 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 disutfide	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-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	tLLL. Ethyl ether
K. Chloroform**	EE. Ethylbenzene**	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
L. 1,2-Dichloroethane	FF. Styrene	ZZ. 2-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN. 2-Methyl-2-propanel
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000.
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB, 4-Chlorotoluene	VVV. 4-Ethyltoluene	рррр.
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC, tert-Butylbenzene	WWW. Ethanol	<u>aaaa.</u>
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
Q. 1,2-Dichloropropane**	KK. Trichlorofluoromethane	EEE. sec-Butylbenzene	YYY. tert-Butanol	SSSS.
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butył alcohol	TTTT.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-isopropyftoluene	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.

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VALIDATION FINDINGS WORKSHEET Initial 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". N N/A N N/A N N/A

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

Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's? Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation? $\frac{L}{L}$ 2. 19

Y N N/A

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

Qualifications PN. Associated Samples BIRS Finding RRF (Limit: >0.05) 0.015 Finding %RSD (Limit: <30.0%) Compound マママス Standard ID るととしまし 167/65 Date

SDC # 90S LDC #22285 b)

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?

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?

	N/A N/A	was a continuing calibration standard arialyzed at least orice every 12 nours for Were percent differences (%D) and relative response factors (RRF) within metho Were all %D and RRFs within the validation criteria of ∠25 %D and ≥0.05 RRF?	ition standard arialyzers (%D) and relative re- within the validation cr	u at least office every sponse factors (RRF) iteria of ∠25 %D and	est once every 1z nous for each instruments for all C sectors (RRF) within method criteria for all C of ≤25 %D and ≥0.05 RRF?	idst office every 12 flours for each final office. te factors (RRF) within method criteria for all CCC's and SPCC's ? of ≤25 %D and ≥0.05 RRF ?	~	
*	Date	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications	
	69 11/11	F4268	NNNN		0.018	1,3, 178949-MB	3/M5/A (9	7-
		3 - 3 7 1	/4 is 34 34		2100	44 751 BC1 4 C	1 /11 /4	Ţ
	11/25/05	6/64	2 2 2			-	Y.	Ţ
								Ī

LDC # 22285D/ SDG #:

VALIDATION FINDINGS WORKSHEET

Blanks

of

Page:

2nd Reviewer. Reviewer:

निक्वse 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?

Was there contamination in the method blanks? If yes, please see the qualifications below. $\frac{1}{3} \frac{1}{3} \frac$ -U Associated Samples: Blank analysis date: Conc. units: Y N N/A V/N N/A

Sample Identification 178949-1 0,27 Blank ID 0, 29 4 ò マスス MMM スペス Compound

12/04

Blank analysis date:

Sample Identification Associated Samples: 170136-M Blank ID 0, 28 0.34 NNN Compound Conc. units:

(DC#: 72365D) SDG #:_

VALIDATION FINDINGS WORKSHEET Field Blanks

Page: __l of__ Reviewer:_ 2nd Reviewer:

(M)

Associated Samples:

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

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

Y N N/A

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

Blank units: 49 /L

Associated sample units: 49 /L

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

打

ntification							
Sample Identification							
							ns L
Blank ID							l
Blank ID 3	11/63/64	4.0					
Compound	ı	#-					nc //
Com							

Associated Samples: 4 Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other Associated sample units: Blank units: "9/6

		Ī						
Sample Identification		(8d	\					
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Sa		D or						
		\ \?						
		ither						
		HSUITS either ND or >						
		nsn				***		
		II W			-			
Slank ID								
アダルスタのターチン Blank ID Blank ID	10/25/01	5.1	0,28			_		
Compound	oling Dafe	L	¥					
<u>ن</u>								

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SDG #:_			

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	l of/
Reviewer:_	Dr.
2nd reviewer:_	1

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

1	P	N	N/A
	¥	N	N/A

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

	Concentra	100 /15/L	Pare
•	Concentra	1	- Con
Compound		Y	
k	43	41	5 (2302 RPD).
A_	0, 48	0.55	0,07 (21.0 D)
	Concentrat	ion ()	
Compound			RPD

			·
	Concentrat	ion (
Compound			RPD
	Concentrati	on ()	
Compound			RPD

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

November 5, 2009

LDC Report Date:

January 11, 2010

Matrix:

Soil/Water

Parameters:

Volatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906403

Sample Identification

SA77-0.5B SA77-10B SA77009-10B TB110509-SO1

Introduction

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

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

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

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
10/31/09	2-Methyl-2-propanol	0.028 (≥0.05)	All water samples in SDG R0906403	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
11/17/09	Dichlorodifluoromethane	29.0	All water samples in SDG R0906403	J+ (all detects)	А
11/17/09	2-Butanone	25.9	All water samples in SDG R0906403	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
11/17/09	2-Methyl-2-propanol	0.025 (≥0.05)	All water samples in SDG R0906403	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
179830-MB	11/17/09	Hexachlorobutadiene	0.28 ug/L	All water samples in SDG R0906403

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

Sample TB110509-SO1 was identified as a trip blank. No volatile contaminants were found in this blank.

Sample FB082809-SO (from SDG R0904894) 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
FB082809-SO	8/28/09	Acetone Toluene	9.2 ug/L 0.44 ug/L	All soil samples in SDG R0906403

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
SA77-10B	Acetone	16 ug/Kg	16U ug/Kg

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0906403	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 SA77-10B and SA77009-10B were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concentration (ug/Kg)					
Compound	SA77-10B	SA77009-10B	RPD (Limits)	Difference (Limits)	Flags	A or P
2-Butanone	1.2	1.2	•	0 (≤10)	-	-
Acetone	16	22		6 (≤20)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Data Qualification Summary - SDG R0906403

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906403	TB110509-SO1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Initial calibration (RRF) (c)
R0906403	TB110509-SO1	Dichlorodifluoromethane	J+ (all detects)	А	Continuing calibration (%D) (c)
R0906403	TB110509-SO1	2-Butanone	J- (all detects) UJ (all non-detects)	А	Continuing calibration (%D) (c)
R0906403	TB110509-SO1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Continuing calibration (RRF) (c)
R0906403	SA77-0.5B SA77-10B SA77009-10B TB110509-SO1	All compounds reported below the PQL.	J (all detects)	А	Project Quantitation Limit (PQL) (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Laboratory Blank Data Qualification Summary - SDG R0906403

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Trip Blank Data Qualification Summary - SDG R0906403

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Field Blank Data Qualification Summary - SDG R0906403

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0906403	SA77-10B	Acetone	16U ug/Kg	А	bf

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LDC #:	22285E1	VALIDATION COMPLETENESS WORKSHEET	Date: 6/31/66
SDG #:	R0906403	Stage 2B	Page: <u>l</u> of <u>/</u>
Laboratory	r: Columbia Analytic	al Services	Reviewer: N6
	000000000000000000000000000000000000000		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: 11/65/65
11.	GC/MS Instrument performance check	A	' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '
# 11.	Initial calibration	SW	2 RSD r
IV.	Continuing calibration/ICV	SW	Ca € 25 8
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	(lient spec
VIII.	Laboratory control samples	Ą	us
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	Ą	
XVI.	Field duplicates	Sw	0 = 2,3
XVII.	Field blanks	SW	TTB = 4 FB = FB682809-50 (R6964894

Note:

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

**ND = No compounds detected R = Rinsate

FB = Field blank

D = Duplicate TB = Trip blank

EB = Equipment blank

Validated Samples:

+ Water

		·				
1 1	SA77-0.5B \$	11	178847-MB	21	31	
2	SA77-10B 👂]	12)	179830	22	 32	
3 1	sa77009-10B <i>Љ</i> 🕽	13		23	33	
4 7	TB110509-SO1	14		24	34	
5		15		25	35	
5 6		16		26	36	
7		17		27	37	
8		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-Trichioroethane	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 allonde	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 disutfide	AA. Tetrachioroethene	UU. 1,1,1,2-Tetrachlomethane	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. dis-1,2-Dichloroethene	KKKK. Propionitrite
J. 1,2-Dichloroethene, total	DD. Chlorobenzene⁴	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-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN. 2-Methyl-2-propanel
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000.
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	рррр.
0. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	යයය.
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	MiM. 1,2-Dibromo-3-chloropropane	GGG. p-tsopropyrtoluene	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.

<u> </u>	}
SE	3
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4	9
#	#
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VALIDATION FINDINGS WORKSHEET Initial Calibration

ot	370	2
Lage:	Reviewer:	2nd Reviewer:

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

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

Did the laboratory perform a 5 point calibration prior to sample analysis? Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's? Was a curve fit used for evaluation? $\frac{r}{r} \stackrel{?}{=} \stackrel{?}{=$

alidation criteria of /30 %BSD and >0.05 BBE 2 Did the initial calibration meet the acceptance criteria?

22285 E) 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".

	A A A	Was a continuing calibration standard analyzed at le Were percent differences (%D) and relative respons Were all %D and RRFs within the validation criteria	 Was a continuing calibration standard analyzed Were percent differences (%D) and relative results. Were all %D and RRFs within the validation criticals. 	d at least once every 12 hours for e sponse factors (RRF) within metho iteria of ≤25 %D and ≥0.05 RRF ?	Was a continuing calibration standard analyzed at least once every 12 hours for each instrument? Were percent differences (%D) and relative response factors (RRF) within method criteria for all C Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF?	Was a continuing calibration standard analyzed at least once every 12 hours for each instrument? 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 ?	s?	
#	Date	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications	
	11/7/66	62396	777		0, 025	4 179830-MB	J/MJ/A	(9)
				29.0			J+ dets /A	
		-	(-) W	25.9			J-/WJ/A	1

E	
28626	
LDC #:	

SDG #:

VALIDATION FINDINGS WORKSHEET Blanks

Page: Reviewer:	Jo.) ()	1
200	Page:	Reviewer:	2nd Reviewer:

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

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

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

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

(ay) $\sqrt{N N/A}$ Was there contamination in the method blanks? If yes, please see the qualifications below. Blank analysis date: 11 $\sqrt{2}$ /6 5Associated Samples:

Sample Identification 179830m Blank ID 0.28 ここ Compound Conc. units:

					,	
	fication					
-	Sample Identification					
nples:						
Associated Samples:						
	Blank ID					
Blank analysis date:	Compound	-				

(458ccc #) SDG#:_

VALIDATION FINDINGS WORKSHEET Field Blanks

2nd Reviewer: Reviewer:_

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

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: V9/L Associated sample units: V9/K5/Field blank type: (circle one) Field Blank Rinsate / Trip Blank / Other:

All siils (bf) R Sample Identification Associated Samples: ٤ S ف (44) FB033809-50 Blank ID Blank ID 8/23/09 440 4 Sampling Date Compound CROL

Blank units: Associated sample units: Associated Slank / Rinsate / Trip Blank / Other:

Associated Samples:

Compound	Blank ID	Blank ID		Sample Identification	ntification		
Sampling							
CRQL							

LDC #: 22245 E | SDG #: Su Crad

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:	1 of 1
Reviewer:	216
2nd reviewer:	8/

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

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

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

	Concentrati	on uskes	Parox
Compound	2	3	RPD
M	1,2	1,2	0 (=10)
	16	22	6 (£ 20 þ) _
			and the second s
	Concentrati	on ()	
Compound			RPD
		-	
	Concentrati	on ()	
Compound			RPD
	Concentrati	on ()	
Compound			RPD

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation.

Henderson, Nevada

Collection Date:

November 11, 2009

LDC Report Date:

January 11, 2010

Matrix:

Water

Parameters:

Volatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906477

Sample Identification

M-122B

TB111109-GW1

Introduction

This data review covers 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
10/31/09	2-Methyl-2-propanol	0.028 (≥0.05)	All samples in SDG R0906477	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	AorP
11/19/09	Acetone	27.3	All samples in SDG R0906477	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
11/19/09	2-Methyl-2-propanol	0.024 (≥0.05)	All samples in SDG R0906477	J (all detects) UJ (all non-detects)	Α

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
180234-MB	11/19/09	Hexachlorobutadiene	0.33 ug/L	All samples in SDG R0906477

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

Sample TB111109-GW1 was identified as a trip blank. No volatile contaminants were found in this blank.

Sample PB102309-A3 (from SDG R0906095) was identified as a pump blank. No volatile contaminants were found in this blank with the following exceptions:

Pump Blank ID	Sampling Date	Compound	Concentration	Associated Samples	
PB102309-A3	10/23/09	Acetone Chloroform	5.1 ug/L 0.28 ug/L	M-122B	

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) 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 R0906477	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

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Data Qualification Summary - SDG R0906477

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906477	M-122B TB111109-GW1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Initial calibration (RRF) (c)
R0906477	M-122B TB111109-GW1	Acetone	J- (all detects) UJ (all non-detects)	Α	Continuing calibration (%D) (c)
R0906477	M-122B TB111109-GW1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	А	Continuing calibration (RRF) (c)
R0906477	M-122B TB111109-GW1	All compounds reported below the PQL.	J (all detects)	Α	Project Quantitation Limit (PQL) (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Laboratory Blank Data Qualification Summary - SDG R0906477

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Trip Blank Data Qualification Summary - SDG R0906477

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Volatiles - Pump Blank Data Qualification Summary - SDG R0906477

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #: 22285F1 Stage 2B SDG #: R0906477 Laboratory: Columbia Analytical Services

Reviewer: 2nd Reviewer:

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 11/11/09
11.	GC/MS Instrument performance check	A	
III.	Initial calibration	Sh	7 RSD r
IV.	Continuing calibration/ICV	SW	CW & 25 Z
V.	Blanks	SW	
VI.	Surrogate spikes	<u> </u>	
VII.	Matrix spike/Matrix spike duplicates	N	Client spec.
VIII.	Laboratory control samples	A	tcs
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	N	<u> </u>
XVII.	Field blanks	SW	*TB = 2 PB = PB102309- A3 (R0906095)

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

PB = Pump Blk

Validated Samples:

	WW	te/			
1	M-122B	11	180234-MB	21	31
2	TB111109-GW1	12		22	32
3		13		23	33
4		14		24	34
5		15		25	35
6		16		26	36
7		17		27	37
8		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-Chloronexane
8 Bromomethane	V. Benzene	PP. Bromochloromethane	JJJ. 1,2-Dichlorobenzene	DDDD. Isopropyl alcohol
C Vind shoride*	W. trans-1.3-Dichloropropene	QQ. 1,1-Dichloropropene	KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
C. Vinit Ground	X Bromoform*	RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF. Acrolein
Dichigramethane	V 4-Methyd-2-neotanone	SS. 1.3-Dichloropropane	MMM. Naphthalene	GGGG. Acrytonitrile
E. Methylene Gnoride	7 2-Hevepone	1 -	NNN. 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
r. Acetone	A A Total bandhown	1 7	OOO. 1,3,5-Trichlorobenzene	IIII. Isobutyi alcohol
G. Carbon disuffide	AA. renachioreurene		ppp. trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
H. 1,1-Dkchloroemene	DD. 1, (-4,4-104 act	WWW Consolored	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
I. 1,1-Dichloroethane*	CC. Toluene	WW. Digitalization		
J. 1.2-Dichloroethene, total	DD. Chlorobenzene*	XX. 1,2,3-Trichloropropane	RRR. m.p-Xylenes	LLLL. Ethyl ether
K Chlomfom**	EE. Ethylbenzene**	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
1 2.Dichlomathane	FF. Styrene	ZZ. 2-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN. 2-Methyl-2-propanol
D. D. Butanoose	GG. Xvienes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000.
M. 4-Dutandro	HH Vinvi acetate	BBB, 4-Chlorotoluene	VVV. 4-Ethyltoluene	рррр.
N. 1, 1, 1-111childrendendendendendendendendendendendendende	11 2-Chlomethylviny ether	CCC, tert-Butylbenzene	WWW. Ethanol	0000.
O. Carbon tetractionide		ODD 124-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
P. Bromodichloromethane	JJ, DIGHOODHINGON BANGAN	CEE sec-Buildhersene	YYY, tert-Butanol	SSSS.
Q. 1,2-Dichloropropane	KK. Inchiororiuorometriene			
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alconol	
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG, p-isopropyttoluene	AAAA. Ethyl tert-butyl ether	uuuu.
T Dimmochlommathana	NN. Methyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	ww.
1. Digitilization of the state				

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

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50	4
55	4
#	#
LDC	SDG

VALIDATION FINDINGS WORKSHEET Initial 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".

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{1}{2

Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF?	Associated Samples														
Res within the v	Compound	NAN	N N N N												
Nere all %RSDs and RF	Standard ID	ICAI MOIN	01011-1401												
V A/N/N/A	و ا	<u>↓</u>	10/10/01												

LDC # 22285F SDG#:

VALIDATION FINDINGS WORKSHEET Continuing Calibration

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

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

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

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

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Qualifications	. C I	JAJA T																							
Associated Samples	A11 + B115	\																							
Finding RRF (Limit: >0.05)		0.624																							
Finding %D (Limit: <25.0%)	27.3																								
Compound	(-) 4	K N N A	N A A A																						
Standard ID	(シイヨン	2/ 500																							
# Date	1, / 4 /	1000																							
1											L				L			<u> </u>					L		

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DC #:	# DQ

VALIDATION FINDINGS WORKSHEET Blanks

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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/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: 1/14/69 *-- ★* Associated Samples:

Γ		Ī	T			
/an	tion					
//	Sample Identification					
Ŧ	Sarr					
ples:						
Associated Samples:						
Asso						
				_		
		α				
-	Blank ID	180239-MR	0.33			
4			717			
Conc. units: 45/	Compound		17			
Conc. uni	٥					

	ıtion			
	Sample Identification			
	S			
Associated Samples:				
Ass				
	Blank ID			
ıte:	punc			
Blank analysis date:Conc. units:	Compound			

SDG#: 22285 F)

VALIDATION FINDINGS WORKSHEET Field Blanks

Page:___ 2nd Reviewer._ 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?

Were target compounds detected in the field blanks?

Were target compounds detected in the field blanks?

Sample Identification Associated Samples: E Ę el The PB Results Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: PPル2569~4.B Blank ID Blank 10/25/09 80 Compound

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						
Compound	Sampling Date					

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Data Validation Reports LDC #22285

Semivolatiles



Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

October 22 through October 26, 2009

LDC Report Date:

January 8, 2010

Matrix:

Soil

Parameters:

Semivolatiles

Validation Level:

Stage 4

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906056

Sample Identification

RSAQ8-10BSPLP2

RSAQ8-31BSPLP2

SA34-10BSPLP2

SA34-10BSPLP3

SA34-31BSPLP2

SA34-31BSPLP3

RSAQ8-10BSPLP3

RSAQ8-31BSPLP3

Sample sin this SDG underwent SPLP extraction

Introduction

This data review covers 8 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

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

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

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

Date	Compound	%D	Associated Samples	Flag	A or P
11/11/09	1,4-Dioxane	27.6	RSAQ8-10BSPLP2 RSAQ8-31BSPLP2 SA34-10BSPLP3 SA34-31BSPLP3	J+ (all detects)	A

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

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

V. Blanks

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

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
SPLP3-BLK1	10/29/09	Bis(2-ethylhexyl)phthalate Di-n-butylphthalate	1.2 ug/L 2.9 ug/L	RSAQ8-10BSPLP3 RSAQ8-31BSPLP3
SPLP2-BLK1	11/2/09	Di-n-butylphthalate	3.1 ug/L	RSAQ8-10BSPLP2 RSAQ8-31BSPLP2
SPLP3-BLK2	11/3/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Di-n-butylphthalate	0.45 ug/L 0.11 ug/L 3.7 ug/L	SA34-10BSPLP3 SA34-31BSPLP3
SPLP2-BLK2	11/4/09	Butylbenzylphthalate Di-n-butylphthalate	0.12 ug/L 2.3 ug/L	SA34-10BSPLP2 SA34-31BSPLP2

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
RSAQ8-10BSPLP3	Bis(2-ethylhexyl)phthalate Di-n-butylphthalate	0.42 ug/L 3.0 ug/L	0.42U ug/L 3.0U ug/L
RSAQ8-31BSPLP3	Bis(2-ethylhexyl)phthalate	0.33 ug/L	0.33U ug/L
SA34-10BSPLP3	Di-n-butylphthalate	2.7 ug/L	2.7U ug/L
SA34-10BSPLP2	Di-n-butylphthalate	3.7 ug/L	3.7U 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) and relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
99895-LCS/D (RSAQ8-10BSPLP2 RSAQ8-31BSPLP2 SA34-10BSPLP3 SA34-31BSPLP3 RSAQ8-10BSPLP3 RSAQ8-31BSPLP3 99895-MB SPLP2-BLK1 SPLP3-BLK1 SPLP3-BLK2)	Pyridine 1,4-Dioxane	27 (50-120) 42 (50-120)	30 (50-120) 44 (50-120)	-	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	Р
100006LCS/D (SA34-10BSPLP2 SA34-31BSPLP2 SPLP2-BLK2 100006-MB)	Pyridine	11 (50-120)	20 (50-120)	58 (≤30)	J (all detects) UJ (all non-detects)	Р
100006LCS/D (SA34-10BSPLP2 SA34-31BSPLP2 SPLP2-BLK2 100006-MB)	1,4-Dioxane	32 (50-120)	26 (50-120)	-	J- (all detects) UJ (all non-detects)	Р

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

All target compound identifications were within validation criteria.

XII. Project Quantitation Limit

All project quantitation limits were within validation criteria

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0906056	All compounds reported below the PQL.	J (all detects)	A

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable.

XV. Overall Assessment

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

XVI. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0906056

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906056	RSAQ8-10BSPLP2 RSAQ8-31BSPLP2 SA34-10BSPLP3 SA34-31BSPLP3	1,4-Dioxane	J+ (all detects)	А	Continuing calibration (%D) (c)
R0906056	RSAQ8-10BSPLP2 RSAQ8-31BSPLP2 SA34-10BSPLP3 SA34-31BSPLP3 RSAQ8-10BSPLP3 RSAQ8-31BSPLP3	Pyridine 1,4-Dioxane	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0906056	SA34-10BSPLP2 SA34-31BSPLP2	Pyridine	J (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R)(RPD) (I,ld)
R0906056	SA34-10BSPLP2 SA34-31BSPLP2	1,4-Dioxane	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0906056	RSAQ8-10BSPLP2 RSAQ8-31BSPLP2 SA34-10BSPLP2 SA34-10BSPLP3 SA34-31BSPLP2 SA34-31BSPLP3 RSAQ8-10BSPLP3 RSAQ8-31BSPLP3	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0906056

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0906056	RSAQ8-10BSPLP3	Bis(2-ethylhexyl)phthalate Di-n-butylphthalate	0.42U ug/L 3.0U ug/L	А	bl
R0906056	RSAQ8-31BSPLP3	Bis(2-ethylhexyl)phthalate	0.33U ug/L	А	bl
R0906056	SA34-10BSPLP3	Di-n-butylphthalate	2.7U ug/L	А	bl
R0906056	SA34-10BSPLP2	、Di-n-butylphthalate	3.7U ug/L	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0906056

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

SDG #: R0906056 Stage 4
Laboratory: Columbia Analytical Services

Date: 12/31/0 1

Page: 1 of 1

Reviewer: 2N6

2nd Reviewer: _____

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

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

			T
	Validation Area		Comments
l.	Technical holding times	A	Sampling dates: 10 /22 - 26 /0 9
11.	GC/MS Instrument performance check	A	,
111.	Initial calibration	≱	2 RSp r7 ca/101 £ 25 }
IV.	Continuing calibration/ICV	SW	Car/101 € 25 }
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	Client Spec
VIII.	Laboratory control samples	SW)	us /b
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	A	
XII.	Compound quantitation/CRQLs	A	
XIII.	Tentatively identified compounds (TICs)	2	
XIV.	System performance	1	
XV.	Overall assessment of data	Á	
XVI.	Field duplicates	N	
XVII.	Field blanks	2	

Note:

LDC #:

22285A2a

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:

Sa'l

1 RSAQ8-10E	BSPLP2 11	99895-MB	21	31
- 1/1 2 RSAQ8-31E	3SPLP2 12 3	100006 - 1	22	32
3 2 SA34-10BS	PLP2 13	CPLP3 - BIKI	23 (1)	33
4 V SA34-10BS	PLP3 14	SPLP2- BIK!	24 (1)	34
5 SA34-31BS	PLP2 15	SPLP3. BINY	11 /0 3 (1) 25	35
- 1/5 6 SA34-31BS	+ 6	SPLPZ - BIKT	26 (5)	36
7 RSAQ8-10	BSPLP3 17		27	37
+ \/3 8 RSAQ8-31I	BSPLP3 18		28	38
9	19		29	39
10	20		30	40

VALIDATION FINDINGS CHECKLIST

Method: Semivolatiles (EPA SW 846 Method 8270C)

	T T	T	T	T
Validation Area	Yes	No	NA	Findings/Comments
T. Technical holding times	T	г F		An Emperical Control of the property of the Control
All technical holding times were met.		_	-	
Cooler temperature criteria was met.				
II. GC/MS insurant pendimense crazi				A CONTROL OF THE PROPERTY OF T
Were the DFTPP 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?				
Were all percent relative standard deviations (%RSD) \leq 30% and relative response factors (RRF) \geq 0.05?				
IV. Continuing calibration				er de la companya de
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 for each matrix and concentration?				
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		/		
VI. Surrogate spikes				A SECURITY OF THE SECURITY OF
Nere all surrogate %R within QC limits?	_			
f 2 or more base neutral or acid surrogates were outside QC limits, was a eanalysis performed to confirm %R?				
f any %R was less than 10 percent, was a reanalysis performed to confirm %R?				
/II. Matrix spike/Matrix spike duplicates				Manager Committee of the Committee of th
Vere a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each natrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.			-	
Vas a MS/MSD analyzed every 20 samples of each matrix?				
Vere the MS/MSD percent recoveries (%R) and the relative percent differences RPD) within the QC limits?			7	
III. Laboratory control samples			14,85	opte process as a second secon
Vas an LCS analyzed for this SDG?	7	$\overline{}$		

LDC #: See Cover

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2 Reviewer: 50 2nd Reviewer: V

	7			
Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?	/			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?				
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		/		
Were the performance evaluation (PE) samples within the acceptance limits?		20.0-1	_	
X Internal standards				A CONTRACTOR OF THE CONTRACTOR
Were internal standard area counts within -50% or +100% of the associated calibration standard?				
Were retention times within ± 30 seconds from the associated calibration standard?				
XI. Target compound identification				A CONTRACTOR OF THE STATE OF TH
Were relative retention times (RRTs) within \pm 0.06 RRT units of the standard?				
Did compound spectra meet specified EPA "Functional Guidelines" criteria?				
Were chromatogram peaks verified and accounted for?				The control of the co
XII. Compound quantitation/CRQLs				A series of the
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)	n e			
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				en e
System performance was found to be acceptable.				
XV Overell assessment of data				MO CHANGE THE PROPERTY OF THE
Overall assessment of data was found to be acceptable.		,		· · · · · · · · · · · · · · · · · · ·
√VI Field duplicates				220 1000
Field duplicate pairs were identified in this SDG.		7		
Target compounds were detected in the field duplicates.			7	
KVII. Field blanks				
Field blanks were identified in this SDG.		7	T	
Target compounds were detected in the field blanks.			7	

VALIDATION FINDINGS WORKSHEET

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

A. Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene™	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene™	T. 4-Chloroaniline	II. 4-Nitrophenol⁴	XX. Di-n-butyiphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene™	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethyiphthalate	AAA. Butylbenzylphthalate	PPP, Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chiorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine⁴	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	00. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TT. 1,4. Dioxane
M. Isophorone	BB. 2-Nitroanlline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	unu octachloristyrene
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	WW.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	WWW.

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

LDC# 22285 AVA

VALIDATION FINDINGS WORKSHEET

Continuing Calibration

Reviewer 2nd Reviewer:

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

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

X N N/A V N N/A

س Qualifications コナダイヤ/4 Associated Samples Finding RRF (Limit: >0.05) Finding %D (Limit: <25.0%) C Compound Standard ID AW048 100 Date

22785 A24	Jan 2
LDC #:	# 500

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 BNA (EPA SW 846 Method 8270C)

Was a method blank analyzed for each matrix?

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

Y/N N/A

PO ^ Associated Samples ▼ N N/A Was the blank contaminated? If yes, please see qualification below. \$pt? Blank extraction date: 10/29/69 Blank analysis date: 11 1/0 1/05 Conc. units:

	(~ a)	ication						
•	80	Sample Identification						
j	7							
	Associated Samples:							
4 109	Associa		8	10.33/11				
ysis date: 11			7	0,42/4	3,0/4	`		
Blank anal		Blank ID	5PLP3-BLK1	1,2	2.9			
19 Blank extraction date: 10/29/69 Blank analysis date: 11/11/0	Conc. units: NS/L	Compound		EFE	ΧX			

Sp.p Blank extraction date: 11/62/9 Blank analysis date: 11/11/69 Conc. units: 145 /

4

Sample Identification Associated Samples: Sprp2 BIK Blank ID ш — X Compound

5x Phthalates 2x all others

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A 20	ع
22285	7
LDC #:_	SDG #:

VALIDATION FINDINGS WORKSHEET Blanks

Page: Zof Z 2nd Reviewer: Reviewer:

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

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"N". Not applicable questions are identified as "N/A	
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Was a method blank analyzed for each matrix? Y N N/A

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

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

Blank extraction date: 11/63/69 Blank analysis date: 11. Y/N N/A

(89) Sample Identification Associated Samples: 2.7/U SPLP 3-BIK Blank ID 0.45 2.7 = · a AAA EEE × MSA Compound Conc. units:

3 Associated Samples: Blank extraction date: 11 /4/69 Blank analysis date: 11 /12/09 Conc. units: WA/L ands

(79

īcation							
Sample Identification							
					The state of the s		
	50 LP2-B1K7 3		2.3 3.7/4				
Blank ID	8-29192	4.0	2.3				
Compound		444	××				

5x Phthalates 2x all others

LDC #: 22285 A24 SDG #:

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

Reviewer: _ 2nd Reviewer: _ Page: __

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

][<u></u>	7	Т	T	T	4	a		7		П			٦	7		٦		T		7	T	T	П	
Qualifications	5-145/0					5/45/P(L	J-/45/P (L)																		
	'gw	BKI.																							-
Associated Samples	12 4 6-8 99895-MB	5PLP2-BIKI SPLP3-BIK	5PLP3-BKY			3 5 SPLP2-Blkz,	100006-MB																		
RPD (Limits)	()	()	()		()	(04) 85))	(())			())	_))		(
	70)	Î	^	,	^	ſ	Ŝ	_	1		1	1	1	1	1	-	-	7		-	_	_	^	_	
LCSD %R (Limits)	(ex1/25) &	1))	•	20 (26 ()	,)	,	,					,	,		_	_	_	_	_	J
(slimit) a%	27 (50-120)	1		,	(37 (,														((
7	K & R	1 1 1	, , ,			000	1 L																		
1 100	A A B A C I C A	TO TO THE WILL				18000 LSA	ļ																		
	Date																								
	#																				1				\perp

LDC # 2225 Ara SDG #: See Cover

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Page: lof 2nd Reviewer: Reviewer:

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

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

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

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

A_b = Area of associated internal standard C_b = Concentration of internal standard X = Mean of the RRFs

		NA		Reported	Recalculated	Reported	Recalculated	Reported	Receiculated
*	# Standard ID	Calibration Date	Compound (Reference Internal Standard)	RRF (/o, o std)	RRF (16.0 std)	Average RRF (initial)	Average RRF (initial)	%RSD	%RSD
	1641	10 6-160	Phene (1St internal standard)	Ž	1.740	1.608	1.603	6.62	6.81
		L	Naphthalene (2nd internal standard)		1.005	1.096	1.096	5.73	5.73
		,	Fluorene (3rd internal standard)		1,166	1.137	1.137	4.97	4.97
		-	Pentachiorophenol (4th internal standard)		1.119	1,167	1.167	14.8	69'8
			Bis(2-ethylhexyl)phthalate (5th internal standard)		6.943	0.944	0.944	13,68	12.60
_			Renzo(a)pigene (6th internal standard)		1. 949	1.382	1.282	1201	15.01
7	15)	10 / 100	Phench (1st internal standard)		1.246	1.15/	1.151.1	14.60	14.59
			Naphthalene (2nd internal standard)		1,034	1.044	1.044	36.6	3.36
			Fluorene (3rd internal standard)		1.297	1.286	1.286	26.3	16.2
			Pentachlomphengl (4th internal standard)		1.05/	1.168	1.105	4.67	4.67
			Bis(2-ethylhexyl)phthalate (5th internal standard)		0.753	0.787	0.787	8.49	8.46
			Benzo(a)pyrene (Sth internal standard)	Ź	e547	1.343	1.243	7.28	7.28
٣			Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)						
	•		Fluorene (3rd internal standard)						
			Pentachlorophenol (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						

10/27/09

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 10/11/01

esults.		4.0	2,0	0,01	4.0	9, 9	2.01
	Pyridine	1.659	1.614	1.740	1.147	1, 229	1,246
	Na. o tra	1, 12)	1,078	1.065	240	1.062	1.02
	# En prene	1. 212	1.186	-, -60		1. 3.4.1	2 1 1 0
	Phender	781.	1.161	611	3000	7007	-
	Mis 12-eh)ph	1.044	1.032	0.943	40.	106.0	150
SC O IOINI	Benzo (A) Du	1.361	× ×	777	578 0	\	67/2
03:030m				(++-)	2.250	Cot .	**

LDC # 22285 A26 SDG # See Cover

VALIDATION FINDINGS WORKSHEET Continuing Calibration Results Verification

Page: l of 1.
Reviewer: JV.
2nd Reviewer: 1.

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

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

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

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

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

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

						Reported	Recalculated	Reported	Recalculated
	*	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	RRF (CC)	RRF (CC)	G %	%D
1,2,4,6	-	AW 048	1 A. 169	Phenol (St internal standard)	1,608	1.857	1.857	15,5	15,5
				Naphthalene (2nd internal standard)	1.096	1.135	1,135	3.6	ジ を
				Fluorene (3rd internal standard)	1,157	1.199	1,199	なな	5.5
				Penfachlorophenol (4th internal standard)	1,167	1, 136	1.136	2,7	2.7
-00				Bis (2-ethylhexyl)phthalate (5th internal standard)	0, 944	2011	1, 10 7	17.3	£ 21
				Benzo(a)pyrene (6th internal standard)	1, 282	1,309	1,304	١, ٧	7)
0天/0天/	2	DC 325	11/1/04	Phene (1st internal standard)	1.151	1,137	1, 137	1.7	1,2
Sprp3-B				Naphthalene (2nd internal standard)	1.044	1,050	1.050	9.0	2,0
27.43	Ą			Fluorene (3rd internal standard)	1.286	1.297	1,297	6.0	6.9
L_W ∞				14 U U V V V V V V V V V V V V V V V V V	1.105	1,107	1.107	اح 'و	0.7
				Bis(2-ethylhexyl)phthalate (5th internal standard)	0787	296.0	6,795	۵٬۱	6-1
				Renzo(a)pyrene (6th internal standard)	1,243	1,319	1.319	(,)	١, ٦
ى ئ	3	१८६ ज्य	11/2/04	PKR (1st internal standard)	_	1,099	1.099	4.5	4.6
2-24nds		,	•	Naphthalene (2nd internal standard)		1,072	1.047	٥,٧	٥, ٧
,				Fluorene (3rd internal standard)		1, 293	1.293	2.0	٥٠٧
				Pentachhanol (4th internal standard)		1, 120	051.1	† ••	1.3
				Bis(2-ethylhexyl)phthalate (5th internal standard)		253.0	0.535	ა. გ	8.6
				Benzo(a)pyrene (6th internal standard)		(,245	1.245	8.7	87

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#: 22285 AV SDG#: Sre Cover

VALIDATION FINDINGS WORKSHEET **Surrogate Results Verification**

Page:	<u>lof_1</u>
Reviewer:	376
2nd reviewer:	[h

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

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

% Recovery: SF/SS * 100

Where: SF = Surrogate Found

SS = Surrogate Spiked

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	2.00	1, 94	97	47	0
2-Fluorobiphenyl		1,4)	81	8)	
Terphenyl-d14	}	2.07	101	[0]	
Phenol-d5					7
2-Fluorophenol					
2.4.6-Tribromophenol					

Sample ID:

2-Chlorophenol-d4 1,2-Dichlorobenzene-d4

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5	·				
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4		,			

LDC# 2285 # 20

SDG #: See Corr

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

Reviewer: Nb

Page: __lof_1 2nd Reviewer:

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

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

% Recovery = 100 * (SC/SA

SSC = Spike concentration SA = Spike added Where:

RPD = I LCSC - LCSDC I* 2/(LCSC + LCSDC)

LCSC = Laboraotry control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS/LCSD samples:

9985 KS/D

	3		ن ا	ike.	SOL	S	10	csp	I CS/I CSD	CSD
Compound	Added (VA)	ded	Conce (N/	Concentration (b/ //_)	Percent Recovery	ecovery	Percent Recovery	\ecovery	RPD	סי
	-	ICSD	S	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene	4.00	4.00	3.15	3.30	79	79	83	83	7	\mathcal{V}
Dentachlorophenol						•				
Pyrene	4.00	4.00	7.08	4.7	86	86	101	/ ⟨0 /	4	y
	-			\ \ !						
							-			

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

LDC#:_	22	285	A~
SDG #:			_

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:	ot
Reviewer:_	NG
2nd reviewer:	\sim

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

,		\	
/	Υ	N	N/A
(Y/	N	N/A
1	7	$\overline{}$	

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

Concentration = $(A_{\bullet})(I_{\bullet})(V_{\bullet})(DF)(2.0)$ $(A_{\bullet})(RRF)(V_{\bullet})(V_{\bullet})(\%S)$

A_x = Area of the characteristic ion (EICP) for the compound to be measured

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

I_ = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

V, = Volume of extract injected in microliters (ul)

V. = Volume of the concentrated extract in microliters (ul)

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

Example:

Conc. = $\frac{(1778331)(1.00)(1m)(100)(}{(324447)(1.344)(1060m)(})($

= 3.7 mg/

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

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

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

October 22 through October 23, 2009

LDC Report Date:

January 8, 2010

Matrix:

Soil/Water

Parameters:

Semivolatiles

Validation Level:

Stage 2B

RSAR8-34BMS

RSAR8-34BMSD

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906081

Sample Identification

EB102209-SO1A3

SA112-0.5B

SA112-10B

SA112-20B

SA112-34B **RSAQ8-0.5B**

RSAQ8-10B

RSAQ8-22B

RSAQ8-31B

RSAQ8-34B

RSAR8-0.5B

RSAR8-10B

RSAR8-20B

RSAR8-34B

RSAP8-0.5B

RSAP8-10B

RSAP8-25B

RSAP8-40B RSAQ8-22BMS

RSAQ8-22BMSD

Introduction

This data review covers 21 soil samples and one water sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

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

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

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

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

V. Blanks

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

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
99188-MB	10/27/09	Di-n-butylphthalate	0.12 ug/L	All water samples in SDG R0906081
99052-MB	10/26/09	Di-n-butylphthalate	40 ug/Kg	SA112-0.5B SA112-10B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-10B RSAQ8-22B RSAQ8-31B RSAQ8-34B
99309-MB	10/28/09	Butylbenzylphthalate	6.7 ug/kg	RSAR8-0.5B RSAR8-10B RSAR8-20B RSAR8-34B RSAP8-0.5B RSAP8-10B RSAP8-25B RSAP8-40B

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
SA112-20B	Di-n-butylphthalate	54 ug/Kg	54U ug/Kg
RSAQ8-10B	Di-n-butylphthalate	57 ug/Kg	57U ug/Kg
RSAQ8-34B	Di-n-butylphthalate	75 ug/Kg	75U ug/Kg
RSAR8-0.5B	Butylbenzylphthalate	8.6 ug/Kg	8.6U ug/Kg
RSAR8-10B	Butylbenzylphthalate	4.7 ug/Kg	4.7U ug/Kg
RSAR8-20B	Butylbenzylphthalate	5.6 ug/Kg	5.6U ug/Kg
RSAR8-34B	Butylbenzylphthalate	4.8 ug/Kg	4.8U ug/Kg

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
RSAP8-10B	Butylbenzylphthalate	3.6 ug/Kg	3.6U ug/Kg
RSAP8-25B	Butylbenzylphthalate	3.3 ug/Kg	3.3U ug/Kg
RSAP8-40B	Butylbenzylphthalate	4.2 ug/Kg	4.2U ug/Kg

Sample EB102209-SO1A3 was identified as an equipment blank. No semivolatile contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Compound	Concentration	Associated Samples
EB102209-SO1A3	10/22/09	Bis(2-ethylhexyl)phthalate	0.50 ug/L	SA112-0.5B SA112-10B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-10B RSAQ8-10B RSAQ8-22B RSAQ8-31B RSAQ8-34B

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

Sample FB082809-SO (from SDG R0904894) was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB082809-SO	8/28/09	Diethylphthalate 1,4-Dioxane	0.37 ug/L 0.16 ug/L	All soil samples in SDG R0906081

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
99188-LCS/D (All water samples in	Pyridine	37 (50-120)	48 (50-120)	-	J- (all detects) UJ (all non-detects)	Р
SDG R0906081)	1,4-Dioxane	32 (50-120)	32 (50-120)	-	J- (all detects) UJ (all non-detects)	

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 R0906081	All compounds reported below the PQL.	J (ali detects)	Α

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

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

XVI. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0906081

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906081	EB102209-SO1A3	Pyridine 1,4-Dioxane	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0906081	EB102209-SO1A3 SA112-0.5B SA112-10B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-10B RSAQ8-22B RSAQ8-31B RSAQ8-31B RSAQ8-34B RSAR8-0.5B RSAR8-0.5B RSAR8-10B RSAR8-10B RSAR8-20B RSAR8-20B RSAP8-20B RSAP8-25B RSAP8-10B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0906081

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0906081	SA112-20B	Di-n-butylphthalate	54U ug/Kg	A	bl
R0906081	RSAQ8-10B	Di-n-butylphthalate	57U ug/Kg	А	bl
R0906081	RSAQ8-34B	Di-n-butylphthalate	75U ug/Kg	А	ld
R0906081	RSAR8-0.5B	Butylbenzylphthalate	8.6U ug/Kg	А	bl
R0906081	RSAR8-10B	Butylbenzylphthalate	4.7U ug/Kg	А	bl
R0906081	RSAR8-20B	Butylbenzylphthalate	5.6U ug/Kg	Α	bl
R0906081	RSAR8-34B	Butylbenzylphthalate	4.8U ug/Kg	А	bl
R0906081	RSAP8-10B	Butylbenzylphthalate	3.6U ug/Kg	А	bl

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0906081	RSAP8-25B	Butylbenzylphthalate	3.3U ug/Kg	A	bl
R0906081	RSAP8-40B	Butylbenzylphthalate	4.2U ug/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Equipment Blank Data Qualification Summary - SDG R0906081

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Field Blank Data Qualification Summary - SDG R0906081

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #: 22285B2a VALIDATION COMPLETS
SDG #: R0906081 Stage

Laboratory: Columbia Analytical Services

Stage 2B

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

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

			Comments
	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 10 / 22 - 23 / 8 q
l 1 .	GC/MS Instrument performance check	<u> </u>	
111.	Initial calibration	A	2 RSD rr RRF/mm-SPCC CW/IW & 25 B
IV.	Continuing calibration/ICV	<u> </u>	CW/1W & 25 B
V.	Blanks	_SM_	
VI.	Surrogate spikes	<u> </u>	
VII.	Matrix spike/Matrix spike duplicates	<u> </u>	
VIII.	Laboratory control samples	SW	us/p
IX.	Regional Quality Assurance and Quality Control	N	
Χ.	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	N	
XVII.	Field blanks	SW	EB = 1 FB = FB 082809-50 (R6904894)

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank EB = Equipment blank

Validated Samples:

Water + Soil

Valluateu Samples.	Water	+ 501					- Ju
EB102209-SO1A3	\ 3	RSAR8-0.5B	S 21 3	RSAR8-34BMS	S 311	99188-11B	₃ ,
2 SA112-0.5B	S 12	RSAR8-10B	22	RSAR8-34BMSD	32 7	99052-	51
3 SA112-10B	1 13	RSAR8-20B	23		33 7	99309-	
4 SA112-20B	14	RSAR8-34B	24		34		
5 SA112-34B	15	RSAP8-0.5B	25		35		
6 RSAQ8-0.5B	16	RSAP8-10B	26		36		
7 RSAQ8-10B	17	RSAP8-25B	27		37		
8 RSAQ8-22B	18	RSAP8-40B	28		38		
9 RSAQ8-31B	19	RSAQ8-22BMS	29		39		
10 RSAQ8-34B	20	RSAQ8-22BMSI	₃₀		40		

VALIDATION FINDINGS WORKSHEET

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

A Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene***
B Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF, 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
	R 124-Trichlorobenzene	GG. Acenaphthene**	VV. Anthracene	KKK. Dibenz(a,h)anthracene
C. Z-Chiorophano		2	WW Carbazola	LLL. Benzo(g,h,i)perylene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol		
E. 1,4-Dichlorobenzene**	T, 4-Chloroaniline	II, 4-Nitrophenol*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenoi**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butyibenzyiphthalate	PPP. Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyi-phenyi ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
almshoron-in-passing	Y. 2,4,6-Trichlorophenoi**	NN. Fluorene	CCC, Benzo(a)anthracene	RRR. Pyridine
	7 2.4 & Trichlorophanol	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
K. Hexachioroethane				Discourse
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	11. 14. 7.8XX
M. isophorone	BB. 2-Nitroanlline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	unu octachlorostyrene
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	۷۷۷.
0. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachiorobenzene	HHH. Benzo(k)fluoranthene	WWW.

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

LDC#: 22285 B29 SDG #:

VALIDATION FINDINGS WORKSHEET Blanks

35 Page: 1 of > Reviewer:__ 2nd Reviewer:

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

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

Was a method blank analyzed for each matrix?

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

Was the blank contaminated? If yes, please see qualification below. Blank extraction date: $\frac{16}{27/64}$ Blank analysis date: $\frac{10}{20}$

(MD)

Sample Identification											
2	Blank ID	91/88-m		0.77							
	Compound Blank ID	9-891/6	××	0.17	`						

Associated Samples: Blank extraction date: 10/56/69 Blank analysis date: 40 11/05/69 Conc. units:

2-18

(19)

Sample Identification 9 K 99652-MB Blank ID f Compound

5x Phthalates 2x all others

big Socce	Sa Commy
LDC#:_	SDG #:

VALIDATION FINDINGS WORKSHEET Blanks

Reviewer: 2nd Reviewer: Page:

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

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

Was a method blank analyzed for each matrix?

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

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

Blank extraction date: 10/26/64 Blank analysis date: 11/64

(79)

2 Associated Samples: Conc. units:

3 Sample Identification m h 4 チン e se 99309-MB Blank ID AAA Compound

Blank analysis date: Blank extraction date:

_				 				
	E							
	Sample Identification			i				
	Sam							
Associated Samples:								
Associate								
	Blank ID							
	puno							
Conc. units:	Compound							
ပ	ــــــــــــــــــــــــــــــــــــــ	16	<u></u>	 	<u> </u>	<u></u>	1	

LDC #: 27785 \$24 SDG #: 54 (122)

VALIDATION FINDINGS WORKSHEET Field Blanks

2nd Reviewer: Page: of Reviewer:___

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

Were field blanks identified in this SDG?

Sampling date: 16/22/29 Y N N/A

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

2-10

Sample Identification Associated Samples: 0,0 Blank ID 距 Compound CRQL

Associated sample units: NS/RS Blank units 16 1/

Sampling date: 8/24/04
Field blank type: (circle one) Field Blank > Rinsate / Other:

Associated Samples:

All sails (ND)

Sample Identification FB082809+50 0.37 Blank ID 0,16 Compound

5x Phthalates 2x all others

CROL

SDG #: 22285 BVA

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Page:_ 2nd Reviewer:

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

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

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?

-	:	\bigcirc	7				7		77	 _	_	-		_	7			-			T		\neg
	Qualifications	No mac (MSD +	1			No sual (MSD in		4															
5 limits?	Associated Samples	7				4		•															
Was a MS/MSD analyzed every 20 samples of each matrix? Was a MS/MSD negrent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	RPD (Limits)	.,	48 20	()	<u> </u>	(65) CE)	()			(()	((()	_	`		· ·	
rix? tive percent differenc	MSD %R (1 imits)	/		•				()	(()		7	_	()		,	()	()		
samples of each mat ries (%R) and the rela	MS WB // Janifer)	Yor (Lillins)	43 (50-150)	()		(12, 4)	139 (30-120)	(/) 851		` }	()			_	,			-			<u> </u>	,	
zed every 20 rcent recove		Compound	スペペ			1	たれた	××															
Was a MS/MSD analyzed every 20 samples of each matrix?	Marchine Monator	DI QSW/SW	19/20			1	2 /22	/															
N N/A	W NI	# Date																					
(A)		<u> </u>	L.,	<u> </u>				<u></u>		 		_		<u></u>			_	L		-	<u> </u>		

Phenol 2-Chlorog	Compound	(1108)		Mater	(Water)		Compound	(Soil)	(Soil)	(Water)	(Water)
i I			(1106)	(Maici)	/				,,,,,	70 4400/	/ 210/
		26-90%	×35%	12-110%	<u>< 42%</u>	99	Acenaphthene	31-137%	%6L >I	40-11076	2 /1
									,002	/00004	< 50%
		25.402%	< 50%	27-123%	< 40%	<u>=</u>	4-Nitrophenol	11-114%	%0c >	%00-01	9/ 00/
	IOUS	20-102/0			300		2.4 Distrateduene	28-89%	< 47%	24-96%	< 38%
	honzone	28-104%	< 27%	36-97%	< 25%	ż	Z,4-Dilling Colocal C				
F. 1,4-Diction Control	Delicence			70077	/000/	 	Dentachlorophenol	17-109%	< 47%	9-103%	< 20%
N-Nitroso-di-	N-Nitroso-di-n-propylamine	41-126%	< 38%	41-110%	1		o di mana di m			4070/	/ 240/
		20 4070/	< 23%	39-98%	< 28%	77.	Pyrene	35-142%	× 36%	02.171-07	0/10/
1,2,4-Trichlorobenzene	orobenzene	30-107 70	1,52,0	200 00							
1 Other 2 methodopono	logothop and	26-103%	< 33%	23-97%	< 42%						

LDC# 222 85 Bra SDG#: Se Com

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

Reviewer: _ Page: 2nd Reviewer:

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

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

Y N N/A

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

	Associated Samples Qualifications	7			1) 2-10, 99052-MR No Tual (MS/MSD/m)				3.47	1 11 - 18 17 309 - 11 15 1																
	RPD (Limits))			32 (30	,		•	•	7	•))	J)))))))	J	_		
	LCSD %R (I imits)	48 (50,120)	1			10	1 2	`	()	47 1 1	()		(()		(())	())	()	
	SOT SOT	3.7 (C) 13.0		, , , , , , , , , , , , , , , , , , , ,		, , ,	4.	()	()	39 ()	()						(,		())				
		Compound	NKK 1		> >		777			ナヤナ																
			01/82 - 43/16		GANCO 100%	1/82 - 1/8/1				0/5/1 poepb																
١	_	Date																-								
,		#		١		١		1		1			1			Ì	١	-	١				\perp	L		

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

October 28, 2009

LDC Report Date:

January 8, 2010

Matrix:

Soil

Parameters:

Semivolatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906191

Sample Identification

RSAS8-0.5B

RSAS8-10B

RSAS8-25B

RSAS8-35B

RSAS8-35BMS

RSAS8-35BMSD

Introduction

This data review covers 6 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

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

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

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

Date	Compound	%D	Associated Samples	Flag	A or P
11/11/09	1,4-Dioxane	27.6	All samples in SDG R0906191	J+ (all detects)	Α

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

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

V. Blanks

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

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
99725-MB	11/3/09	Butylbenzylphthalate Di-n-octylphthalate	3.0 ug/Kg 15 ug/Kg	All samples in SDG R0906191

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
RSAS8-10B	Butylbenzylphthalate	3.3 ug/Kg	3.3U ug/Kg

Sample FB082809-SO (from SDG R0904894) was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB082809-SO	8/28/09	Diethylphthalate 1,4-Dioxane	0.37 ug/L 0.16 ug/L	All samples in SDG R0906191

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Although the MS/MSD percent recoveries (%R) were not within QC limits for one compound, the LCS or LCSD percent recoveries (%R) were within QC limits and no data were qualified.

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0906191	All compounds reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

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

XVI. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0906191

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906191	RSAS8-0.5B RSAS8-10B RSAS8-25B RSAS8-35B	1,4-Dioxane	J+ (all detects)	A	Continuing calibration (%D) (C)
R0906191	RSAS8-0.5B RSAS8-10B RSAS8-25B RSAS8-35B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0906191

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0906191	RSAS8-10B	Butylbenzylphthalate	3.3U ug/Kg	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0906191

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #: 22285C2a VALIDATION COMPLETENT
SDG #: R0906191 Stage 2B
Laboratory: Columbia Analytical Services

Page: \lof \frac{1}{\sqrt{6}}
Reviewer: \sqrt{7\lambda}

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

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

	Validation Area		Comments
1.	Technical holding times	A	Sampling dates: 10/28/09
11.	GC/MS Instrument performance check	A	Part o
111.	Initial calibration	<u> </u>	2 RSD r RRF/mon-Spec Ca/101 & 25 %
IV.	Continuing calibration/ICV	SM	ca/10/ £ 25 %
V.	Blanks	SM	
VI.	Surrogate spikes	_A_	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SV	LCS /D
IX.	Regional Quality Assurance and Quality Control	N_	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	Charles (March Car)
XVII.	Field blanks	SM	FB = FB082809-50 (R0904894)

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:

4	RSAS8-0.5B	11	99725-MB	21	31
1				22	32
2	RSAS8-10B	12			33
3	RSAS8-25B	13		23	
4	RSAS8-35B	14		24	34
5	RSAS8-35BMS	15		25	35
-	RSAS8-35BMSD	16		26	36
0	NOAGO-SCHIICE	17		27	37
<u>′ </u>		18		28	38
8_		19		29	39
9 10		20		30	40

VALIDATION FINDINGS WORKSHEET

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

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

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

VALIDATION FINDINGS WORKSHEET

Page: Reviewer: 2nd Reviewer.

Continuing Calibration

LDC# 22285 C29

SDG#:

N NA

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

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

						 								 	 		- 1	-			
	J+ dets/4 (C)																				-
Associated Samples	All + BIK																				
Finding RRF (Limit: >0.05)																					
Finding %D (Limit: <25.0%)	27.6																				
Compound	(F) TTT																				
Cl backage	Stailuaiu in	AW 0 18																			
	Date	60/11/11																			
1 7	*	١		 _			\perp	\perp	上	 \perp	┸	\perp	 \bot	 	 	<u> </u>	<u></u>				<u></u>

629	7
22285	3
LDC#:	SDG #:

VALIDATION FINDINGS WORKSHEET	Blanks

Reviewer._ 2nd Reviewer:_

Page:

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Was a method blank analyzed for each matrix? METHOD: GC/MS BNA (EPA SW 846 Method 8270C) Y N N/A N/A N/A

Was a method blank analyzed for each concentration preparation level?

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

Blank extraction date: 1/6 2/04 Blank analysis date: 11

Y/N N/A Y N N/A

(79)

= + Associated Samples:

Associated Samples:	Sample Identification								
	2	Blank ID							
Stank extraction date:		Compound							

Blank analysis date:

Blank extraction date:

5x Phthalates 2x all others

VALIDATION FINDINGS WORKSHEET

LDC #: 22285 (24

Su Carry

SDG #:_

Field Blanks

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

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

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

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

*Blank units: 45 / L Associated sample units:

(MA)

7

Sample Identification Associated Samples: Field blank type: (circle one) Field Blank / Rinsate / Other: F8082809-50 Blank ID 0.97 0.0 +++ Compound

Associated sample units: Blank units:

Sampling date:

CROL

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

Sample Identification Associated Samples: Blank ID

Compound CRQL

5x Phthalates 2x all others

LDC #: 2 2 2 85 (24 SDG# Ba Cr

Matrix Spike/Matrix Spike Duplicates VALIDATION FINDINGS WORKSHEET

Page: of 1 Reviewer J 2nd Reviewer:__

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

YN N/A

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

		Qualifications	No miss (165m)	A same																	
C limits?		Associated Samples	7																		
es (RPD) within the Q		RPD (Limits)			,	()	()		()	,		· •)				()		_	(
matrix?	בוואס ליסוס מוויסים אוויי	MSD (4) imite)	/8V (EIIIIE)	05/-05) /2	(•			((()	(
samples of each mat	Tes (%K) allu tile leta	MS	%R (Limits)	(asl-es) 82				()			()	()				()	,)	(
zed every 20	rcent recove		Compound	**																	
MS/MSD analyzed every 20 samples of each matrix? Was a MS/MSD analyzed every 20 samples of each matrix?	Were the MS/MSD pe		MS/MSD ID	17 1	2/6																
(Y) N/A	Y/N/N/A)	# Date	╀																	

									2	l imite	RPD
		QC Limits	RPD	QC Limits	RPD		panound	QC Limits (Soil)	(Soil)	(Water)	(Water)
	ou i ou made	(Soil)	(Soil)	(Water)	(water)		Compodina				
	Compound	()	/ 260/	42-110%	< 42%	99	Acenaphthene	31-137%	< 19%	46-118%	< 31%
₹	Phenol	%08-9Z	% () ()	2/21-31							
					Т	Π		44 44 40/	< 50%	10-80%	< 20%
_		25-102%	< 20%	27-123%	< 40%	=	4-Nitropnenol	0/1-1-1			,000
رن ا	C. 2-Chlorophenoi	27-10-70		, 610		×	2 4-Dinitrotoliuene	28-89%	< 47%	24-96%	< 38%
L	4 4 Displorshond	28-104%	< 27%	36-97%	> 2070		2,7			/0000	/OUR /
اند	1,4-Dignolobenzene			/0047 77	/ 380/	ļ	Pentachlorophenol	17-109%	< 47%	9-103%	82.00 V
	N-Nitroso-di-n-propylamine	41-126%	< 38%	41-110%	十	+		/0077 20	/036 /	26_127%	< 31%
<u>-</u>		70 40 40	/ 23%	39-98%	< 28%	77.	Pyrene	35-142%	0,000	0/ 171-07	
œ	1,2,4-Trichlorobenzene	30-10770	20,02								
		26 103%	< 33%	23-97%	< 42%						
> =	4-Chloro-3-methylpnenol	20-102/0									

LDC #: 2228 5 C2K SDG #: 54

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: _ Reviewer: 2nd Reviewer:

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

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

Was a LCS required?

Y(N,N/A)

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

Qualifications	No gual (LCSA)																					
Associated Samples	A11 + BTK																					
RPD (Limits)	()	()	()	()	()	()	()	()	())	(7
LCSD %R (1 imits)	48 (SD-120)		(()	()						())	()						
LCS	700 (Emilia))	()		(()	()	
	Compound F + F																					
	LCS/LCSD ID	11/45 45/10																				
	# Date																					

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

November 2, 2009

LDC Report Date:

January 12, 2010

Matrix:

Water

Parameters:

Semivolatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906270

Sample Identification

M-147B M-147009B

EB110209-GWA3

Introduction

This data review covers 3 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

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

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

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
11/11/09	1,4-Dioxane	27.6	EB110209-GWA3 99893-MB	J+ (all detects)	Α

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

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

V. Blanks

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

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
99893-MB	11/4/09	Butylbenzylphthalate	0.11 ug/L	All samples in SDG R0906270

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

Sample EB110209-GWA3 was identified as an equipment blank. No semivolatile contaminants were found in this blank.

Sample PB102309-A3 (from SDG R0906095) was identified as a pump blank. No semivolatile contaminants were found in this blank with the following exceptions:

Pump Blank ID	Sampling Date	Compound	Concentration	Associated Samples
PB102309-A3	10/23/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate	1.5 ug/L 0.11 ug/L	All samples in SDG R0906270

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
99893-LCS/D (All samples in SDG	Pyridine	27 (50-120)	30 (50-120)	<u>-</u>	J- (all detects) UJ (all non-detects)	Р
R0906270)	1,4-Dioxane	42 (50-120)	44 (50-120)	-	J- (all detects) UJ (all non-detects)	

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 R0906270	All compounds reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

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

XVI. Field Duplicates

Samples M-147B and M-147009B were identified as field duplicates. No semivolatiles were detected in any of the samples.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0906270

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906270	EB110209-GWA3	1,4-Dioxane	J+ (all detects)	А	Continuing calibration (%D) (c)
R0906270	M-147B M-147009B EB110209-GWA3	Pyridine 1,4-Dioxane	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0906270	M-147B M-147009B EB110209-GWA3	All compounds reported below the PQL.	J (all detects)	А	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0906270

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Equipment Blank Data Qualification Summary - SDG R0906270

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Pump Blank Data Qualification Summary - SDG R0906270

No Sample Data Qualified in this SDG

Trongy Northgate Henderson

		Hollox Hollingate Heliacieen
LDC #:	22285D2a	VALIDATION COMPLETENESS WORKSHEET
SDG #:	R0906270	Stage 2B

Reviewer: 370 2nd Reviewer:

Laboratory: Columbia Analytical Services

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

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

	Validation Area		Comments
l.	Technical holding times	A	Sampling dates: 11/02/09
II.	GC/MS Instrument performance check	A	·
111.	Initial calibration	A	2 RSD rr Car/101 2252
IV.	Continuing calibration/ICV	ŚW	car/a 2252
V.	Blanks	Sh)	
VI.	Surrogate spikes	À	
VII.	Matrix spike/Matrix spike duplicates	N	Chient spec
VIII.	Laboratory control samples	SW	Client spec Us /D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	ND	p = 1, 2
XVII.	Field blanks	SW	4 FB = 3 PB = PB102309-A3 (R09060

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:

here

	NA	ter			
1	M-147B	+ 11	99893-MB	21	31
2	M-147009B	12		22	32
3	EB110209-GWA3	13		23	33
4		14		24	34
5		15		25	35
6		16		26	36
7		17		27	37
8		18		28	38
9		19		29	39
10		20		30	40

VALIDATION FINDINGS WORKSHEET

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

A. Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene**	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene**	T. 4-Chloroaniline	II. 4-Nitrophenol*	XX. Di-n-butyiphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene [™]	JJ, Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP. Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	OO, 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TTT. 1,4. Dioxane
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	usu octachlinostyrene
N. 2-Nitrophenol ^{±±}	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	ww.
0. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	www.

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

22785 029 LDC#:

VALIDATION FINDINGS WORKSHEET

Page:

2nd Reviewer. Reviewer:

Continuing Calibration

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

Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis for each instrument? Please see qualifications below for all questions answered "N". Not applicable questions are identified as "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?

Qualifications	J+ 4et (C)																				
Associated Samples	3 + 8K										-						,				
Finding RRF (Limit: >0.05)															-						-
Finding %D (Limit: <25.0%)	27,6																				
Compound	(t) 11+																				
Standard ID	A W048																				
Date	1 pg/ 1/11																				
*		$oldsymbol{ol}}}}}}}}}}}}}}}}}}$			<u> </u>	<u>L</u>	<u> </u>			<u> </u>		<u> </u>	 	<u> </u>	<u></u>	<u></u>	<u> </u>	<u> </u>	<u></u>	<u> </u>	

V
70
22.85
7
LDC

SDG #: 24 C2-27

VALIDATION FINDINGS WORKSHEET Blanks

Jo	3/5	4
Page:	Reviewer:	2nd Reviewer:_

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

"A/N" se heifitachi oro caciterii a the in	Not applicable questions are identified as 1977:	0
:	ż	<u>`</u>
ETHOD: GC/MS BNA (EPA SW 846 Meulou 92709)	passe see malifications below for all questions answered "N". Not applicable questions are identified as 1977.	Cylindra doco and the later to the company of the c

Was a method blank analyzed for each matrix? Was a method blank analyzed for each concentration preparation level?

Was a method blank associated with every sample?

Associated Samples: Vas the blank contaminated? If yes, please see qualification below. Blank analysis date: 11/11/69

(BX)

Sample Identification 99893-1118 Blank ID 6, 11 444 Compound Conc. units: MS //

	Sample Identification											
		Diank ID									==	
CONC. UINES.		Compound										

Associated Samples:

Blank analysis date:_

Blank extraction date:_

5x Phthalates 2x all others

SDG #: 222 85 D24

VALIDATION FINDINGS WORKSHEET Field Blanks

Page: of A Reviewer: OM 2nd Reviewer:

(ND)						
Associated Samples:						
Were field blanks identified in this SDG? Were target compounds detected in the field blanks? Were target compounds detected in the field blanks? Were target compounds detected in the field blanks? Were target compounds detected in the field blanks? Were target compounds detected in the field blanks? Were target compounds detected in the field blanks? Pp.	PB 102309-A3	51	0,11			
Were field blanks identified in this SC W N/A Were target compounds detected in the Scanning date: 10 / 23 / 64 Field blank type: (circle one) Field Blank / Rinsate / Field blank type: (circle one) Field Blank / Rinsate / Elank in type: (circle one) Field Blank / Rinsate / Elank in type: (circle one) Field Blank / Rinsate / Elank in type: (circle one) Field Blank / Rinsate / Elank in type: (circle one) Field Blank / Rinsate / Elank in type: (circle one) Field Blank / Rinsate / Elank in type: (circle one) Field Blank / Rinsate / Elank in type: (circle one) Field Blank / Rinsate / Elank in type: (circle one) Field Blank / Rinsate / Elank in type: (circle one) Field Blank / Rinsate / Elank in type: (circle one) Field Blank / Rinsate / Elank in type: (circle one) Field Blank / Rinsate / Elank in type: (circle one) Field Blank / Rinsate / Elank in type: (circle one) Field Blank / Rinsate / Elank in type: (circle one) Field Blank / Rinsate / Elank in type: (circle one) Field Blank / Rinsate / Elank in type: (circle one) Field Blank in type: (circle o	Compound		AAA			ICaci

Associated sample units:_

Blank units:_

samples:	Sample Identification					
ar: Associated Samples:						
ık / Rinsate / Oth						
Field Blar	Blank ID					
Sampling date:	parioamo				CROL	

5x Phthalates 2x all others

LDC #: 222 85 D29 SDG #:

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

2nd Reviewer: _ Reviewer: Page:

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

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

YN N/A

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

ualifica	J-/M3/P (4)																							
Associated Samples	All + BKS																							
RPD (Limits)				()	()	()	()	()				())))	_				
LCSD	/ ₀ κ (Limits) / ₀ κς	2 22	4		()	()				()	(()	(_
SOT	%R (L	27 (50-120)	47 7							(ì		7			(())	,
	Compound	RRR																						
	TCS/TCSD ID	49893 150																						
	# Date																							

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

November 5, 2009

LDC Report Date:

January 11, 2010

Matrix:

Soil

Parameters:

Semivolatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906403

Sample Identification

SA77-0.5B

SA77-10B

SA77009-10B

SA77-10BMS

SA77-10BMSD

Introduction

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

This review follows 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.

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- 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

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

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

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

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

V. Blanks

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

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
100482-MB	11/11/09	Butylbenzylphthalate Di-n-butylphthalate	3.3 ug/Kg 54 ug/Kg	All samples in SDG R0906403

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
SA77-10B	Butylbenzylphthalate	11 ug/Kg	11U ug/Kg
SA77009-10B	Butylbenzylphthalate	5.7 ug/Kg	5.7U ug/Kg

Sample FB082809-SO (from SDG R0904894) was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB082809-SO	8/28/09	Diethylphthalate 1,4-Dioxane	0.37 ug/L 0.16 ug/L	All samples in SDG R0906403

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Although the MS/MSD percent recoveries (%R) and relative percent difference (RPD) were not within QC limits for one compound, the LCS/LCSD percent recoveries (%R) were within QC limits and no data were qualified.

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0906403	All compounds reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

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

XVI. Field Duplicates

Samples SA77-10B and SA77009-10B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentrati	on (ug/Kg)	RPD	Difference		
Compound	SA77-10B	SA77009-10B	(Limits)	(Limits)	Flags	A or P
Butylbenzylphthalate	11	5.7	-	5.3 (≤180)	•	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0906403

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906403	SA77-0.5B SA77-10B SA77009-10B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0906403

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0906403	SA77-10B	Butylbenzylphthalate	11U ug/Kg	A	bl
R0906403	SA77009-10B	Butylbenzylphthalate	5.7U ug/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Field Blank Data Qualification Summary - SDG R0906403

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

R0906403 SDG #: Laboratory: Columbia Analytical Services

22285E2a

LDC #:

Stage 2B

Reviewer:__

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

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: 11/05/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	2 KSD -> RRF/nm-SHE CW/W = 25 &
IV.	Continuing calibration/ICV	A	cw/w ≤ 25 3
V.	Blanks	2M	
VI.	Surrogate spikes	_A_	
VII.	Matrix spike/Matrix spike duplicates	ZM)	
VIII.	Laboratory control samples	SW	vs/b
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	SW	D = 2,3 $FB = FB082809-50 (R0904894)$
XVII.	Field blanks	-ZW	FB = FB082809-50 (R0904894)

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

/allua	ated Samples:	01				
1	SA77-0.5B	11	100 482 - MB	21	31	_
2	SA77-10B	12		22	32	
3	SA77009-10B	13		23	33	_
4	SA77-10BMS	14		24	34	
5	SA77-10BMSD	15		25	35	_
6		16		26	36	
7		17		27	37	
8		18		28	38	_
9		19		29	39	
10		20		30	40	

VALIDATION FINDINGS WORKSHEET

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

A. Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q, 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene**	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene**	T. 4-Chloroaniline	II. 4-Nitrophenol*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP. Benzoic Acid
1. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC, Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TTT. 1,4. Dioxane
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	unu octachlorostyrene
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	ww.
0. 2,4-Dimethy/phenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	www.

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

#24	d d
5	J
222	S
# /	#
LDC	SDG

VALIDATION FINDINGS WORKSHEET Blanks

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

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

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

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

Was a method blank analyzed for each concentration preparation level?

Was the blank contaminated? If yes, please see qualification below. In date: 11/11/69 Blank analysis date: 11/20/69 Was a method blank associated with every sample?

Blank extraction date: 11/11/69 Blank analysis date: 11

Sample Identification Associated Samples: 3 y 160482-M Blank ID w Y 54 AAA Compound Conc. units:

Blank analysis date: Blank extraction date:_

Associated Samples:

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

5x Phthalates 2x all others

LDC# 2228 C E29 SDG #:

VALIDATION FINDINGS WORKSHEET

Field Blanks

_d d	X	<u>ا</u> ک
Page:	Reviewer:	2nd Reviewer:

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

Were field blanks identified in this SDG?

Y N N/A

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

Blank units: 45 /L Associated sample units: 45 /L Associated sa 128/09

Field blank type: (dircle one) Field Blank) Rinsate / Other. Sampling date: &

Sample Identification Associated Samples: FB 182809-50 0.37 0.16 Blank ID 111 Compound CROL

Associated sample units:_ Blank units:

Associated Samples:

panoamo	Blank ID	Sample Identification	
	<u> </u>		
CRQL			

5x Phthalates 2x all others

22265 132 SDG#: LDC#:

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

2nd Reviewer:_ Page:_ Reviewer:

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

Y N N/A

WS/MSD. Soil / Water.

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

			_		_	7			-	- 11	_	-	_	1	Т	_	-	Т	-	Γ	Т	<u> </u>	T	_	T	٦
	Qualifications	I WETHER	No cha	(" 0/8) 1/																						
: IImits :	ad amed better	Associated Samples																								
es (RPD) within the Q(RPD (Limits)	1 08) 26		,		,					,		(,		^ _			(,	`	()			,
tive percent difference	MSD	%R (Limits)	1 60/ 60 / 77	1	()	,		^ _		,	,		_	ì			((`	_				
ries (%R) and the rela	311	%R (Limits)	20	(05/-05) 66				_		· ·			(_				,			-	_		
cen every 20		panoumou	, primodilio	RRR																						
Was a MS/MSD arranged every 20 samples of the relative percent differences (RPD) within the QC limits of the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits of the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits of the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits of the MS/MSD percent differences (RPD) within the QC limits of the MS/MSD percent differences (RPD) within the QC limits of the MS/MSD percent differences (RPD) within the QC limits of the MS/MSD percent differences (RPD) within the QC limits of the MS/MSD percent differences (RPD) within the QC limits of the MS/MSD percent differences (RPD) within the QC limits of the MS/MSD percent differences (RPD) within the QC limits of the MS/MSD percent differences (RPD) within the QC limits of the MS/MSD percent differences (RPD) within the MS/MSD percent differences (RPD) within the QC limits of the MS/MSD percent differences (RPD) within the MS/MSD percent differences (RPD) percent differences (RPD) within the MS/MSD percent differences (RPD) within the	Weiering wow		MS/MSD ID	5/4																						
N N N	Y N JN/A		# Date																							

											(
						-		Oc I imite	RPD	OC Limits	주 구
L		OC Limits	RPD	QC Limits	RPD		purioumo	(Soil)	(Soil)	(Water)	(Water)
=	•	(Coil)	(Soil)	(Water)	(water)	1	Sombodino			,00,,	/ 240/
_	Compound	(SOII)			Г	00	Acenaphthene	31-137%	× 19%	46-118%	8 5 1
L	-	78-90%	< 32%	12-110%	× 45%	2					
_	A. Pheriol		1			†			,000	40 00%	< 50%
_					_	=	4 Nitrophenol	11-114%	%0c v	0,00-01	2,22
_		7E 402%	× 50%	27-123%	< 40%	٦				7000	/38% /
_	C. 2-Chlorophenol	67-107/0				}	2 4 Dinitrotolliene	28-89%	< 47%	24-90%	200
<u> </u>		707 4040/	/020/	36-97%	%8Z>		2,4-Dilling Cold Cold			,000,	/E00%
	F 1.4-Dichlorobenzene	28-10476	7.77				Incohlorophanol	17-109%	< 47%	9-103%	20.00
_	t	14 4000	%380/	41-116%	< 38%	=	Periacinologicalo			70207 00	/ 240/
	N-Nitroso-di-n-propylamine	41-12070	200			_	00000	35-142%	× 36%	721-97	0/10
<u></u>		70 4070/	/0°C >	39-98%	< 28%	7	Fylelle				
	R 12.4-Trichlorobenzene	30-10770	200		,30,						
<u> </u>		26 103%	< 33%	23-97%	< 42%						
==	V 4-Chloro-3-methylphenol	20-10278									

LDC #: 222 85 E24 SDG #:

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Reviewer: _ 2nd Reviewer: _ Page: _

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

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

Y N N/A

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

Qualifications	No gual (LCSm)																								
Associated Samples	41 + PK))	
	RPD (Limits)	(-			-	_		1			_	,))			
CSD		46 (30720)		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	,)	_)				\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\)				-))	-		
30 -	LCS %R (Limits)		_			-))	,		_)	,	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	-		_)
	Compound	1111																				1			
	TCS/ICSD ID	100 482-1CS/D																							
	# Date	╂-																							

LDC #: 22285 E29 SDG #: <u>Su Cuy</u>

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:	_of_	
Reviewer:	7	16
2nd reviewer:		

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

/	Y	N	N/A
	Y	N	N/A

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

y.v	Concentral	tion (Eg)	f esect only
Compound	2	3	RPD
AAA	11	5.7	5.3 (E 180D) -
71733			

	Concentration	(
			RPD
Compound			
	[

Concentration (
	RPD
	Concentration ()

	Concentration (
Compound		RPD
·		

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

November 11, 2009

LDC Report Date:

January 8, 2010

Matrix:

Water

Parameters:

Semivolatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906477

Sample Identification

M-122B

Introduction

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

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

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

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

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

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

V. Blanks

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

Sample PB102309-A3 (from SDG R0906095) was identified as a pump blank. No semivolatile contaminants were found in this blank with the following exceptions:

Pump Blank ID	Sampling Date	Compound	Concentration	Associated Samples
PB102309-A3	10/23/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate	1.5 ug/L 0.11 ug/L	All samples in SDG R0906477

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
100898-LCS/D (All samples in SDG	Pyridine	32 (50-120)	28 (50-120)	-	J- (all detects) UJ (all non-detects)	Р
R0906477)	1,4-Dioxane	39 (50-120)	39 (50-120)	-	J- (all detects) UJ (all non-detects)	

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 R0906477	All compounds reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

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

XVI. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0906477

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906477	M-122B	Pyridine 1,4-Dioxane	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0906477	M-122B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0906477

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Pump Blank Data Qualification Summary - SDG R0906477

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

		riollox Northgate Henderson	
LDC #:	22285F2a	VALIDATION COMPLETENESS WORKSHEET	
SDG #:_	R0906477	Stage 2B	
aborato	ry: Columbia Ar	nalytical Services	

Date:	12/30/09
Page:_	<u>\</u> of <u>/</u>
Reviewer:	M.
2nd Reviewer:	-N

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

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

	Validation Area		Comments
l.	Technical holding times	A	Sampling dates: // /6 5
11.	GC/MS Instrument performance check	A	
111.	Initial calibration	A	2 RFD r X RRF/non-SP
IV.	Continuing calibration/ICV	A	2 RFD r X RRF/non-SPR COV/ICV & 25 3
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	Client Spec
VIII.	Laboratory control samples	SM	Ws/p
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	SW	PB = PB 102309- A3 (R0906095)

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:

IN GARL

	10 ares				
1	M-122B	11	21	31	
2	100898-MB	12	22	32	
3	·	13	23	33	
4		14	24	 34	
5		15	25	35	
6		16	26	36	
7		17	27	37	
8		18	28	38	
9		19	29	39	
10		20	30	40	

VALIDATION FINDINGS WORKSHEET

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

A. Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol™	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenof**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene**	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene⁴	T. 4-Chloroaniline	II. 4-Nitrophenol*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ, Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP, Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyi alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TT. 1,4. Dioxane
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	uuu octachlurostyrene
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	w.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	WWW.

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

F29	1
285	2
4	4
#	#
	SDG

VALIDATION FINDINGS WORKSHEET Field Blanks

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

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

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

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

Blank units: bs / L Associated sample units: bs / L
Sampling date: 16 / 2 > 6 s
Field blank type: (circle one) Field Blank / Rinsate / Other: PB

Associated Samples:

ıtion						
Sample Identification						
S						
	3					
Blank ID	P8102304-43	5'1	11.0			
		EEE 1.5	AAA			
Compound						CROL

Associated sample units: Blank units:

Sampling date:

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

Associated Samples:

Sample Identification Blank ID Compound

thalat	thor
P	=
ŭ	ζ

CRQL

2x all others

LDC #: 222 85 F24 SDG #: 24 (1-45)

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: of Reviewer: _ 2nd Reviewer:

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

Y N N/A

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

YANNA Was a LCS required?

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

	X	<u> </u>	T	T	- T	T	Т	Т	٦	Ţ	T	T	_			Γ	Τ	T	7	T	T	7	\neg	T	T	
Qualifications	J-145/P (L																									
Associated Samples	All + Blic																									
RPD (Limits)	()	()	()	()	()	()	()	()) (()	((,			((()	()	()	()	()	()	(
LCSD %R (Limits)	28 (50-120)	Ĭ	((())	()	()									~		()	()	())	-	())	
LCS %R (Limits)	32 (50-120)	39 (1)	-		()	()	()	()	,	(()		()	()	()				
Compound	RRR	E																								
	160899-145/6																									
-	Cale																									
11 4	ŧ∥	1	- 1	ı	1	1	1	ı	- 1	H	ı	- 1	- 1	1			ı	ł	1	11	ı	ı	1	1		- 1

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Data Validation Reports LDC #22285

Chlorinated Pesticides



Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

October 21 through October 22, 2009

LDC Report Date:

January 8, 2010

Matrix:

Soil

Parameters:

Chlorinated Pesticides

Validation Level:

Stage 4

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906056

Sample Identification

SA52-15BSPLP2

SA52-15BSPLP3

SA52-28BSPLP2

SA52-28BSPLP3

RSAQ8-10BSPLP2

RSAQ8-10BSPLP3

RSAQ8-31BSPLP2

RSAQ8-31BSPLP3

Samples in this SDG underwent SPLP extraction

Introduction

This data review covers 8 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8081A for Chlorinated Pesticides.

This review follows 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 XIV.

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/ECD Instrument Performance Check

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

III. Initial Calibration

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

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

Retention times (RT) of all compounds in the calibration standards were within QC limits.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 20.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 20.0% for all compounds.

Retention times (RT) of all compounds in the calibration standards were within QC limits.

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

V. Blanks

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

No field blanks were identified in this SDG.

VI. Surrogate Spikes

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

Sample	Column	Surrogate	%R (Limits)	Compound	Flag	A or P
SPLP3-BLK	STX-CLP1	Decachlorobiphenyl	31 (40-140)	All TCL compounds	J- (all detects) UJ (all non-detects)	Р

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
99758-LCS/D (SA52-15BSPLP3 SA52-28BSPLP3 RSAQ8-10BSPLP3 RSAQ8-31BSPLP3 99758-BLK SPLP3-BLK)	Endrin aldehyde	19 (50-130)	19 (50-130)	-	J- (all detects) UJ (all non-detects)	Р

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

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

b. GPC Calibration

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

XI. Target Compound Identification

All target compound identifications were within validation criteria

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 R0906056	All compounds reported below the PQL.	J (all detects)	А

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Chlorinated Pesticides - Data Qualification Summary - SDG R0906056

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906056	SA52-15BSPLP3 SA52-28BSPLP3 RSAQ8-10BSPLP3 RSAQ8-31BSPLP3	Endrin aldehyde	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0906056	SA52-15BSPLP2 SA52-15BSPLP3 SA52-28BSPLP2 SA52-28BSPLP3 RSAQ8-10BSPLP2 RSAQ8-10BSPLP3 RSAQ8-31BSPLP2 RSAQ8-31BSPLP3	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Chlorinated Pesticides - Laboratory Blank Data Qualification Summary - SDG R0906056

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Chlorinated Pesticides - Field Blank Data Qualification Summary - SDG R0906056

No Sample Data Qualified in this SDG

Tronox Northgate Henderson N COMPLETENESS WORKSHEET

LDC #: <u>22285A3a</u>	VALIDATION COMPLETEN
SDG #:R0906056	Stage 4

Reviewer: 514 2nd Reviewer:

Laboratory: Columbia Analytical Services

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081A)

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: 10/21 - 22/09
II.	GC/ECD Instrument Performance Check	A	,
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	ca/101 = 20 2
V.	Blanks	A	
VI.	Surrogate spikes	SW_	
VII.	Matrix spike/Matrix spike duplicates	N	elient spec
VIII.	Laboratory control samples	SW	us/D
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	A	
XII.	Compound quantitation and reported CRQLs	A	
XIII.	Overall assessment of data	A	·
XIV.	Field duplicates	N	
XV.	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

Validated Samples:

Validated Samples.	(or)				
1 SA52-15BSPLP2	11 1	10 0224 - MB	21	31	
2 SA52-15BSPLP3	12	99758 -	22	32	
3 SA52-28BSPLP2	13 1	SPLP2-BIK	23	33	
4 SA52-28BSPLP3	14	spip3-BK	16/28 24	34	
5 RSAQ8-10BSPLP2	15		25	35	
6 RSAQ8-10BSPLP3			26	36	
7 RSAQ8-31BSPLP2	17		27	37	
8 RSAQ8-31BSPLP3	18		28	38	
9	19		29	39	
10	20		30	40	

LDC#: 22785 A 39 SDG#: Su Core

VALIDATION FINDINGS CHECKLIST

Page: _of \frac{\gamma}{V}
Reviewer: _\nabla \lambda

2nd Reviewer: _\nabla \lambda

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

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.				
Cooler temperature criteria was met.	-			
II. GC/ECD instrument performance check				
Was the instrument performance found to be acceptable?				
III. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?				
Was a linear fit used for evaluation? If yes, were all percent relative standard deviations (%RSD) ≤ 20%?	/			
Was a curve fit used for evaluation? If Yes, what was the acceptance criteria used?				
Did the initial calibration meet the curve fit acceptance criteria?			_	
Were the RT windows properly established?				
Were the required standard concentrations analyzed in the initial calibration?				
IV. Continuing calibration				
What type of continuing calibration calculation was performed?%D or%R				
Were Evaluation mix standards analyzed prior to the initial calibration and sample analysis?	/			
Were endrin and 4,4'-DDT breakdowns ≤ 15%.0 for individual breakdown in the Evaluation mix standards?		/		
Was a continuing calibration analyzed daily?				
→の 80→20 Were all percent differences (%D) <u><</u> 15‰0 or percent recovieries 85-115 %?				
Were all the retention times within the acceptance windows?		-		
V. Blanks				
Was a method blank associated with every sample in this SDG?		,		
Was a method blank analyzed for each matrix and concentration?				
Were extract cleanup blanks analyzed with every batch requiring clean-up?				
Was there contamination in the method blanks or clean-up blanks? If yes, please see the Blanks validation completeness worksheet.				
VI. Surrogate spikes				
Were all surrogate %R within the QC limits?	H	(JZ		
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			Þ	×
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?				
VII. Matrix spike/Matrix spike duplicates				

LDC #: 22785 A34 SDG #: Su Core

VALIDATION FINDINGS CHECKLIST

Page: Vof V Reviewer: 3W 2nd Reviewer: V

Validation Area	l.,	T	T	
	Yes	No	NA	Findings/Comments
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?				/
Vill. Laboratory control samples				
Was an LCS analyzed for this SDG?				
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		/		
IX: Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?				
Were the performance evaluation (PE) samples within the acceptance limits?				
X Target compound identification				
Were the retention times of reported detects within the RT windows?				
XI Compound quantitation/CRQLs				
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?				
XII System performance				
System performance was found to be acceptable.	7			
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	71			
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.				
	\dashv		_	
Target compounds were detected in the field duplicates.			1	
XV. Field blanks				
Field blanks were identified in this SDG.				
Target compounds were detected in the field blanks.			オ	

SDG #: 52 (22)

VALIDATION FINDINGS WORKSHEET Surrogate Spikes

Page: \overline{\sqrt{0f}}

Reviewer: \overline{\sqrt{0f}}

2nd Reviewer: \overline{\sqrt{0f}}

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

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

Were surrogates spiked into all samples, standards and blanks? Did all surrogate percent recoveries (%R) meet the QC limits?

	(ئ)	\																		
Qualifications	٩																			
Qual	/n1 /																			
	J- 105																			
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its)	(fo- 140																			
%R (Limits)	3) (6)))))))))))))))))
										:										
gate ound	æ																			
Surrogate Compound																				
nmnlo	SIX-CLP 1																			
	×1×																			
e ID	31K																			
Samp	SPLP3-BIK																			
	45																			
Date																				
#																				
	82/01																			

Letter Designation	Surrogate Compound	Recovery QC Limits (Soil)	Recovery QC Limits (Water)	Comments
A	Tetrachoro-m-xylene			
В	Decachlorobiphenyl			

VALIDATION FINDINGS WORKSHEET

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

A alpha-BHC	l. Dieldrin	Q. Endrin ketone	Y. Aroclor-1242	.00.
B. beta-BHC	J. 4,4'-DDE	R. Endrin sidehyde	Z. Aroclor-1248	нн.
C. delta-BHC	K. Endrin	S. aipha-Chlordane	AA Arocior-1254	н.
D. gamma-BHC	L. Endosulfan II	T. garrıma-Chlordane	BB. Arocior-1260	JJ.
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC, DB 608	KK.
F. Adrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	ur.
G. Heptachlor epoxide	0. 4,4'-DDT	W. Aroclor-1221	EE.	мм.
H. Endosulfan l	P. Methoxychior	X. Arocior-1232	#	NN.

Notes:

LUC#: 2355 434 SDG#:

VALIDATION FINDINGS WORKSHEET

-aboratory Control Samples

Page: of

2nd Reviewer:__ Reviewer:

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

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

Was a LCS analyzed every 20 samples for each matrix or whenever a sample extraction was evel IV/D Only Y N/A N/A Y)N N/A

r.		1	\leq	`				 																					
	C. C	Adamications	J-145/P																										
ormed'?	Associated Samples	TO TO S OGYET AIL	TO TO THE	SPLPS-BK			-																						
Losn Losn	RPD (Limits)				()	·			())	,)	())			())			7	()	,
LCSD	%R (Limits)	19 (50-120))	()	(())	(\(\hat{\chi}\)		`	()			^ -	())				
H	A.	12 (50-170)	())			^)	^				()			()	()	(^)	()	()			
	Compound	Y										·																	
4000	967E4 1/c /*	0 m 001.																											
*	_																												

LDC # 22285 A34 SDG #:

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Page: \of \ Reviewer:__ 2nd Reviewer:___

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

The calibration factors (CF) and relative standard deviation (%RSD) were recalculated using the following calculations:

CF = A/C

Where:

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

A = Area of compound C = Concentration of compound

S = Standard deviation of calibration factors X = Mean of calibration factors

						Senorted	Reported Recalculated	Renorted	Recalculated	Reported	Recalculated
*	Standard ID	Calibration Date		Compound		CF ctd)	CF (1)		CE /inelial)	200	2002
_	125	/ / '	I	STX-CUP!	7 7	2.727 67	ننال	2,790 27	> 790 e7	4,17	4.17
		60/11/11	A			1.237	12 374000	1.227	1,227	1.68	1.61
			I	٧		7.890	74 400 00 0		6.856	7.31	7.80
			7	x x		7870 ₺	286 490 000	2.787 /	7 686-2	6.29	6.79
2											
3											
4											

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

LDC#: 22285 A39 SDG #:

Continuing Calibration Results Verification VALIDATION FINDINGS WORKSHEET

Page: of Reviewer:_ 2nd Reviewer:_

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

Percent difference (%D) = 100 * (N - C)/N

Where: N = Initial Calibration Factor or Nominal Amount (ng)
C = Calibration Factor from Continuing Calibration Standard or Calculated Amount (ng)

						Reported	Recalculated	Reported	Recalculated
#	Standard ID	Calibration Date/Time	Compound		Average CF/ CCV Conc	CF/Conc CCV	CF/Conc CCV	Ф%	G %
	SNIA	11/12/05	T STX-CL	67	27. 900 26	28.54) ec	28540000	2,3	2,3
-	-		d		12.270	12,536	12536000	2.7	۲,
			t	λ	68.559	73.465	23415000	7.7	7.7
1_		_	۵	7	27.869	28, 924	28434500	٥,٢	R >
^ ا	CA 2.A	, , ,		_		27.596	22955000	6,3	٤'٠٥
۷		50/cl/		_		11. 878	605 86 8 11	3,7	y Y
			=	^		71.636	71640000	4.5	4.5
			9	7		26. 421	26 420 50	5.2	617
	_		7)			29.005	29005005	4.D	63
n	*	11/4/09	4 2			12,815	1281450	4.4	4.4
		-	I	>		74. 638	24 635 000	8.7	8.9
			٩	7		28. 668	28 668 000	2.9	612
	A 8 122					29.287	2928600	2:5	6,2
+	2 22	60/61/u	2	-		12.723	12 723000	3.7	3.7
			##	٨		77. 343	77345000	801	12,8
		···•	9	7		27.6931	27 6925VD	719	J'0

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 #: 22788 A39 SDG #: Se Cm

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:_	of
Reviewer:_	SVC
2nd reviewer:_	1/

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

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

% Recovery: SF/SS * 100

Where: SF = Surrogate Found SS = Surrogate Spiked

Sample ID: #

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
Tetrachloro-m-xylene						
Tetrachloro-m-xylene	87 X-CLP1	100	76.613	76	7,6	
Decachlorobiphenyl	}	V	89.597	90	40	J
Decachlorobiphenyl						

Sample ID:

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

Sample ID:

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

Sample ID:

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

Notes:	

LDC#: 22785 And SDG #:

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

Page:

Reviewer._ 2nd Reviewer.

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

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

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

SC = Concentration

SSC = Spiked sample concentration SA = Spike added

Where:

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

49758 LCS/LCSD samples:

2/ SIN

	ŝ	oike	Spiked	Sample	SOT	Ş	27	CSD	/SOT	CS/CSD
	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Added	Conce	Concentration	Percent Recovery	BCOVEIV	Percent	Percent Recovery	2	RPD
Compound	317)	2/2								1
	۶	28.7	S	CSD	Reported	Recalc.	Reported	Recalc.	Reported	Kecalc.
Ond -	3	0 2 60	0.14	K 1.2	٧٨	٧8	٧ 🗴	87	0	<u>م</u>
gamma-pric	2, 700	7		,	5	FI	7.7	77	_	
4,4'-DDT	→	~	0, (3.5	0.184	9	5.9,				,
Arnelor 1260										
								-		
					-					

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

صر:# LDC	285	' A 39
SDG #:	Su	Cno

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

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Reviewer:	₩
2nd reviewer:	~

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

Y)	N	N/A
Y	N	N/A

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

Example:	81x-up~
Sample I.D	
Conc. = (5826.4e6) (10 ml)	
(1.019 e8) (1060 ml))
= 0,54 ug/2	

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

Note:

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

October 22 through October 23, 2009

LDC Report Date:

January 8, 2010

Matrix:

Soil

Parameters:

Chlorinated Pesticides

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906081

Sample Identification

RSAQ8-0.5B RSAQ8-10B RSAQ8-10BRE RSAQ8-22B RSAQ8-22BRE

RSAQ8-31B RSAQ8-31BRE RSAQ8-34B

RSAQ8-34BRE SA132-0.5B SA132-10B

SA132009-10B SA132-20B SA132-20BRE

SA132-34B

SA132-34BRE RSAR8-0.5B

RSAR8-10B

RSAR8-20B

RSAR8-34B

RSAP8-0.5B

RSAP8-10B RSAP8-25B

RSAP8-40B

RSAQ8-0.5BMS RSAQ8-0.5BMSD

RSAR8-34BMS

RSAR8-34BMSD

Introduction

This data review covers 28 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8081A for Chlorinated Pesticides.

This review follows 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 XIV.

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 Extraction	Required Holding Time (in Days) From Sample Collection Until Extraction	Flag	A or P
RSAQ8-10BRE RSAQ8-22BRE RSAQ8-34BRE SA132-20BRE SA132-34BRE	All TCL compounds	27	14	J- (all detects) UJ (all non-detects)	А

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

II. GC/ECD Instrument Performance Check

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

III. Initial Calibration

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

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

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 20.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 20.0% for all compounds.

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

V. Blanks

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

Sample FB082809-SO (from SDG R0904894) was identified as a field blank. No chlorinated pesticide contaminants were found in this blank.

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	Column	Surrogate	%R (Limits)	Compound	Flag	A or P
RSAQ8-10B	Not specified	Tetrachloro-m-xylene	39 (40-140)	All TCL compounds	J- (all detects) UJ (all non-detects)	А
RSAQ8-10BRE	Not specified	Tetrachloro-m-xylene	31 (40-140)	All TCL compounds	J- (all detects) UJ (all non-detects)	А
RSAQ8-31B	Not specified	Tetrachloro-m-xylene Decachlorobiphenyl	20 (40-140) 27 (40-140)	All TCL compounds	J- (all detects) UJ (all non-detects)	A
RSAQ8-31BRE	Not specified	Tetrachloro-m-xylene	5 (40-140)	All TCL compounds	J- (all detects) R (all non-detects)	A
RSAQ8-34B	Not specified	Tetrachloro-m-xylene	22 (40-140)	All TCL compounds	J- (all detects) UJ (all non-detects)	Α
SA132-20BRE	Not specified	Tetrachloro-m-xylene	36 (40-140)	All TCL compounds	J- (all detects) UJ (all non-detects)	Α
SA132-34B	Not specified	Tetrachloro-m-xylene Decachlorobiphenyl	6 (40-140) 14 (40-140)	All TCL compounds	J- (all detects) R (all non-detects)	А
SA132-34BRE	Not specified	Tetrachloro-m-xylene	5 (40-140)	All TCL compounds	J- (all detects) R (all non-detects)	A

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 MS, MSD, LCS, or LCSD percent recoveries (%R) were within QC limits and no data were qualified.

VIII. Laboratory Control Samples (LCS)

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

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
99356-LCS/D (RSAP8-0.5B RSAP8-10B RSAP8-25B RSAP8-40B 99356-MB)	Endrin aldehyde Hexachlorobenzene	45 (50-130) 43 (50-130)	47 (50-130) 41 (50-130)	-	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	Р
101045-LCS/D (RSAQ8-10BRE RSAQ8-22BRE RSAQ8-34BRE SA132-20BRE SA132-34BRE 101045-MB)	Hexachlorobenzene	46 (50-130)	45 (50-130)	-	J- (all detects) UJ (all non-detects)	Р

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

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

b. GPC Calibration

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

XI. Target Compound Identification

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 R0906081	All compounds reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

XIII. 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
RSAQ8-10BRE RSAQ8-22BRE RSAQ8-31BRE RSAQ8-34BRE SA132-20BRE SA132-34BRE	All TCL compounds	x	A

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

XIV. Field Duplicates

Samples SA132-10B and SA132009-10B were identified as field duplicates. No chlorinated pesticides were detected in any of the samples.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Chlorinated Pesticides - Data Qualification Summary - SDG R0906081

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906081	RSAQ8-10BRE RSAQ8-22BRE RSAQ8-34BRE SA132-20BRE SA132-34BRE	All TCL compounds	J- (all detects) UJ (all non-detects)	А	Technical holding times (h)
R0906081	RSAQ8-10B RSAQ8-10BRE RSAQ8-31B RSAQ8-34B SA132-20BRE	All TCL compounds	J- (all detects) UJ (all non-detects)	А	Surrogate spikes (%R) (s)
R0906081	RSAQ8-31BRE SA132-34B SA132-34BRE	All TCL compounds	J- (all detects) R (all non-detects)	А	Surrogate spikes (%R) (s)
R0906081	RSAP8-0.5B RSAP8-10B RSAP8-25B RSAP8-40B	Endrin aldehyde Hexachlorobenzene	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0906081	RSAQ8-10BRE RSAQ8-22BRE RSAQ8-34BRE SA132-20BRE SA132-34BRE	Hexachlorobenzene	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0906081	RSAQ8-0.5B RSAQ8-10B RSAQ8-10BRE RSAQ8-22BRE RSAQ8-22BRE RSAQ8-31BRE RSAQ8-31BRE RSAQ8-34BRE SA132-0.5B SA132-10B SA132-09B SA132-20B SA132-20BRE SA132-34B SA132-34BRE RSAR8-0.5B RSAR8-10B RSAR8-10B RSAR8-10B RSAP8-10B RSAP8-10B RSAP8-10B	All compounds reported below the PQL.	J (all detects)	Α	Project Quantitation Limit (sp)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906081	RSAQ8-10BRE RSAQ8-22BRE RSAQ8-31BRE RSAQ8-34BRE SA132-20BRE SA132-34BRE	All TCL compounds	X	А	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Chlorinated Pesticides - Laboratory Blank Data Qualification Summary - SDG R0906081

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Chlorinated Pesticides - Field Blank Data Qualification Summary - SDG R0906081

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 12/24/09
Page: <u> </u>
Reviewer: <u> </u>
2nd Reviewer:

Laboratory: Columbia Analytical Services

LDC #: 22285B3a

SDG #: R0906081

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081A)

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

	Validation Area		Comments
I.	Technical holding times	SW)	Sampling dates: 10/22 - 23/01
H.	GC/ECD Instrument Performance Check	_A_	,
Ш.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	ca/10 = 20 }
V.	Blanks	A	
VI.	Surrogate spikes	SN)	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	us 16
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	SN)	
XIV.	Field duplicates	ND	0 = 11, 12
XV.	Field blanks	ND	TB = FB08 2809-50 (R0904 894)

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

D = Duplicate

TB = Trip blank

EB = Equipment blank FB = Field blank

Validated Samples:

		Soil						7
1 3	RSAQ8-0.5B	11	SA132-10B 9	21	RSAP8-0.5B	31	99215-MB	4:
2 1	RSAQ8-10B	12	SA132009-10B	22	RSAP8-10B	32	99356 -	54
5	RSAQ8-10BRE	13	SA132-20B	23	RSAP8-25B	33 3	99194-	4.
4	RSAQ8-22B	14	SA132-20BRE	24	RSAP8-40B	34 4	99779-	دع
5 5	RSAQ8-22BRE	15	SA132-34B	25	RSAQ8-0.5BMS	35 S	101045-	s
6	RSAQ8-31B	16	SA132-34BRE	26	RSAQ8-0.5BMSD	36		
₇	RSAQ8-31BRE	17	RSAR8-0.5B	27	RSAR8-34BMS	37		
8	RSAQ8-34B	18 1	RSAR8-10B	28	RSAR8-34BMSD	38		
9	RSAQ8-34BRE	19	RSAR8-20B	29		39		
10	SA132-0.5B	20	RSAR8-34B	30		40		

VALIDATION FINDINGS WORKSHEET

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

A. alpha-BHC	I. Dieldrin	Q. Endrin ketone	Y, Aroclor-1242	.00
B. beta-BHC	J. 4,4'-DDE	R. Endrin aldehyde	Z. Aroclor-1248	H,
C. delta-BHC	K. Endrin	S. alpha-Chlordane	AA. Aroclor-1254	н.
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	ىل.
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	cc. DB 608	KK.
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	u.
G. Heptachlor epoxide	0. 4,4'-DDT	W. Aroclor-1221	EE. Hexachlorobenzene	мм.
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	ŧ	N

Notes:

LDC #:_	22285	B31
	Su	

VALIDATION FINDINGS WORKSHEET Technical Holding Times

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3 L'
-la

All circled dates have exceeded the technical holding times.

_	<u>Y/N</u>	N/A	_Were all co	oler ter	mperatures	within	validation	criteria?
ľ								

METHOD : GC Pe	sticides/PCBs	(EPA SW 846 M	lethod 8081/8082)	Γ	1	T	
Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifie
5 9 14, 16	<u> </u>	N	10/22/09	Extraction date	Analysis date 11 /24 /89	27	J-/WJ/
							<u> </u>
	·						
			•				
			·				

TECHNICAL HOLDING TIME CRITERIA

Water:

Extracted within 7 days, analyzed within 40 days.

Soil:

Extracted within 14 days, analyzed within 40 days.

LDC# 22285 B34 SDG #:

VALIDATION FINDINGS WORKSHEET Surrogate Spikes

Page: Reviewer:_ 2nd Reviewer._

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

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

Were surrogates spiked into all samples, standards and blanks?

N/A

Did all surrogate percent recoveries (%R) meet the QC limits?

l etter Designation	Surrogate Compound	Recovery QC Limits (Soil)	Recovery QC Limits (Water)	Comments
in the second second				
	-	-		
∀	l etrachoro-m-xylene			
ď	Decachlorobiphenyl			
		The state of the s		

(4, 13 = sur ordinate brints in 2nd ord.)

LDC #: 222 85 B34 SDG #:

Matrix Spike/Matrix Spike Duplicates VALIDATION FINDINGS WORKSHEET

Page: ⊥of 」 2nd Reviewer: Reviewer:

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

Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". N N/A

Was a MS/MSD analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

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

Qualifications	No gual CUESPIN		*			Noqual (cither LCS	MCD, MS or ASD m																			
Associated Samples			>			20																				
RPD (Limits)	()	()		()		Manits ()	()	()	()	()	()	()	()	()	(()	()	()	()	()	()	()	())	()	
MSD %R (Limits)	260 (56-125)	222 (9-149)	(05/-02) /12	())	ntride	Symmetry)	(/ ()	()	()	()	()	()	()	(()	()	()	()		()	()	()))	()
MS %R (Limits)	293 (56-125)	21) (9-149)	(25/20/28)	_		,	of the se		(()	()	()	()	())	()		()	()			()	()
panoamo		0	33			Severa																				
CI COMON	27/2C					er/c	J																			
_	# Date																									

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:

Project:

Northgate Environmental Tronox LLC Henderson/2027.001

Sample Matrix:

Soil

Service Request: R0906081 Date Collected: 10/23/09 Date Received: 10/24/09

Date Analyzed: 11/17/09

Matrix Spike Summary Organochlorine Pesticides by Gas Chromatography

Sample Name:

RSAR8-34B

Lab Code:

R0906081-024

Units: µg/Kg Basis: Dry

Analytical Method: 8081A

Prep Method:

EPA 3541

Trop III.		_	m			Dunlie	ate Matrix	Snike			
	0 1		Iatrix Spike				Q0910455-0		% Rec		RPD
	Sample		Q0910455-0 Amount	* % Rec		Result	Amount	% Rec	Limits		Limit
Analyte Name	Result	Result	Amount	/0 ACC	•					***	20
4,4'-DDD	ND	3.20	9,52	34	*	0,814	9.52	9	* 58 - 121	119 *	30
4,4'-DDE	ND	3.56	9.52	37	*	0.805	9.52	8	* 56 - 125	126 *	30
4,4'-DDT	ND	3.50	9.52	37		0.800	9.52	8	* 9 - 149	126 *	30
Aldrin	ND	2.20	9,52	23		0.576	9.52	6	* 15 - 135	117 *	30
Dieldrin	ND	3.17	9.52	33		1.02	9.52	11	* 25 - 150	103 *	30
Endosulfan I	ND	3.17	9.52	33	*	1.12	9.52	12	* 56 - 119	95 *	30
Endosulfan II	ND	3.41	9.52	36	*	1.20	9.52	13	* 65 - 127	96 *	30
Endosulfan Sulfate	ND	3.14	9.52	33	*	1.22	9.52	13	* 37 - 122	88 *	30
Endrin	ND	3.38	9.52	35		1.07	9.52	11	* 28 - 143	104 *	30
Endrin Aldehyde	ND	2.12	9.52	22		0.924	9.52	10	* 18 - 135	79 *	30
Endrin Ketone	ND	3.19	9.52	33	*	1.37	9.52	14	* 57 - 123	80 *	30
Heptachlor	ND	2.40	9.52	25	*	0.814	9.52	9	* 35 - 127	99 *	30
Heptachlor Epoxide	ND	3.03	9.52	32	*	1.20	9.52	13	* 61 - 120	86 *	30
Hexachlorobenzene	ND	3.30	23.8	14	*	1.58	23.8	7	* 20 - 150	70 *	30
Methoxychlor	ND	20.2	47.6	42		6.56	47.6	14	* 38 - 149	102 *	30
alpha-BHC	ND	1.59	9.52	17	*	1.19	9.52	13	* 53 - 130	29	30
alpha-Chlordane	ND	2.97	9.52	31		0.733	9.52	8	* 27 - 130	121 *	30
beta-BHC	ND	3.29	9.52	35		1.53	9,52	16	* 35 - 142	73 *	30
delta-BHC	ND	2,42	9.52	25	*	1.03	9.52	11	* 44 - 119	80 *	30
gamma-BHC (Lindane)	ND	1,93	9.52	20	*	1.21	9.52	13	* 37 - 124	46 *	30
gamma-Bric (Emdane) gamma-Chlordane	ND	3.28	9.52	34	*	1.09	9.52	11	* 38 - 127	101 *	30

LDC # 222 85 B 34

VALIDATION FINDINGS WORKSHEET

Page: _\of_

2nd Reviewer:__ Reviewer:_

Laboratory Control Samples

SDG #: \$4 (2-4)
METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

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

Were a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG? _ Were the LCS percent recoveries (%R) and relative percent differences (RPD) within the QC limits? Y N N/A W Y N N/A W Level IV/D Only

Y N/N/A

Was a LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

	lons	(18/8)	(445 1.)		(18.4;)	Te.				*		(0)				MINIPI										
	Qualifications	Nomice										J-14T/P		*		6										
	Associated Samples	7		L						>		24 94351 -MB	_			5 9 14 16, 10 m d5-MB										
s performed?) A	-	^	^	^				-	-	() 21-	<u> </u>	<u> </u>	-	3 6	, (_		_) ()	(<u> </u>	^	-
extraction wa	RPD (Limits)	to (30	_	47 (~ %	46 (31 (36	34))))	`	`))))))))))	,
atrix or whenever a sample extraction was performed?	LCSD %R (Limits)) ((29-1%)		· ·	,	()	()	^)	(· ·	(58-130)	(()	^ `		()	()	()	()	()	()	(()	()	1
atrix or wher	3%) 47	. 47					())	47	14)	() 45) ()	,	(()))	
ies for each m	LCS %R (Limits)))))	,)))))	oél-85) St	43 ())	46)))	`))))	<u> </u>	_
evely 20 saffig	Compound	#	ø	旺	רוו	₩	J	Ø	7			R	EE EE			一										
was a Los allalyzeu evely zu sallipies for each m	TCS/TCSD ID	91215 Les 16										9935- US/D				10 1045 LCS /D										
	#												1					1	T							

LDC#: 22505 \$34 SDG#: 24 Cm-1

VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page: _

2nd Reviewer: Reviewer:

METHOD: GC Pesticides/PCBs (EPA SW846 Method 8081/8082)

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? AN N/A

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

October 28, 2009

LDC Report Date:

January 8, 2010

Matrix:

Soil

Parameters:

Chlorinated Pesticides

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906191

Sample Identification

RSAS8-0.5B

RSAS8-35B

RSAS8-35BMS

RSAS8-35BMSD

Introduction

This data review covers 4 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8081A for Chlorinated Pesticides.

This review follows 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 XIV.

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/ECD Instrument Performance Check

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

III. Initial Calibration

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

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

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 20.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 20.0% for all compounds.

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

V. Blanks

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

Sample FB082809-SO (from SDG R0904894) was identified as a field blank. No chlorinated pesticide contaminants were found in this blank.

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

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

b. GPC Calibration

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

XI. Target Compound Identification

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 R0906191	All compounds reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Chlorinated Pesticides - Data Qualification Summary - SDG R0906191

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906191	RSAS8-0.5B RSAS8-35B	All compounds reported below the PQL.	J (all detects)	Α	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Chlorinated Pesticides - Laboratory Blank Data Qualification Summary - SDG R0906191

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Chlorinated Pesticides - Field Blank Data Qualification Summary - SDG R0906191

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

Stage 2B

2nd Reviewer:

Reviewer:

SDG #:_	R0906191
Laborato	ry: Columbia Analytical Services

LDC #: 22285C3a

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081A)

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: 10 /28 /09
II.	GC/ECD Instrument Performance Check	A	1
111.	Initial calibration	<u> </u>	
IV.	Continuing calibration/ICV	A	Ca/a 6 202
V.	Blanks	A	
VI.	Surrogate spikes		
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	us/p
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	A	·
XIV.	Field duplicates	N	
XV.	Field blanks	ND	FB = FB082809-50 (R0964894)

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:

anao	Soi				
1	RSAS8-0.5B	11	99 779-MB	21	31
 2	RSAS8-35B	12		22	32
3	RSAS8-35BMS	13		23	33
4	RSAS8-35BMSD	14		24	34
5		15		25	35
6		16		26	36
7		17		27	37
8		18		28	38
9		19		29	39
10		20		30	40

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

November 2, 2009

LDC Report Date:

January 8, 2010

Matrix:

Water

Parameters:

Chlorinated Pesticides

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906270

Sample Identification

M-147B M-147009B

EB110209-GWA3

Introduction

This data review covers 3 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8081A for Chlorinated Pesticides.

This review follows 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 XIV.

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/ECD Instrument Performance Check

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

III. Initial Calibration

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

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

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 20.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 20.0% for all compounds.

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

V. Blanks

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

Sample EB110209-GWA3 was identified as an equipment blank. No chlorinated pesticide contaminants were found in this blank.

Sample PB102309-A3 (from SDG R0906095) was identified as a pump blank. No chlorinated pesticide contaminants were found in this blank.

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

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

b. GPC Calibration

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

XI. Target Compound Identification

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 R0906270	All compounds reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

Samples M-147B and M-147009B were identified as field duplicates. No chlorinated pesticides were detected in any of the samples.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Chlorinated Pesticides - Data Qualification Summary - SDG R0906270

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906270	M-147B M-147009B EB110209-GWA3	All compounds reported below the PQL.	J (all detects)	А	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Chlorinated Pesticides - Laboratory Blank Data Qualification Summary - SDG R0906270

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Chlorinated Pesticides - Field Blank Data Qualification Summary - SDG R0906270

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #: 22285D3a SDG #: R0906270

Stage 2B

Laboratory: Columbia Analytical Services

Reviewer: 2nd Reviewer:

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081A)

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: 11 / 0 2/0 9
11.	GC/ECD Instrument Performance Check	_A_	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	ca/101 = 203
V.	Blanks	À	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	Chiant Spec
VIII.	Laboratory control samples	₼	ics/p
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	A	·
XÍV.	Field duplicates	ND	b=!、ア
XV.	Field blanks	ND	EB = 3 PB = PB102309-43 (R0906095

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:

MIGLER

	W	iter				
1	M-147B	11	99996-MB	21	31	
2	M-147009B	12		22	32	
3	EB110209-GWA3	13		23	33	
4		14		24	34	
5		15		25	35	
6		16		26	36	
7		17		27	37	
8		18		28	38	
9		19		29	39	
10		20		30	40	

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

November 11, 2009

LDC Report Date:

January 8, 2010

Matrix:

Water

Parameters:

Chlorinated Pesticides

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906477

Sample Identification

M-122B

Introduction

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

This review follows 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 XIV.

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/ECD Instrument Performance Check

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

III. Initial Calibration

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

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

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 20.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 20.0% for all compounds.

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

V. Blanks

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

Sample PB102309-SO (from SDG R0906095) was identified as a pump blank. No chlorinated pesticide contaminants were found in this blank.

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
100766-LCS/D (All samples in SDG R0906477)	Endrin aldehyde	26 (50-130)	24 (50-130)	-	J- (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

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

b. GPC Calibration

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

XI. Target Compound Identification

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 R0906477	All compounds reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Chlorinated Pesticides - Data Qualification Summary - SDG R0906477

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906477	M-122B	Endrin aldehyde	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0906477	M-122B	All compounds reported below the PQL.	J (all detects)	А	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Chlorinated Pesticides - Laboratory Blank Data Qualification Summary - SDG R0906477

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Chlorinated Pesticides - Pump Blank Data Qualification Summary - SDG R0906477

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #:_	22285F3a	VALIDA
SDG #:	R0906477	
Laborat	ory: <u>Columbia Analytical</u>	<u>Services</u>

Stage 2B

Date:	12/30/09
Page:_	<u>of</u>
Reviewer:	<u> </u>
2nd Reviewer:	\ <u>\</u>

METHOD: GC Chlorinated Pesticides (EPA SW 846 Method 8081A)

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: 11 /1 /64
II.	GC/ECD Instrument Performance Check	A	′
111.	Initial calibration	A	
IV.	Continuing calibration/ICV	<u> </u>	Ca/10 = 25)
V.	Blanks	<u>À</u>	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	client spec
VIII.	Laboratory control samples	SW	ics/p
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	ND	PB = PB 102309-50 (Rogo 6095)

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:

Wat	er			
1 M-122B	11	21	31	
2 100766-MB	12	22	32	
3	13	23	33	
4	14	24	34	
5	15	25	35	
6	16	26	36	
7	17	27	37	
8	18	28	38	
9	19	29	39	
10	20	30	40	

VALIDATION FINDINGS WORKSHEET

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

A. alpha-BHC	i, Dieldrin	Q. Endrin ketone	Y. Arocior-1242	GG.
B. beta-BHC	J. 4,4'-DDE	R. Endrin aldehyde	Z. Aroclor-1248	HH.
C. delta-BHC	K. Endrin	S. alpha-Chlordane	AA. Aroclor-1254	=
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Arocior-1260	.بر
E. Heptachlor	М. 4,4'-DDD	U. Toxaphene	CC. DB 608	KK.
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	Ť
G. Heptachlor epoxide	0. 4,4'-DDT	W. Aroclor-1221	EE.	мм.
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	Ŧ	NN.

Notes:

LDC #: 2225 Fra

VALIDATION FINDINGS WORKSHEET

Page: 1 of Reviewer: 32 2nd Reviewer:

Laboratory Control Samples

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

Were a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG? N'N'A

Were the LCS percent recoveries (%R) and relative percent differences (RPD) within the QC limits? evel W/B Only Y(N'N/A

Date			ייי				
	LCS/LCSD ID	Compound	%R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	0/577- 97/00	X	26 (50-120)	24 (50-133)	()	AN + BK	5-147/2/
			()	()	()		
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Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Data Validation Reports LDC #22285

Polychlorinated Biphenyls



Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

October 21 through October 26, 2009

LDC Report Date:

January 8, 2010

Matrix:

Soil

Parameters:

Polychlorinated Biphenyls

Validation Level:

Stage 4

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906056

Sample Identification

SA52-15BSPLP2

SA52-15BSPLP3

SA52-28BSPLP2

SA52-28BSPLP3

RSAQ8-10BSPLP2

RSAQ8-10BSPLP3

RSAQ8-31BSPLP2

RSAQ8-31BSPLP3

SA34-10BSPLP2

SA34-10BSPLP3

SA34-31BSPLP2

SA34-31BSPLP3

Samples in this SDG underwent SPLP extraction

Introduction

This data review covers 12 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8082 for Polychlorinated Biphenyls.

This review follows 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 XIV.

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/ECD Instrument Performance Check

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

III. Initial Calibration

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

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

Retention times (RT) of all compounds in the calibration standards were within QC limits.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 20.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 20.0% for all compounds.

Retention times (RT) of all compounds in the calibration standards were within QC limits.

V. Blanks

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

No field blanks were identified in this SDG.

VI. Surrogate Spikes

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

Sample	Column	Surrogate	%R (Limits)	Compound	Flag	A or P
SPLP3-BLK2	DB-1701	Decachlorobiphenyl	36 (40-140)	All TCL compounds	J- (all detects) UJ (all non-detects)	P
SPLP2-BLK2	DB-1701	Decachlorobiphenyl	31 (40-140)	All TCL compounds	J- (all detects) UJ (all non-detects)	Р
SPLP3-BLK1	DB-1701	Decachlorobiphenyl	33 (40-140)	All TCL compounds	J- (all detects) UJ (all non-detects)	Р

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

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

b. GPC Calibration

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

XI. Target Compound Identification

All target compound identifications were within validation criteria.

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 R0906056	All compounds reported below the PQL.	J (all detects)	Α

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Polychlorinated Biphenyls - Data Qualification Summary - SDG R0906056

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906056	SA52-15BSPLP2 SA52-15BSPLP3 SA52-28BSPLP2 SA52-28BSPLP3 RSAQ8-10BSPLP2 RSAQ8-10BSPLP3 RSAQ8-31BSPLP2 RSAQ8-31BSPLP3 SA34-10BSPLP2 SA34-10BSPLP3 SA34-31BSPLP3 SA34-31BSPLP3	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG R0906056

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Polychlorinated Biphenyls - Field Blank Data Qualification Summary - SDG R0906056

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

SDG #: R0906056 Laboratory: Columbia Analytical Services

LDC #: 22285A3b

Stage 4

Reviewer:_ 2nd Reviewer: L

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

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
		Å	Sampling dates: 10 /21 - 24 /09
1.	Technical holding times		Gampling dates.
11.	GC/ECD Instrument Performance Check	N.	
111.	Initial calibration	<u> </u>	
IV.	Continuing calibration/ICV	_ A	ca/10/ £ 20 2
V.	Blanks	À	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	N	Wint spec
VIII.	Laboratory control samples	#	us/p
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N _	
XI.	Target compound identification	A	
XII.	Compound quantitation and reported CRQLs	A	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	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

Validated Samples:

	501			
1 1	SA52-15BSPLP2	11 SA34-31BSPLP2	- 100224-MB	31
2 2	SA52-15BSPLP3	12 / SA34-31BSPLP3	22 × 99758 - V	32
3 1	SA52-28BSPLP2	13	231 SPLP2 -BIK1	33 762
- 2 4	SA52-28BSPLP3	14	24 x SPLP3 - B/K1	10/28 34
5	RSAQ8-10BSPLP2	15	25 SPLP2- B1k2	35 11 64
۲ کر	RSAQ8-10BSPLP3	16	26 × Sprp3- Blk2	36 63
7	RSAQ8-31BSPLP2	17	27	37
/8	RSAQ8-31BSPLP3	18	28	38
9 /	SA34-10BSPLP2	19	29	39
10 /	SA34-10BSPLP3	20	30	40

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2 Reviewer: MZ 2nd Reviewer: V

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

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

VALIDATION FINDINGS CHECKLIST

Page: of Page: Of Pag

Validation Area	Yes	No	NA	Findings/Comments
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.				
Was a MS/MSD analyzed every 20 samples of each matrix?				
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			/	
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?				
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?				
IX Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		\		
Were the performance evaluation (PE) samples within the acceptance limits?				
X Target compound identification				
Were the retention times of reported detects within the RT windows?				
XI Compound quantitation/CRQLs				
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?	_			
XII. System performance				
System performance was found to be acceptable.		·		
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.				
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.				
Target compounds were detected in the field duplicates.				
XV. Field blanks				
Field blanks were identified in this SDG.				
Target compounds were detected in the field blanks.			/	

LDC# 22285 A36 SDG #: 55

VALIDATION FINDINGS WORKSHEET Surrogate Spikes

Page: Reviewer:_ 2nd Reviewer:

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

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

Were surrogates spiked into all samples, standards and blanks? Did all surrogate percent recoveries (%R) meet the QC limits?

	(5)				V															
Qualifications	J-145A				7															
(53)	40-140)))	(())	(()	()	((()	()	(
%R (Limits)	36)) (E)) 88)))))))))))))	
Surrogate Compound	2		æ	,	F)															
Column	1021-90																			
Sample ID	SPLP3-BIKY		SPUP2-BK2		SPLP3- BIKI															
Date																				
#																				

ž

163

164

Letter Designation	Surrogate Compound	Recovery QC Limits (Soll)	Recovery QC Limits (Water)	Comments
A	Tetrachoro-m-xylene			
മ	Decachlorobiphenyl			

LDC #: 22285 A3B SDG#:

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

2nd Reviewer: Reviewer:_

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

The calibration factors (CF) and relative standard deviation (%RSD) were recalculated using the following calculations:

CF = A/C

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

A = Area of compound Where:

C = Concentration of compound S = Standard deviation of calibration factors X = Mean of calibration factors

Recalculated	%RSD	14,56	12.27									
Reported	%RSD	14.55										
Recalculated	CF (intial)		1									
Reported		5.746 ex	J. 261.2									
Reported Recalculated	CF (사이 std)	476.74	599.43									
Reported	CF CF (I'\in std)	6.747 82	5.994									
	Compound	DB 1701										
	Con	1560-1										
	Calibration Date	77 7 11	La/ w/11			<u> </u>			1		•	
	Standard ID	147										
	#	_			7			က		4		

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

La Core LDC# 22285A36 SDG #:

Continuing Calibration Results Verification VALIDATION FINDINGS WORKSHEET

Page:

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

The continuing calibration percent difference (%D) values were recalculated for _

using the following calculation:

Percent difference (%D) = 100 * (N - C)/N

Where: N = ___initial Calibration Factor or ___ Nominal Amount (ng)
C = ___ Calibration Factor from Continuing Calibration Standard or ___ Calculated Amount (ng)

				Reported	Recalculated	Reported	Rocalculated
Standard ID	Calibration Date/Time	Compound	Average CF/ CCV Conc	CF/Cone CCV	CF/Conc CCV	G%	ď,
CN 11	11/6 /69	1921 ga 1-9921	574.583	८ % / ८ ४	581,249	ر ا	4.
		4	517.291	504.915	504.916	かな	4.4
52 17	11/2/69	1021.		5 27, 24)	527.242	8.7	\ \ &
		77		464.123	464.124	10,3	દ ⁻ 0).
Ca 13	1/2/50	1021		604.930	604.93	5.3	0.3
		717	<u> </u>	523.940	573. 940	7.6	3.7

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

LDC#: 22285436 SDG #:

Continuing Calibration Results Verification VALIDATION FINDINGS WORKSHEET

 λ of λ Reviewer: 306

2nd Reviewer:_

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

Percent difference (%D) = 100 * (N - C)/N

Where: N = Initial Calibration Factor or _ Nominal Amount (ng) C = Calculated Amount (ng)

						Reported	Recalculated	Reported	Recalculated
#	Standard ID	Calibration Date/Time	Compound	þ	Average CF/ CCV Conc	CF/Conc CCV	CF/Conc CCV	%D	Q %
_	CW 14	20/2/1	1266-1	DB 170)	574, 583	563.977	563.976	1.8	80
·				71	17.291	501.653	£59.105	Çe	ક.ક
<u> </u>									
^									
<u>س</u>									
1									
4									
<u> </u>									

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#: 27285 Anb SDG#: Sec Come/

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:	of
Reviewer:	W
2nd reviewer:	1/

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

The percent recoveries (%	R) of surrogates were	recalculated for the com-	pounds identified below using	g the following	a calculation:
---------------------------	-----------------------	---------------------------	-------------------------------	-----------------	----------------

% Recovery: SF/SS * 100

Where: SF = Surrogate Found SS = Surrogate Spiked

Sample ID: # 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
Tetrachloro-m-xylene						
Tetrachloro-m-xylene	DB - 1701	100	7 2,818	73	75	9
Decachlorobiphenyl	- 172		82 /1	& 3	83	1

Sample ID:

Decachlorobiphenyl

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

Sample ID:

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

Sample ID:

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

Notes:			

VALIDATION FINDINGS WORKSHEET LDC #: 078543b

Page: of Reviewer:_ 2nd Reviewer._

Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

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

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

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

SSC = Spiked sample concentration SA = Spike added

Where:

SC = Concentration

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

LCS/LCSD samples:

100 224 1CB/B

	Sp	ike	Spiked	Sample	רכ	rcs	ST	LCSD	TCS/FCSD	CSD
Compound	 A ⊗	Added (145/L)	ουce γ	Concentration (h々 /し	Percent Recovery	Recovery	Percent Recovery	Recovery	RPD	٥
	SJI	CCSD	CCS	GSDT	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
gamma-BHC										
4,4'-DDT										
Aroclor 1260- 124 >	5.00	s, s	2.99	3.05	09	09	61	6)	7	

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

LDC #:_	22285	X36
SDG #:	Su Co	~~

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:	\ of_ <i>]</i>
Reviewer:	W.
2nd reviewer:	n

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

<u>Y</u>	N	N/A	
Y	N	N/A	Ζ.
	┑		

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

Example:	
Sample I.D.	<u>N</u> D:
Conc. = (
= .	

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

Note:		 	

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

October 22 through October 23, 2009

LDC Report Date:

January 8, 2010

Matrix:

Soil/Water

Parameters:

Polychlorinated Biphenyls

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906081

Sample Identification

EB102209-SO1A3

SA112-0.0B

SA112-0.5B

SA112-34B

RSAQ8-10B

RSAQ8-31B

RSAQ8-31BRE

RSAR8-0.5B

RSAR8-34B

RSAR8-34BMS

RSAR8-34BMSD

Introduction

This data review covers 10 soil samples and one water sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8082 for Polychlorinated Biphenyls.

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 XIV.

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/ECD Instrument Performance Check

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

III. Initial Calibration

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

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

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 20.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 20.0% for all compounds.

V. Blanks

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

Sample EB102209-SO1A3 was identified as an equipment blank. No polychlorinated biphenyl contaminants were found in this blank.

Sample FB082809-SO (from SDG R0904894) was identified as a field blank. No polychlorinated biphenyl contaminants were found in this blank.

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	Column	Surrogate	%R (Limits)	Compound	Flag	A or P
RSAQ8-31B	Not specified	Tetrachloro-m-xylene Decachlorobiphenyl	27 (40-140) 30 (40-140)	All TCL compounds	J- (all detects) UJ (all non-detects)	А
RSAQ8-31BRE	Not specified	Tetrachloro-m-xylene	9 (40-140)	All TCL compounds	J- (all detects) R (all non-detects)	А

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

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

b. GPC Calibration

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

XI. Target Compound Identification

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 R0906081	All compounds reported below the PQL.	J (all detects)	А	

Raw data were not reviewed for this SDG.

XIII. 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	
RSAQ8-31BRE	All TCL compounds	х	А	

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

XIV. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Polychlorinated Biphenyls - Data Qualification Summary - SDG R0906081

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906081	RSAQ8-31B	All TCL compounds	J- (all detects) UJ (all non-detects)	А	Surrogate spikes (%R) (s)
R0906081	RSAQ8-31BRE	All TCL compounds	J- (all detects) R (all non-detects)	А	Surrogate spikes (%R) (s)
R0906081	EB102209-SO1A3 SA112-0.0B SA112-0.5B SA112-34B RSAQ8-10B RSAQ8-31B RSAQ8-31BRE RSAR8-0.5B RSAR8-34B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0906081	RSAQ8-31BRE	All TCL compounds	х	А	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG R0906081

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Polychlorinated Biphenyls - Equipment Blank Data Qualification Summary - SDG R0906081

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Polychlorinated Biphenyls - Field Blank Data Qualification Summary - SDG R0906081

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

SDG #: R0906081 Laboratory: Columbia Analytical Services

LDC #: 22285B3b

Stage 2B

Reviewer: 2nd Reviewer:

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

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: 10 /22 _ 23/0 9
11.	GC/ECD Instrument Performance Check	N	
111.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	COV/10 = 202
V.	Blanks	A	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SM	
VIII.	Laboratory control samples	A	LCS /p
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	SM	-
XIV.	Field duplicates	2	
XV.	Field blanks	ND	EB = 1 FB = FB082809-50 (R0919894)

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

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

EB = Equipment blank

Valida	ited Samples: W A	Aer	+	Soil				
1	EB102209-SO1A3		11	RSAR8-34BMSD	21 /	98873 - MB	31	
2	SA112-0.0B	S	12		22 }	99194-	32	
3	SA112-0.5B		13		23 3	99215-	33	
4	SA112-34B		14		244	99779- 1	34	
5	RSAQ8-10B		15		25		35	
6 7 8	RSAQ8-31B		16		26		36	
7	RSAQ8-31BRE		17		27		37	
8	RSAR8-0.5B		18		28		38	
9	RSAR8-34B		19		29		39	
10	RSAR8-34BMS	V	20		30		40	

VALIDATION FINDINGS WORKSHEET

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

A alpha-BHC	I. Dieldrin	Q, Endrin ketone	Y. Aroclor-1242	.00.
B. beta-BHC	J. 4,4'-DDE	R. Endrin aldehyde	Z. Aroclor-1248	нн.
C. delta-BHC	K. Endrin	S. alpha-Chlordane	AA Arocior-1254	11.
D. gamma-BHC	L. Endosulfan II	T. garmma-Chlordane	BB. Arocior-1260	JJ.
E. Heptachlor	м. 4,4'-DDD	U. Toxaphene	CC. DB 608	KK.
F. Aldrin	N, Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	'n
G. Heptachior epoxide	O. 4,4'-DDT	W. Aroclor-1221	EF.	мм.
H. Endosulfan i	P. Methoxychlor	X. Aroslor-1232	ŦŦ.	NN.

Notes:

COMPLST-3S.wpd

SDG #: 54 Cry

VALIDATION FINDINGS WORKSHEET Surrogate Spikes

Page: of Areviewer: Mc

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

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

Were surrogates spiked into all samples, standards and blanks? Did all surrogate percent recoveries (%R) meet the QC limits?

	(s)	7																			
Qualifications	J-145 A	entre de la companya		J-1R1A																	
(s)	16-140))	(/	ĺ	(((Û)	(())) [(- (()	
%R (Limits)) /c	30 ()	9))))))))))))))))	
Surrogate Compound	*	€		4																	
Column	NS																				
Sample ID	9			_																	
Date																					
#																					

Comments			
Recovery QC Limits (Water)			
Recovery QC Limits (Soil)			
Surrogate Compound	Tetrachoro-m-xylene	Decachlorobiphenyl	
Letter Designation	А	В	

Page: _of \ Reviewer: 1

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

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

LDC # 22285 \$ 36

SDG#: Sc

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

| N/A | Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? N N/A N/A N/A

Was a MS/MSD analyzed every 20 samples for each matrix or whenever a sample extraction was performed? Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

	7																									Ē
Qualifications	"SW)																									
Associated Samples	5	,																								
RPD (Limits)	(0E) Oct	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	
MSD %R (Limits)	(05/-05) 6)	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	
MS %R (Limits)	()	())	()	()		()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	
Compound		•																								
OI OS/WSD ID	11/0	-																								
Date																										
#																										

LDC # 222 85 B36 SDG #:__

VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page: \ of

METHOD: GC Pesticides/PCBs (EPA SW846 Method 8081/8082)

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 X N/A

Was the overall quality and usability of the data acceptable?

Sample ID	Finding	Associated Samples	Qualification	SI
_	confirmation for # 6		X /A	(s)
	san atside limits			
, programme and the second				

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

October 28, 2009

LDC Report Date:

January 8, 2010

Matrix:

Soil

Parameters:

Polychlorinated Biphenyls

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906191

Sample Identification

RSAS8-0.5B

RSAS8-35B

RSAS8-35BMS

RSAS8-35BMSD

Introduction

This data review covers 4 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8082 for Polychlorinated Biphenyls.

This review follows 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 XIV.

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/ECD Instrument Performance Check

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

III. Initial Calibration

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

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

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 20.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 20.0% for all compounds.

V. Blanks

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

Sample FB082809-SO (from SDG R0904894) was identified as a field blank. No polychlorinated biphenyl contaminants were found in this blank.

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

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

b. GPC Calibration

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

XI. Target Compound Identification

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 R0906191	All compounds reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Polychlorinated Biphenyls - Data Qualification Summary - SDG R0906191

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906191	RSAS8-0.5B RSAS8-35B	All compounds reported below the PQL.	J (all detects)	А	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG R0906191

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Polychlorinated Biphenyls - Field Blank Data Qualification Summary - SDG R0906191

No Sample Data Qualified in this SDG

Tronox Northgate Henderson T

		Hollox Holdigate Heliaciden
LDC #:	22285C3b	VALIDATION COMPLETENESS WORKSHEE
SDG #:_	R0906191	Stage 2B
Laborato	ry: <u>Columbia</u>	Analytical Services

Reviewer: 306 2nd Reviewer:

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

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: 10 /28/0 9
II.	GC/ECD Instrument Performance Check	N	,
111.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	COV/10 6202
V.	Blanks	<u> </u>	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	us /b
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	ND	FB = FB 082809-50 (R0904894)

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:

anuc	ated Samples.	501)				
1	RSAS8-0.5B	11	99779-MB	21	31	
2	RSAS8-35B	12		22	32	
3	RSAS8-35BMS	13		23	33	
4	RSAS8-35BMSD	14		24	34	
5		15		25	35	
6		16		26	36	
7		17		27	37	
8		18		28	38	
9		19		29	39	
10		20		30	40	

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

November 5, 2009

LDC Report Date:

January 8, 2010

Matrix:

Soil

Parameters:

Polychlorinated Biphenyls

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906403

Sample Identification

SA77-0.5B SA77-0.5BMS SA77-0.5BMSD

Introduction

This data review covers 3 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8082 for Polychlorinated Biphenyls.

This review follows 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 XIV.

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/ECD Instrument Performance Check

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

III. Initial Calibration

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

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

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 20.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 20.0% for all compounds.

V. Blanks

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

Sample FB082809-SO (from SDG R0904894) was identified as a field blank. No polychlorinated biphenyl contaminants were found in this blank.

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

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

b. GPC Calibration

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

XI. Target Compound Identification

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 R0906403	All compounds reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Polychlorinated Biphenyls - Data Qualification Summary - SDG R0906403

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906403	SA77-0.5B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Polychlorinated Biphenyls - Laboratory Blank Data Qualification Summary - SDG R0906403

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Polychlorinated Biphenyls - Field Blank Data Qualification Summary - SDG R0906403

No Sample Data Qualified in this SDG

Tronox Northaate Henderson

		gate recorded		
LDC #:	22285E3b	VALIDATION COMPLETENESS WORKSHEET	Date: <u>/</u> 2	120/
SDG #:	R0906403	Stage 2B	Page:l	
Laborato	ory: Columbia Anal	Reviewer:_	<u> 7</u> 74	
Laborati	51. j. <u></u>		2nd Reviewer:	^

METHOD: GC Polychlorinated Biphenyls (EPA SW 846 Method 8082)

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: 11 /65/09
II.	GC/ECD Instrument Performance Check	N	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	<u> </u>	COU/W = 20 D
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	les/p
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	N	
XII.	Compound quantitation and reported CRQLs	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	N	
XV.	Field blanks	QN.	TB = FB082809-50 (R0904894)

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:

Cni 1

	59				
1	SA77-0.5B	11	21	31	
2	SA77-0.5BMS	12	22	32	
3	SA77-0.5BMSD	13	23	33	
4	100582-MB	14	24	34	
5		15	25	35	
6		16	26	36	
7		17	27	37	
8		18	28	38	
9		19	29	39	
10		20	30	40	

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Data Validation Reports LDC #22285

Metals



Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

October 21 through October 26, 2009

LDC Report Date:

January 11, 2010

Matrix:

Soil

Parameters:

Metals

Validation Level:

Stage 4

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906056/K0910677

Sample Identification

SA52-28BSPLP2

SA52-28BSPLP3

SA52-15BSPLP2

SA52-15BSPLP3

RSAQ8-10BSPLP2

NOAGO-TODOL LI Z

RSAQ8-10BSPLP3 RSAQ8-31BSPLP2

RSAQ8-31BSPLP3

SA34-31BSPLP2

SA34-31BSPLP3

SA34-10BSPLP2

SA34-10BSPLP3

SA52-28BSPLP2MS

SA52-28BSPLP2DUP

SA52-28BSPLP3MS

SA52-28BSPLP3DUP

ONOE EDDO! LI ODO!

SA52-15BSPLP3MS

SA52-15BSPLP3DUP

Samples in this SDG underwent SPLP extraction

Introduction

This data review covers 18 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 6010B, 6020, and 7000 for Metals. The metals analyzed were Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Platinum, Potassium, Selenium, Silver, Sodium, Strontium, Thallium, Tin, Titanium, Tungsten, Uranium, Vanadium, and Zinc.

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 Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

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

Blanks are summarized in Section IV.

Field duplicates are summarized in Section XIV.

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. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Calibration

An initial calibration was performed.

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

IV. Blanks

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

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
SPLP PB (prep blank)	Barium Boron Strontium Zinc	0.082 mg/L 0.04 mg/L 0.0008 mg/L 0.075 mg/L	SA52-28BSPLP2 SA52-15BSPLP2 RSAQ8-10BSPLP2 RSAQ8-31BSPLP2 SA34-31BSPLP2 SA34-10BSPLP2
SPLP PB (prep blank)	Barium Boron Strontium Sodium Zinc	0.059 mg/L 0.12 mg/L 0.0011 mg/L 0.3 mg/L 0.020 mg/L	SA52-28BSPLP3 SA52-15BSPLP3 RSAQ8-10BSPLP3 RSAQ8-31BSPLP3 SA34-31BSPLP3 SA34-10BSPLP3

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	Analyte	Reported Concentration	Modified Final Concentration
SA52-28BSPLP2	Barium	0.092 mg/L	0.092J+ mg/L
	Boron	0.39 mg/L	0.39J+ mg/L
	Zinc	0.005 mg/L	0.005J+ mg/L
SA52-15BSPLP2	Barium	0.078 mg/L	0.078J+ mg/L
	Zinc	0.002 mg/L	0.002J+ mg/L
RSAQ8-10BSPLP2	Barium	0.122 mg/L	0.122J+ mg/L
	Boron	0.03 mg/L	0.03J+ mg/L
RSAQ8-31BSPLP2	Barium	0.064 mg/L	0.064J+ mg/L
	Boron	0.11 mg/L	0.11J+ mg/L
	Zinc	0.012 mg/L	0.012J+ mg/L
SA34-31BSPLP2	Barium	0.136 mg/L	0.136J+ mg/L
	Zinc	0.012 mg/L	0.012J+ mg/L
SA34-10BSPLP2	Barium	0.361 mg/L	0.361J+ mg/L
	Zinc	0.003 mg/L	0.003J+ mg/L
SA52-28BSPLP3	Barium	0.200 mg/L	0.200J+ mg/L
	Boron	0.40 mg/L	0.40J+ mg/L
	Zinc	0.003 mg/L	0.003J+ mg/L
SA52-15BSPLP3	Barium	0.103 mg/L	0.103J+ mg/L
	Zinc	0.002 mg/L	0.002J+ mg/L
RSAQ8-10BSPLP3	Barium	0.142 mg/L	0.142J+ mg/L
	Boron	0.04 mg/L	0.04J+ mg/L
RSAQ8-31BSPLP3	Barium	0.038 mg/L	0.038J+ mg/L
	Boron	0.10 mg/L	0.10J+ mg/L
	Zinc	0.011 mg/L	0.011J+ mg/L
SA34-31BSPLP3	Barium	0.141 mg/L	0.141J+ mg/L
	Zinc	0.002 mg/L	0.002J+ mg/L
SA34-10BSPLP3	Barium	0.350 mg/L	0.350J+ mg/L
	Boron	0.50 mg/L	0.50J+ mg/L
	Zinc	0.003 mg/L	0.003J+ mg/L

No field blanks were identified in this SDG.

V. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

VI. Matrix Spike Analysis

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

VII. Duplicate Sample Analysis

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

VIII. Laboratory Control Samples (LCS)

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

IX. Internal Standards

All internal standard percent recoveries (%R) were within QC limits.

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met.

XII. Sample Result Verification and Project Quantitation Limit

All sample result verifications were acceptable.

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P	
All samples in SDG R0906056/K0910677	All analytes reported below the PQL.	J (all detects)	А	

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Metals - Data Qualification Summary - SDG R0906056/K0910677

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0906056/ K0910677	SA52-28BSPLP2 SA52-28BSPLP3 SA52-15BSPLP2 SA52-15BSPLP3 RSAQ8-10BSPLP2 RSAQ8-31BSPLP3 RSAQ8-31BSPLP3 SA34-31BSPLP2 SA34-31BSPLP3 SA34-10BSPLP3 SA34-10BSPLP3	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Metals - Laboratory Blank Data Qualification Summary - SDG R0906056/K0910677

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906056/ K0910677	SA52-28BSPLP2	Barium Boron Zinc	0.092J+ mg/L 0.39J+ mg/L 0.005J+ mg/L	А	bl
R0906056/ K0910677	SA52-15BSPLP2	Barium Zinc	0.078J+ mg/L 0.002J+ mg/L	А	bl
R0906056/ K0910677	RSAQ8-10BSPLP2	Barium Boron	0.122J+ mg/L 0.03J+ mg/L	A	bl
R0906056/ K0910677	RSAQ8-31BSPLP2	Barium Boron Zinc	0.064J+ mg/L 0.11J+ mg/L 0.012J+ mg/L	А	bl
R0906056/ K0910677	SA34-31BSPLP2	Barium Zinc	0.136J+ mg/L 0.012J+ mg/L	A	bl
R0906056/ K0910677	SA34-10BSPLP2	Barium Zinc	0.361J+ mg/L 0.003J+ mg/L	A	ld
R0906056/ K0910677	SA52-28BSPLP3	Barium Boron Zinc	0.200J+ mg/L 0.40J+ mg/L 0.003J+ mg/L	А	bl
R0906056/ K0910677	SA52-15BSPLP3	Barium Zinc	0.103J+ mg/L 0.002J+ mg/L	А	bl

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906056/ K0910677	RSAQ8-10BSPLP3	Barium Boron	0.142J+ mg/L 0.04J+ mg/L	A	bl
R0906056/ K0910677	RSAQ8-31BSPLP3	Barium Boron Zinc	0.038J+ mg/L 0.10J+ mg/L 0.011J+ mg/L	A	Ы
R0906056/ K0910677	SA34-31BSPLP3	Barium Zinc	0.141J+ mg/L 0.002J+ mg/L	A	bl
R0906056/ K0910677	SA34-10BSPLP3	Barium Boron Zinc	0.350J+ mg/L 0.50J+ mg/L 0.003J+ mg/L	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Metals - Field Blank Data Qualification Summary - SDG R0906056/K0910677

No Sample Data Qualified in this SDG

LDC #:

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

RC906056/K0910677

Stage 4

SDG #:	R0910677 K0106036/K011067/	St
Laboratory	Columbia Analytical Services	

Reviewer: 2nd Reviewer:

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

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: 10/21/09 - 10/26/09
II.	ICP/MS Tune	A	
III.	Calibration	A	
IV.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	A	uz
VII.	Duplicate Sample Analysis	A	as
VIII.	Laboratory Control Samples (LCS)	A	LES
IX.	Internal Standard (ICP-MS)	A	
X.	Furnace Atomic Absorption QC	\sim	Notutilized
XI.	ICP Serial Dilution	A	
XII.	Sample Result Verification	A	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	N	
XV	Field Blanks	$ \mathcal{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

Validated Samples:

	So!1					
1	SA52-28BSPLP2	11	SA34-10BSPLP2	21	31	PB5
2	SA52-28BSPLP3	12	SA34-10BSPLP3	22	32	PB5
3	SA52-15BSPLP2	13	SA52-28BSPLP2MS	23	33	
4	SA52-15BSPLP3	14	SA52-28BSPLP2DUP	24	34	
5	RSAQ8-10BSPLP2	15	SA52-28BSPLP3MS	25	35	
6	RSAQ8-10BSPLP3	16	SA52-28BSPLP3DUP	26	36	
7	RSAQ8-31BSPLP2	17	SA52-15BSPLP3MS	27	37	
8	RSAQ8-31BSPLP3	18	SA52-15BSPLP3DUP	28	38	
9	SA34-31BSPLP2	19		29	39	
10	SA34-31BSPLP3	20		30	40	

Notes:		 	
		 	<u></u>

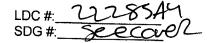
LDC#: 22785A9 SDG#: SEE COVER

VALIDATION FINDINGS CHECKLIST

Page: ____ of ___ Reviewer: _____ 2nd Reviewer: _____

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

Volidation Avec	T:.	Γ	T	
Validation Area	Yes	<u>No</u>	NA	Findings/Comments
All technical holding times were met.				
Cooler temperature criteria was met	-			
H: Calibration			4	
Were all isotopes in the tuning solution mass resolution within 0.1 amu?				
Were %RSD of isotopes in the tuning solution < 5%?				
Were all instruments calibrated daily, each set-up time?				
Were the proper number of standards used?				
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury and 85-115% for cyanide) QC limits?				
Were all initial calibration correlation coefficients > 0.995?				
III. Bianks				
Was a method blank associated with every sample in this SDG?		_		
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	_	_		
IV ICP Interference Check Sample				
Were ICP interference check samples performed daily?				
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?				
IV: Matrix spike/Matrix spike duplicates				The state of the s
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.				
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.		-		
Were the MS/MSD or duplicate relative percent differences (RPD) \leq 20% for waters and \leq 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were \leq 5X the RL, including when only one of the duplicate sample values were \leq 5X the RL.				
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?		`		
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?				



VALIDATION FINDINGS CHECKLIST

Page: Zof Z Reviewer: CC 2nd Reviewer:

Validation Area	T.,	Ī.,	T	
VI. Furnace: Atomic Absorption QC	Yes	No No	NA	Findings/Comments
If MSA was performed, was the correlation coefficients > 0.995?				
Do all applicable analysies have duplicate injections? (Level IV only)				
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%? (Level IV only)			/	
Were analytical spike recoveries within the 85-115% QC limits?				
Vit. IGP Senal Diletton:				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the IDL?	7			
Were all percent differences (%Ds) < 10%?		_		
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.				
VIII. Internal Standards (EPA SW 846 Method 6020).				
Were all the percent recoveries (%R) within the 30-120% of the intensity of the internal standard in the associated initial calibration?	\	1		
If the %Rs were outside the criteria, was a reanalysis performed?	V			
IX: Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		-		
Were the performance evaluation (PE) samples within the acceptance limits?			7	
X Sample Result-Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	-	-		
XI Overall assessment of data				
Overall assessment of data was found to be acceptable.	1			26 10 10 10 10 10 10 10 10 10 10 10 10 10
XII - Freid diplicates				
Field duplicate pairs were identified in this SDG.		V	-	
Target analytes were detected in the field duplicates.			7	
XIII. Field blanks				
Field blanks were identified in this SDG.		4		
Target analytes were detected in the field blanks.			1	

LDC #: 22285/4 SDG #: See Cover

VALIDATION FINDINGS WORKSHEET Sample Specific Element Reference

Page: ___of/_ Reviewer: _____ 2nd reviewer: ____

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-12	5	Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
ac13,14		(Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
15,16		Al, (Si) As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, (Pb) Mg, Mo, Mn, (Hg) Ni, (Pt) K, Se, Ag, Na, Sr, (Ti) Sn, Ti, (W, Ū) V, Zn
17,18		(A) Sb, (As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe) Pb, Mg, Mo, Mn, Hg, Ni, Pt, (K, Se, Ag, Na, Sr) TI, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
47,000		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
	<u> </u>	Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
	<u> </u>	Analysis Method
ICP	15	Al) Sb,(As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe) Pb,(Mg, Mo, Mn) Hg(Ni) Pt, (K, Se, Ag, Na, Sr) TI,(Sn, Ti)W, U(V, Zn
ICP-MS	5	Al, (Sb), As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, (Pt), K, Se, Ag, Na, Sr, (1), Sn, Ti, (W, U) V, Zn
GFAA		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn

Comments Mercury by CVAA if performed

LDC #: 22285A4
SDG #: See Cover
METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)
Sample Concentration units, unless otherwise noted: mg/L

VALIDATION FINDINGS WORKSHEET PB/ICB/CCB QUALIFIED SAMPLES

Soil preparation factor applied: NA Associated Samples: 1, 3, 5, 7, 9, 11

2nd Reviewer:

Reason Code: bl

Analyte Extraction (mg/L) Maximum (Maximum PBs (Limit ICB/CCBs Limit) 1 3 5 7 9 11 9 11 Blank (mg/L) PBs (mg/L) (ug/L) (ug/L) Limit (ug/L) 0.092 J+ 0.078 J+ 0.078 J+ 0.078 J+ 0.078 J+ 0.064 J+ 0.136 J+ 0.136 J+ 0.013 J+ 0.11 J+ 0.013 J+ 0.013 J+ 0.012 J+ 0.003 J+ 0.003 J+ 0.003 J+ 0.012 J+ 0.012 J+ 0.012 J+ 0.012 J+ 0.012 J+ 0.012 J+ 0.003 J+ 0.003 J+													
Analyte Extraction (mg/L) Maximum (maximum pB² (Limit fmg/L)) Action (Limit pB² (Limit fmg/L)) Action (Limit limit pB² (Limit fmg/L)) Action (Limit limit limit pB² (Limit limit limit pB² (Limit limit limit pB² (Limit limit limit pB² (Limit limit limit limit pB² (Limit limit l											**		
(mg/L) (ug/L) (ug/L)<	Analyte	Extraction Blank	Maximum PB ^a	Maximum ICB/CCB ^a	Action Limit		m	ဂ	,	ກ	_		
0.082 0.082 0.092 J+ 0.078 J+ 0.122 J+ 0.04 0.04 0.39 J+ 0.03 J+ 0.0008 0.008 0.008 0.075 0.75 0.005 J+ 0.002 J+		(mg/L)		(ng/L)									
0.04 0.4 0.39 J+ 0.03 J+ 0.0008 0.008 0.005 J+ 0.002 J+	Ö	0.082			0.82	+I. 560 0	0.078 J+	0.122 J+	0.064 J+	0.136 J+	0.361 J+		
r 0.004 0.4 0.39 J+ 0.03 J+ 0.03 J+ 0.03 J+ 0.002 J+ 0.005 J+ 0.00	Da	0.00%			3								
n 0.075 0.005 J+ 0.002 J+	α	0.04			9.0	0.39 J+		0.03 J+	0.11 J+				
0.0008 0.008 0.005 J+ 0.002 J+ 0.002 J+		5											
0.075 0.005 J+ 0.002 J+	Š	0.0008			0.008								
0.75 0.003 3+ 0.002 3+					1	1 200 0	11 200 0		1 000	+1 0100	0.003 1+		
	Zu	0.075			0.75	+c cou.u	0.00Z JŦ		0.012.0	0.012.0.0			

ample Co	Sample Concentration units, unless otherwise noted: mg/	nits, unless o	therwise not	ed: ma/L	As	sociated Sar	Associated Samples: 2, 4, 6, 8, 10, 12	4.6.8.10.	12		
									188 cm 188 cm		
Analyte	Extraction Blank (mg/L)	Maximum PB ^a (mg/L)	Maximum ICB/CCB ^a (ug/L)	Action Limit	2	4	9	œ	10	12	
D,	0.059			0.59	0.200 J+	0.103 J+	0.103 J+ 0.142 J+ 0.038 J+ 0.141 J+ 0.350 J+	0.038 J+	0.141 J+	0.350 J+	
D 0	0.12			1.2	<u> </u>		0.04 J+ 0.10 J+	0.10 J+		0.50 J+	
מ' ב	0 0011			0.011							
N N	0.3			8							
Zn Zn	0.020			0.2	0.003 J+	J+ 0.002 J+		0.011 J+	0.011 J+ 0.002 J+ 0.003 J+	0.003 J+	

a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element. Note:

LDC#. 2228549 SDG#. SECCOVER

Initial and Continuing Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Page: 2nd Reviewer:_ Reviewer:

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

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

%R = Found × 100

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

True = concentration (in ug/L) of each analyte in the ICV or CCV source

					Recalculated	Reported	
Standard ID	Type of Analysis	Element	Found (HB/L)	True (Wa/L)	2		Acceptable
ICV	ICP (Initial calibration)	S	5,185	5.00		%K	(Y/N)
	GFAA (Initial calibration)	-	201			5) —
		·					
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	CVAA (Initial calibration)	中的中	C. CAR	7500,0	100	175	þ
5.00		7	-03	000)	\ \ \ \ \ \ \	
< V.J.	COntinuing calibration)	50	0.09	8	8	99	
	GFAA (Continuing calibration)				7		<i>l</i> .
	/IDIDIDIDIDE BUILDIDID						
CCV6	CVAA (Continuing calibration)	44	0.0000 0.0050	S(B)	100	×	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
				3,)	001) ~
<u> </u>	ICP/MS (Initial calibration)	FA	1250.0	0,220 0 7250	9	90)
コンシ	CP/MS /Continuing adjusting	,				/ /	
ر م	tor and tournaing candaton)	\supset	20,0	0.025	2	/0	

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

SDG #: SEC COLON 145027 LDC #:

VALIDATION FINDINGS WORKSHEET **Level IV Recalculation Worksheet**

Reviewer: 2nd Reviewer:

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

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

%R = Found x 100 True

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

True = Concentration of each analyte in the source.

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

RPD = <u>IS-DI</u> × 100 (S+D)/2

Where, S = Original sample concentration

D = Duplicate sample concentration

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

%D = ||-SDR| × 100

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

					Recalculated	Renorted	
Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	%R / RPD / %D	%R/RPD/%D	Acceptable (Y/N)
108AB	ICP interference check	0	0.8887	1.0000	68	68)-
577	Laboratory centrol sample	1-1-	10.13	16.00) 01	[0]	
51	Matrix spike	12	(ssr-sr)	1.01	101	001	
ト	Duplicate	R	2120.0	0,093	-	1	
	ICP serial dilution	Na	00154	45,515	0,0	6,0	>

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

LDC #: 2228549 SDG #: <u>Secole</u>1

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page: U of All Reviewer: 2nd reviewer:

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

Pease Y N I Y N I Y N I	see qua N/A N/A N/A	The second second	ated range of the instruments and within the linear range of the ICP2
Detecte ollowin	ed analy g equat	rte results fortion:	were recalculated and verified using the
Concentr	ation =	(RD)(FV)(Dil) (In. Vol.)(%S)	Recalculation: 1: Zn= Raw Da+a=0.0049mg/L
RD V	=	Raw data concentration	7 3,33 11,37
	==	Final volume (ml)	
n. Vol.	=	Initial volume (mi) or weight (G)	
)il	=	Dilution factor	60 d: W = Raw bata = \$ 10.05 mg/L/1000 -0.0100
6S	=	Decimal percent solids	60 a: W = Raw Bata = \$ 10.05 mg/L/1000 = 0.01000

Sample ID	Analyte	Reported Concentration	Calculated Concentration	Acceptable
1	Ba	(mg/L)	(mg/L)	(Y/N)
	B	0.39	0.39	
	Ca	5.30	5,30	
	C	0.016	0.016	
	Mg	2.54	254	
	mô	0.002	0.003	
	15	0.9	09	
	Na	45.1	45.1	
	<u> DISC</u>	0.1819	0.1819	
	V	0.013	0.013	
	20	0005	0.005	
_ 2_	Ba	0.200	0.200	
	B	0.40	0,40 5.32	
	Ca	5.32	5.32	
	<u> </u>	0.016	0.016	
	Fe	0.01	0.01	
	PD Mg	6 2.69	2.69 1.0 45.8	
		1.0	1.0	
	Na	45.8	45.8	
	<u> </u>	0.1827	0.1827	
	$\overline{\omega}$	0.0107	0.0101	
	20	0.003	0.003	

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

November 2, 2009

LDC Report Date:

January 11, 2010

Matrix:

Water

Parameters:

Metals

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906270

Sample Identification

M-147B

M-147009B

EB110209-GWA3

M-147BMS

M-147BDUP

Introduction

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

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 Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

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

Blanks are summarized in Section IV.

Field duplicates are summarized in Section XIV.

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. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Calibration

An initial calibration was performed.

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

IV. Blanks

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

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Barium Beryllium Boron Iron Manganese Strontium Tin Antimony Tungsten	0.7 ug/L 0.10 ug/L 5.2 ug/L 3.8 ug/L 0.5 ug/L 0.1 ug/L 2.4 ug/L 0.021 ug/L 0.04 ug/L	All samples in SDG R0906270
ICB/CCB	Calcium Molybdenum	6,8 ug/L 0,8 ug/L	M-147B
ICB/CCB	Molybdenum Sodium	1.4 ug/L 29 ug/L	M-147009B EB110209-GWA3

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	Analyte	Reported Concentration	Modified Final Concentration
EB110209-GWA3	Boron	11.4 ug/L	50.0U ug/L
	Iron	3.4 ug/L	20.0U ug/L
	Strontium	0.4 ug/L	10.0U ug/L
	Molybdenum	0.8 ug/L	2.0U ug/L
	Sodium	154 ug/L	300U ug/L

Sample EB110209-GWA3 was identified as an equipment blank. No metal contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
EB110209-GWA3	11/2/09	Aluminum Boron Calcium Iron Lead Magnesium Manganese Molybdenum Sodium Strontium Titanium Tungsten Uranium	3.5 ug/L 11.4 ug/L 43 ug/L 3.4 ug/L 0.015 ug/L 12.2 ug/L 6.8 ug/L 0.8 ug/L 154 ug/L 0.4 ug/L 0.4 ug/L 0.16 ug/L 0.1007 ug/L	M-147B M-147009B

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	Analyte	Reported Concentration	Modified Final Concentration
M-147B	Manganese	31.5 ug/L	31.5J+ ug/L
	Titanium	7.8 ug/L	10.0U ug/L
M-147009B	Manganese	29.1 ug/L	29.1J+ ug/L
	Titanium	7.8 ug/L	10.0U ug/L

Sample PB102309-A3 (from SDG R0906095) was identified as a pump blank. No metal contaminants were found in this blank with the following exceptions:

Pump Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
PB102309-A3	10/23/09	Boron Calcium Chromium Copper Magnesium Manganese Sodium Strontium Thallium Tungsten Uranium	7.0 ug/L 73 ug/L 0.6 ug/L 1.3 ug/L 4.8 ug/L 1.1 ug/L 103 ug/L 0.5 ug/L 0.005 ug/L 0.002 ug/L 0.038 ug/L	M-147B M-147009B

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

Sample	Analyte	Reported Concentration	Modified Final Concentration
M-147009B	Thallium	0.051 ug/L	0.200U ug/L

V. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

VI. Matrix Spike Analysis

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

VII. Duplicate Sample Analysis

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

VIII. Laboratory Control Samples (LCS)

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

IX. Internal Standards

Raw data were not reviewed for this SDG.

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met.

XII. Sample Result Verification and Project Quantitation Limit

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0906270	All analytes reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

Samples M-147B and M-147009B were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

	Concentration (ug/L)					
Compound	M-147B	M-147009B	RPD (Limits)	Difference (Limits)	Flags	A or P
Aluminum	98.3	98.5	-	0.2 (≤50.0)	-	-
Barium	18.1	18.3	1 (≤30)	-	-	-
Boron	2600	2670	3 (≤30)	-	-	-
Calcium	514000	529000	3 (≤30)	-	•	-
Chromium	140	142	1 (≤30)	· -	-	-
Cobalt	0.4	0.4U	-	0 (≤10.0)	-	-
Copper	12.1	10.6	-	1.5 (≤10.0)	-	-

	Concentra	tion (ug/L)	RPD			A or P
Compound	M-147B	M-147009B	(Limits)	Difference (Limits)	Flags	
Iron	57	75.1	-	18.1 (≤20.0)	•	-
Lead	0.252	0.178	-	0.074 (≤0.200)	-	-
Magnesium	201000	206000	2 (≤30)		-	-
Manganese	31.5	29.1	8 (≤30)	-	-	-
Mercury	0.02	0.02U	-	0 (≤0.20)	-	-
Molybdenum	52.9	55.2	4 (≤30)	-	+	-
Nickel	2.6	3.3	-	0.7 (≤2.0)	-	-
Potassium	11000	11300	3 (≤30)	-	-	-
Sodium	480000	498000	4 (≤30)	-	-	-
Strontium	10300	10900	6 (≤30)	-	**************************************	-
Thallium	0.040U	0.051	-	0.011 (≤0.200)	-	-
Titanium	7.8	7.8	-	0 (≤10.0)	-	-
Tungsten	59.6	63.1	6 (≤30)	-	-	•
Uranium	53.8	55.5	3 (≤30)	-	-	-
Vanadium	105	107	2 (≤30)	-	-	-
Zinc	14.9	14.9	•	0 (≤10.0)	•	<u>.</u>

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Metals - Data Qualification Summary - SDG R0906270

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0906270	M-147B M-147009B EB110209-GWA3	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Metals - Laboratory Blank Data Qualification Summary - SDG R0906270

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906270	EB110209-GWA3	Boron Iron Strontium Molybdenum Sodium	50.0U ug/L 20.0U ug/L 10.0U ug/L 2.0U ug/L 300U ug/L	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Metals - Equipment Blank Data Qualification Summary - SDG R0906270

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906270	M-147B	Manganese Titanium	31.5J+ ug/L 10.0U ug/L	А	be
R0906270	M-147009B	Manganese Titanium	29.1J+ ug/L 10.0U ug/L	А	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Metals - Pump Blank Data Qualification Summary - SDG R0906270

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906270	M-147009B	Thallium	0.200U ug/L	А	bp

MET	#: R0906270 ratory: Columbia Analytic HOD: Metals (EPA SW 8	<u>al Se</u> 46 M e revi	ALIDATIO rvices ethod 6010	S/6020/70	PLETEN Stage 2	NESS B	S WORKSHEET	on fin	Date: 1-5-10 Page: 1 of 1 Reviewer: 2 2nd Reviewer: 0 dings are noted in attached
	Validation	Aros	· · · · · · · · · · · · · · · · · · ·				Comm	onte	
I.	Technical holding times	7-11-60		A	Sampling	dates	11/1/100	G1112	
II.	ICP/MS Tune		.	A	Camping	uaics.		,	
111.	Calibration			A		<u></u>			
IV.	Blanks			5W					
V.	ICP Interference Check Sar	nple (I	CS) Analysis	A					
VI.	Matrix Spike Analysis			A	ms				
VII.	Duplicate Sample Analysis			A	ap				
VIII	Laboratory Control Samples	(LCS)	A	LCS				
IX.	Internal Standard (ICP-MS)			\sim	Not	evi	ewed		
Χ.	Furnace Atomic Absorption	QC		\sim	1 .		lized		
XI.	ICP Serial Dilution			A					
XII.	Sample Result Verification			N					
XIII	Overall Assessment of Data	1		A					
XI∨	Field Duplicates			SW	7(1)	-)			
ΧV	Field Blanks			5W	EB	=3	. Pump Blank	= P	B102309-43 R090609591
Note: /alida	A = Acceptable N = Not provided/applicable SW = See worksheet red Samples: WQ+CL)	R = Rin	o compound sate eld blank	s detected		D = Duplicate TB = Trip blank EB = Equipment blan		RO90609591
1	M-147B	11	8BW		21			31	
2	M-147009B	12			22			32	
3	EB110209-GWA3	13			23			33	
4	M-147BMS	14			24			34	
5	M-147BDUP	15			25			35	
6		16			26	ļ		36	
7		17			27	<u> </u>		37	
8		18			28			38	
9		19			29	<u> </u>		39	
10	***************************************	20	The state of the s		30			40	

Notes:				

LDC #: 22285**)**4 SDG #: See Cover

VALIDATION FINDINGS WORKSHEET Sample Specific Element Reference

Page: __of__ Reviewer: __v 2nd reviewer: __v

All circled elements are applicable to each sample.

Sample	Matrix	Target Analyte List (TAL)
1-3	W	(Al, Sb) As Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, (Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
QC4,5		(Al, Sb), As, (a, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, R), Se, (ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
5,		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
M		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
	-	Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al Sh As Ba Be B Cd Ca Cr Co Cu Fe Ph Mg Mo Mn Hg Ni Pt K Se Ag Na Sr Tl Sn Ti W U V Zn
		Analysis Method
ICP	W	(Al) Sb, As, (Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe) Pb, (Mg, Mo, Mn) Hg, (Ni,)Pt, (K), Se, (Ag, Na, Sr) Tl, (\$n, Ti,)W, U(V, Zn)
ICP-MS	V	Al, Sb As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tj Sn, Ti, W, U V, Zn
GFAA		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn

Comments: Mercury by CVAA if performed

LDC #: 22285D4

SDG #: See Cover

METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000) ng/L Sample Concentration units, unless otherwise noted:

VALIDATION FINDINGS WORKSHEET PB/ICB/CCB QUALIFIED SAMPLES

Soil preparation factor applied: NA Associated Samples: All

Reason Code: bl

Reviewer: 2nd Reviewer:

Page:_

Analyte Maximum Maximum M PB³ IC (mg/Kg) (ug/l)											
0.10 0.10 5.2 3.8 3.8 0.5 0.1	Analyte	Maximum PB ^a	Maximum PB ^a	Maximum ICB/CCB ^a	Action			The state of the s			A CONTRACTOR OF THE CONTRACTOR
0.10 5.2 3.8 0.5 0.1 0.1 2.4 0.021	Ba	7		0.7							
5.2 3.8 0.5 0.1 2.4 2.4 0.021	Be			0.10							
3.8 0.5 0.1 2.4 0.021	<u> </u>			5.2		11.4 / 50.0					
0.5 0.1 2.4 0.021	Fe			3.8		3.4 / 20.0					
2.4	Mn			0.5							
2.4	Š			0.1		0.4 / 10.0					
	Sn			2.4							
	Sb			0.021							
	×			0.04							

Sample Cor	Sample Concentration units, unless otherwise noted:	nits, unless c	therwise not	ted: ua/L	As	Associated Samples: 1
					And the second second second	
Analyte	Maximum PB ^a (ma/Ka)	Maximum PB ^a (110/)	Maximum ICB/CCB ^a (ud/l)	Action Limit	No Qualifiers	
Ca			6.8			
Mo			0.8			
Sample Cor	Sample Concentration units, unless otherwise noted:	nits, unless o	therwise not	ted: ua/L	As	Associated Samples: 2.3
Analyte	Maximum PB ^a (mq/Kq)	Maximum PBa (ug/L)	Maximum ICB/CCB ^a (uq/l)	Action Limit	е	
Мо			1.4		0.8 / 2.0	

a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element. Note:

154 / 300

29

ga

LDC #: 22285D4

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET

Field Blanks

Reviewer: C

Were field blanks identified in this SDG?

METHOD: Trace Metals (EPA SW846 6010B/6020/7000)

Y N N/A YN N/A

Were target analytes detected in the field blanks?

Associated sample units: ug/L

Sampling date: 11/2/09 Soil factor applied Field blank type: (circle one) Field Blank / Rinsate / Other: Sampling date: 11/2/09 Blank units: ug/L

Reason Code: be

Associated Samples:

ation															
Sample Identification															
Ϋ́															
	2							29.1 J+				7.8 / 10.0			
	-							31.5 J+				7.8 / 10.0			
	Action Level							680					16		
Blank ID	3	3.5	11.4	43	3.4	0.015	12.2	6.8	0.8	154	0.4	0.4	0.16	0.007	
Analyte		A	В	Ca	Бe	Pb	Mg	Mn	Mo	Na	Sr	Ľ	W	n	

LDC #: 22285D4

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET

Field Blanks

Reviewer: Cand Reviewer:

METHOD: Trace Metals (EPA SW846 6010B/6020/7000) Y N N/A Were field blanks identified in this SDG?

Were target analytes detected in the field blanks?

Associated sample units: ug/L Blank units: ug/L Y N/A N/A N/A

Soil factor applied Sampling date: 10/23/09

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

Reason Code: bp

Associated Samples:

													 		-	 	
				Week to the state of the state													
ion																	
Sample Identification																	
San																	
$\setminus \mid$																-	
<i>)</i>																	
	2									0.051 / 0.200							
										0.05							
	Action Level		730					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				0.38			-		
Blank ID	PB102309-A3 (SDG#: R0906095)	7.0	73	9.0	1.3	4.8	1.1	103	0.5	0.005	0.02	0.038					
Analyte		В	Ca	ప	Cu	Mg	Mn	Na	Sr	I	Μ	n					

LDC <u>22285D4</u> SDG#: <u>See Cover</u>

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page: of Reviewer: 2nd Reviewer:

METHOD: Metals (EPA Method 6020/6010/7000)

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

	Concentrat	ion (ug/L)	(≤30)	D.W.	-	Qualifications
Compound	1	2	RPD	Difference	Limits	(Parent Only)
Aluminum	98.3	98.5		0.2	(≤50.0)	
Barium	18.1	18.3	1			
Boron	2600	2670	3			
Calcium	514000	529000	3			
Chromium	140	142	1			
Cobalt	0.4	0.4U	***************************************	0	(≤10.0)	
Copper	12.1	10.6		1.5	(≤10.0)	
Iron	57.0	75.1		18.1	(≤20.0)	-
Lead	0.252	0.178		0.074	(≤0.200)	
Magnesium	201000	206000	2			
Manganese	31.5	29.1	8			
Mercury	0.02	0.02U		0	(≤0.20)	
Molybdenum	52.9	55.2	4			
Nickel	2.6	3.3		0.7	(≤2.0)	
Potassium	11000	11300	3			
Sodium	480000	498000	4		_	
Strontium	10300	10900	6			
Thallium	0.040U	0.051		0.011	(≤0.200)	
Titanium	7.8	7.8		0	(≤10.0)	

LDC <u>22285D4</u> SDG#: <u>See Cover</u>

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page: __of__ Reviewer: ___ 2nd Reviewer: ___

METHOD: Metals (EPA Method 6020/6010/7000)

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

	Concentrat	ion (ug/L)	(≤30)	D.15		Qualifications
Compound	1	2	RPD	Difference	Limits	(Parent Only)
Tungsten	59.6	63.1	6			
Uranium	53.8	55.5	3			
Vanadium	105	107	2			
Zinc	14.9	14.9		0	(≤10.0)	

V:\FIELD DUPLICATES\FD_inorganic\22285D4.wpd

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

November 5, 2009

LDC Report Date:

January 11, 2010

Matrix:

Soil

Parameters:

Metals

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906403

Sample Identification

SA77-0.5B SA77-10B

SA77009-10B

SA77-0.5BMS

SA77-0.5BDUP

Introduction

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

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 Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

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

Blanks are summarized in Section IV.

Field duplicates are summarized in Section XIV.

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. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5% .

III. Calibration

An initial calibration was performed.

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

IV. Blanks

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

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Chromium Iron Manganese Strontium Tin	0.05 mg/Kg 1.0 mg/Kg 0.02 mg/Kg 0.03 mg/Kg 4.1 mg/Kg	All samples in SDG R0906403
ICB/CCB	Barium Boron Cadmium Iron Magnesium Manganese Molybdenum Strontium Tungsten	0.60 ug/L 6.0 ug/L 0.30 ug/L 6.0 ug/L 2.0 ug/L 0.10 ug/L 0.50 ug/L 0.10 ug/L	All samples in SDG R0906403
ICB/CCB	Selenium	4.0 ug/L	SA77-0.5B

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	Analyte	Reported Concentration	Modified Final Concentration
SA77-0.5B	Boron	4.6 mg/Kg	10.0U mg/Kg
	Tin	4.9 mg/Kg	10.0U mg/Kg
SA77-10B	Boron	7.2 mg/Kg	10.2U mg/Kg
	Molybdenum	0.29 mg/Kg	0.31U mg/Kg
	Tin	4.7 mg/Kg	10.2U mg/Kg
SA77009-10B	Boron	7.1 mg/Kg	9.8U mg/Kg
	Tin	4.8 mg/Kg	9.8U mg/Kg

Sample FB082809-SO (from SDG R0904894) was identified as a field blank. No metal contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
FB082809-SO	8/28/09	Aluminum Calcium Lead Magnesium Manganese Sodium Strontium Zinc	3.3 ug/L 17 ug/L 0.006 ug/L 5.0 ug/L 0.2 ug/L 39.2 ug/L 0.1 ug/L 1.0 ug/L	All samples in SDG R0906403

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

V. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

VI. Matrix Spike Analysis

Matrix spike (MS) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	%R (Limits)	Flag	A or P
SA77-0.5BMS (All samples in SDG R0906403)	Antimony	53.2 (75-125)	J- (all detects) UJ (all non-detects)	А
·	Tungsten	46.1 (75-125)	J- (all detects) UJ (all non-detects)	

VII. Duplicate Sample Analysis

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

VIII. Laboratory Control Samples (LCS)

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

IX. Internal Standards

Raw data were not reviewed for this SDG.

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

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

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
SA77-0.5BL	Nickel	10.5 (≤10)	All samples in SDG R0906403	J (all detects)	Α
	Sodium	11.3 (≤10)	110900403	UJ (all non-detects) J (all detects) UJ (all non-detects)	

XII. Sample Result Verification and Project Quantitation Limit

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0906403	All analytes reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

Samples SA77-10B and SA77009-10B were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

	Concentra	ition (mg/Kg)				
Compound	SA77-10B	SA77009-10B	RPD (Limits)	Difference (Limits)	Flags	A or P
Aluminum	11000	10200	8 (≤50)	-	-	-
Arsenic	1.69	2	-	0.31 (≤0.53)	-	-
Barium	223	182	20 (≤50)		-	-
Beryllium	0.516	0.629	20 (≤50)	-	-	-
Boron	7.2	7.1	<u>-</u>	0.1 (≤10.2)	-	-
Calcium	33500	28300	17 (≤50)		-	-
Chromium	7.21	7	-	0.21 (≤2.0)	-	-
Cobalt	8.3	7.7	-	0.6 (≤2.0)		-
Copper	19.4	20.4	5 (≤50)	-	•	-
Iron	17400	17400	0 (≤50)	-	•	-
Lead	10.7	9.2	15 (≤50)	-	-	-
Magnesium	10300	10300	0 (≤50)	-	-	-
Manganese	493	365	30 (≤50)	-	-	-
Mercury	0.011	0.015	-	0.004 (≤0.017)	-	-
Molybdenum	0.29	0.34	-	0.05 (≤0.31)	-	-
Nickel	15.6	16	3 (≤50)	-	-	-
Platinum	0.006	0.006	-	0 (≤0.10)	-	-
Potassium	1800	1820	1 (≤50)	-	-	•

	Concentrat	ion (mg/Kg)				
Compound	SA77-10B	SA77009-10B	RPD (Limits)	Difference (Limits)	Flags	A or P
Sodium	927	820	12 (≤50)	•	-	•
Strontium	329	281	16 (≤50)	•	_	•
Thallium	0.082	0.101	•	0.019 (≤0.021)	-	-
Tin	4.7	4.8	-	0.1 (≤10.2)	·	-
Titanium	981	987	1 (≤50)		-	<u>-</u>
Tungsten	0.11	0.11	-	0 (≤0.10)	-	-
Uranium	1.39	1.49	7 (≤50)	-	-	-
Vanadium	53.8	52	3 (≤50)	-	-	-
Zinc	38.5	40	4 (≤50)	<u>-</u>	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Metals - Data Qualification Summary - SDG R0906403

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0906403	SA77-0.5B SA77-10B SA77009-10B	Antimony Tungsten	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	A	Matrix spike analysis (%R) (m)
R0906403	SA77-0.5B SA77-10B SA77009-10B	Nickel Sodium	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	ICP serial dilution (%D) (sd)
R0906403	SA77-0.5B SA77-10B SA77009-10B	All analytes reported below the PQL.	J (all detects)	А	Sample result verification (PQL) (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Metals - Laboratory Blank Data Qualification Summary - SDG R0906403

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906403	SA77-0.5B	Boron Tin	10.0U mg/Kg 10.0U mg/Kg	·A	bl
R0906403	SA77-10B	Boron Molybdenum Tin	10.2U mg/Kg 0.31U mg/Kg 10.2U mg/Kg	А	bl
R0906403	SA77009-10B	Boron Tin	9.8U mg/Kg 9.8U mg/Kg	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Metals - Field Blank Data Qualification Summary - SDG R0906403

No Sample Data Qualified in this SDG

Tronox Northaate Henderson

DD: Metals (EPA SW 84	46 Mothad 60				2:	Page: of \ Reviewer: nd Reviewer:
n findings worksheets.	e reviewed for		,	ilidation areas. Valida		
Validation	Area			Cor	nments	
Technical holding times		IA	Sampling da	ates: 11/5/09		
ICP/MS Tune		A		•		
Calibration						
Blanks		5w				
ICP Interference Check San	nple (ICS) Analys	sis 🔨			· · · · · · · · · · · · · · · · · · ·	
Matrix Spike Analysis		SW	ms			
Duplicate Sample Analysis		A.	0-8			
Laboratory Control Samples	(LCS)	A	LCS			
Internal Standard (ICP-MS)		\sim	Nor re	viewed		
Furnace Atomic Absorption	QC	\sim	Noti	utilized		
ICP Serial Dilution		SW		•		
Sample Result Verification		N				
Overall Assessment of Data		A				
Field Duplicates		J. Sw	1(2,2	\sim		
Field Blanks		SW	FB=	FB082809-	SO CRO90	24894)
A = Acceptable N = Not provided/applicable SW = See worksheet	R =	Rinsate		D = Duplicate TB = Trip blank		
Samples:						
.77-0.5B	11 8	DS	21		31	
.77-10B	12		22		32	
.77009-10B	13		23		33	
.77-0.5BMS	14		24		34	
.77-0.5BDUP	15		25		35	
	16		26		36	
	17		27		37	
	18		28		38	
	19		29		39	
	20					
	CP/MS Tune Calibration Blanks CP Interference Check San Matrix Spike Analysis Duplicate Sample Analysis Duplicate Atomic Absorption CP Serial Dilution Diverall Assessment of Data Field Duplicates Field Blanks A = Acceptable N = Not provided/applicable SW = See worksheet Samples: 77-0.5B 77-10B 77009-10B	CP/MS Tune Calibration Blanks CP Interference Check Sample (ICS) Analysis Matrix Spike Analysis Duplicate Sample Analysis Laboratory Control Samples (LCS) Internal Standard (ICP-MS) Furnace Atomic Absorption QC CP Serial Dilution Coverall Assessment of Data Field Duplicates Field Blanks A = Acceptable N = Not provided/applicable SW = See worksheet FB FB F77-0.5B F77-10B F77-0.5BMS F77-0.5BMS F77-0.5BDUP FR	Cechnical holding times CP/MS Tune Calibration CP Interference Check Sample (ICS) Analysis CP Interference Check Sample (ICS) Analysis Matrix Spike Analysis CP Interference Check Sample (ICS) Analysis Matrix Spike Analysis CP Interference Check Sample (ICS) Analysis CP Interference Check Sample (ICS) Matrix Spike Analysis CP Interference Check Sample (ICS) Analysis CP Interference Check Sample (ICS) Analysis CP Interference Check Sample (ICS) Analysis CP Interference Check Sample (ICS) Analysis CP Interference Check Sample (ICS) Analysis CP Interference Check Sample (ICS) Analysis CP Interference Check Sample (ICS) Analysis CP Interference Check Sample (ICS) Analysis CP Interference Check Sample (ICS) An	Fechnical holding times CP/MS Tune Calibration CP Interference Check Sample (ICS) Analysis CP Interference Check Sample (ICS) CP Inte	Technical holding times CP/MS Tune Calibration Slanks CP Interference Check Sample (ICS) Analysis Adatrix Spike Analysis Duplicate Sample Analysis Aboratory Control Samples (LCS) Anternal Standard (ICP-MS) Furnace Atomic Absorption QC CP Serial Dilution Sample Result Verification Diverall Assessment of Data Field Duplicates Field Blanks A = Acceptable A = Acceptable A = ND = No compounds detected R = Rinsate FB = Field blank FB = Field bl	Sampling dates:

LDC #: 2228514 SDG #: See Cover

VALIDATION FINDINGS WORKSHEET Sample Specific Element Reference

Page: __of__ Reviewer: ____ 2nd reviewer: ____

All circled elements are applicable to each sample.

	1	
Sample ID	Matrix	Target Analyte List (TAL)
1-3	S	Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
QC 4		(Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Ge, Ag, Na, Gr, Tl, Sn, Ti, W, U, V, Zn
5		(Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sh, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Ph, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Analysis Method
ICP	5	(Al, Sb) As, (Ba) Be, (B, Cd, Ca) Cr, (Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, (Ni) Pt, K, Se, Ag, Na, Sr, Tl, (Sn, Ti, W, U(V, Zn
ICP-MS	5	Al, Sb, (As) Ba, (Be) B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, (Pt) K, Se, Ag, Na, Sr, (T), Sn, Ti, (V, V), V, Zn
GFAA	<u> </u>	Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn

Comments: Mercury by CVAA if performed

LDC #: 22285E4 SDG #: See Cover

METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000) Sample Concentration units, unless otherwise noted: mg/Kg

VALIDATION FINDINGS WORKSHEET PB/ICB/CCB QUALIFIED SAMPLES

Page: Of Reviewer: Of Znd Reviewer:

Soil preparation factor applied: 100x Associated Samples: All

					1000			100			
Analyte	Maximum PB ^a (mq/Kq)	Maximum PB³	Maximum ICB/CCB ^a (uq/l)	Action Limit	-	2	ε				
Ва											
В			6.0		4.6 / 10.0	7.2 / 10.2	7.1/9.8				
PS			0:30								
Ċ	0.05									·	
Fe	1.0	•	6.0								
Mg			2.0								
Mn	0.02		0.10								
Mo			0.50			0.29 / 0.31					
Sr	0.03		0.10								
Sn	4.1				4.9 / 10.0	4.7 / 10.2	4.8/9.8				
Μ			0.057								

Sample Concentration units, unless otherwise noted: mo/Ka	Analyte Maxi	Se
ation units	aximum N PB³ ma/Kq)	
s. unless c	Maximum PB ^a (ug/l)	
otherwise no	Maximum Maximum Maximum PBs ICB/CCBs (mg/kg)	4.0
<u>ited:</u> ma/	Action Limit	
(a	No Qualifiers	
Associate	ফ	
Associated Samples:		
_		

Note: a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

SDG#:

VALIDATION FINDINGS WORKSHEET Field Blanks

Reviewer: Cand Reviewer:

Page: ַ

METHOD: Trace Metals (EPA SW846 6010B/7000)

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

Were target analytes detected in the field blanks?

Blank units: ug/L Associated sample units: mg/Kg Sampling date: 8/28/09 Soil-factor applied 100x Field blank type: (circle one) Field Blank / Rinsate / Other:

Reason Code: bf

₹

Associated Samples:

		T	T	T	Т		T	T	\neg	1				Ī		7	
L L																	
entificatio																	
Sample Identification																	
S															20117		
	No Qualifiers																
	Action																
Analyta Blank ID	FB082809-SO (SDG#: R0904894)	3.3	17	900'0	5.0	0.2	39.2	0.1	10								
Analyto	a (minu	A	Ca	Pb	Mg	Mn	e Z	Š	Zn								

100 #: 226 COUNTY SDE 4

VALIDATION FINDINGS WORKSHEET Matrix Spike Analysis

Page: of
Reviewer:

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

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

N N/A Was a matrix spike analyzed for each matrix in this SDG?

Were matrix spike percent recoveries (%R) within the control limits of (75-1257) If the sample concentration exceeded the spike concentration by a factor XW NA

of 4 or more, no action was taken.

Was a post digestion spike analyzed for ICP elements that did not meet the required criteria for matrix spike recovery?

MNA Was a post digestion spirite in North Ware recalculated result

<u> </u>	Y N NA Were recalc	ulated results a	cceptable? See	.T: Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.	rksheet for recalculations.		
*	Matrix Spike ID	Matrix	Analyte	% R	Associated Samples	Qualifications	
<u>!</u>		Soft	48	53.2	14	J-107/4 (m)	
			3	1.95)	\ 7	
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LDC #: 1777 SEE CONN

VALIDATION FINDINGS WORKSHEET ICP Serial Dilution

2nd Reviewer:

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

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

| Kanalyte concentrations were > 50X the IDL, was an ICP serial dilution analyzed?
| Were ICP serial dilution percent differences (%D) < 10%?
| Were ICP serial dilution percent differences (%D) < 10%?
| Is there evidence of negative interference? If yes, professional judgement will be used to qualify the data.

Ware recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

	I IN (NAME) WHIS I SCALOL	ilated results, ac			VICE GERMINARY FORMS CONTROLLE SOCIETATION STREET S	
*	Olluted Sample (D	Matrk	Analyte	9	Associated Semples	Qualifications
		1,08	N:	6,5		N: 0.5 0.5 0.5
			Na	. 11,3		
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3						
I						

LDC <u>22285E4</u> SDG#: <u>See Cover</u>

VALIDATION FINDINGS WORKSHEET Field Duplicates

Pagel___of__ Reviewer:____ 2nd Reviewer:____

METHOD: Metals (EPA Method 6020/6010/7000)

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

	Concentration	on (mg/Kg)	(≤50)	(mg/Kg)	(mg/Kg)	Qualifications
Compound	2	3	RPD	Difference	Limits	(Parent Only)
Aluminum	11000	10200	8			
Arsenic	1.69	2.00		0.31	(≤0.53)	
Barium	223	182	20			
Beryllium	0.516	0.629	20			
Boron	7.2	7.1		0.1	(≤10.2)	
Calcium	33500	28300	17			
Chromium	7.21	7.00		0.21	(≤2.0)	
Cobalt	8.3	7.7		0.6	(≤2.0)	
Copper	19.4	20.4	5			
Iron	17400	17400	0			
Lead	10.7	9.2	15			
Magnesium	10300	10300	0			
Manganese	493	365	30			
Mercury	0.011	0.015		0.004	(≤0.017)	
Molybdenum	0.29	0.34		0.05	(≤0.31)	
Nickel	15.6	16.0	3			
Platinum	0.006	0.006		0	(≤0.10)	
Potassium	1800	1820	1			
Sodium	927	820	12			

LDC#: <u>22285E4</u> SDG#: <u>See Cover</u>

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

METHOD: Metals (EPA Method 6020/6010/7000)

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

	Concentratio	on (mg/Kg)	(≤50)	(mg/Kg)	(mg/Kg)	Qualifications
Compound	2	3	RPD	Difference	Limits	(Parent Only)
Strontium	329	281	16			
Thallium	0.082	0.101		0.019	(≤0.021)	
Tin	4.7	4.8		0.1	(≤10.2)	
Titanium	981	987	1			
Tungsten	0.11	0.11		0	(≤0.10)	
Uranium	1.390	1.490	7			
Vanadium	53.8	52.0	3			
Zinc	38.5	40.0	4			

V:\FIELD DUPLICATES\FD_inorganic\22285E4.wpd

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

November 11, 2009

LDC Report Date:

January 11, 2010

Matrix:

Water

Parameters:

Metals

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906477

Sample Identification

M-122B

M-122BDISS

Introduction

This data review covers 2 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Methods 6010B, 6020, and 7000 for Metals. The metals analyzed were Aluminum, Antimony, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Platinum, Potassium, Silver, Sodium, Strontium, Thallium, Tin, Titanium, Tungsten, Uranium, Vanadium, and Zinc.

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 Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

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

Blanks are summarized in Section IV.

Field duplicates are summarized in Section XIV.

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. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Calibration

An initial calibration was performed.

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

IV. Blanks

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

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Barium Beryllium Boron Iron Manganese Molybdenum Sodium Strontium Tin Antimony Tungsten	0.7 ug/L 0.10 ug/L 5.2 ug/L 3.8 ug/L 0.5 ug/L 1.4 ug/L 29 ug/L 0.1 ug/L 2.4 ug/L 0.021 ug/L 0.04 ug/L	All samples in SDG R0906477

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	Analyte	Reported Concentration	Modified Final Concentration
M-122BDISS	Beryllium Iron	0.10 ug/L 8.3 ug/L	0.30U ug/L 20.0U ug/L
M-122B	Tin	2.1 ug/L	50.0U ug/L

Sample PB102309-A3 (from SDG R0906095) was identified as a pump blank. No metal contaminants were found in this blank with the following exceptions:

Pump Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
PB102309-A3	10/23/09	Boron Calcium Chromium Copper Magnesium Manganese Sodium Strontium Thallium Tungsten Uranium	7.0 ug/L 73 ug/L 0.6 ug/L 1.3 ug/L 4.8 ug/L 1.1 ug/L 103 ug/L 0.5 ug/L 0.005 ug/L 0.02 ug/L 0.038 ug/L	M-122B

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

Sample FiltB092509-A2 (from SDG R0905462) was identified as a filter blank. No metal contaminants were found in this blank with the following exceptions:

Filter Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
FiltB092509-A2	9/25/09	Boron Calcium Lead Magnesium Manganese Sodium Strontium Tungsten Zinc	11.0 ug/L 34 ug/L 0.006 ug/L 3.8 ug/L 0.6 ug/L 398 ug/L 0.2 ug/L 0.02 ug/L 3.6 ug/L	M-122BDISS

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

Sample	Analyte	Reported Concentration	Modified Final Concentration
M-122BDISS	Lead	0.018 ug/L	0.020U ug/L
	Zinc	1.8 ug/L	10.0U ug/L

V. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

VI. Matrix Spike Analysis

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

VII. Duplicate Sample Analysis

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

VIII. Laboratory Control Samples (LCS)

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

IX. Internal Standards

Raw data were not reviewed for this SDG.

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met.

XII. Sample Result Verification and Project Quantitation Limit

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0906477	All analytes reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Metals - Data Qualification Summary - SDG R0906477

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0906477	M-122B M-122BDISS	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Metals - Laboratory Blank Data Qualification Summary - SDG R0906477

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906477	M-122BDISS	Beryllium Iron	0.30U ug/L 20.0U ug/L	А	bl
R0906477	M-122B	Tin	50.0U ug/L	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Metals - Pump Blank Data Qualification Summary - SDG R0906477

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Metals - Filter Blank Data Qualification Summary - SDG R0906477

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906447	M-122BDISS	Lead Zinc	0.020U ug/L 10.0U ug/L	А	br

Tronox Northgate Henderson

LDC #:	22285F4	_ VALIDATION COMPLETENESS WORKSHEET	
SDG #:	R0906477	Stage 2B	
Laborator	y: <u>Columbia Analy</u> t	tical Services	Re
			~

	Date:	1-5-1	
	Page:_	[of	1
	Reviewer:	02	_
2nd	Reviewer:		-

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

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: \\/\\\O9
II.	ICP/MS Tune	A	
III.	Calibration	A	
IV.	Blanks	5~/	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	A	MS (506 x RO906270)
VII.	Duplicate Sample Analysis	A	oup V
VIII.	Laboratory Control Samples (LCS)	A	LC5
IX.	Internal Standard (ICP-MS)	\	Noneviewed
Χ.	Furnace Atomic Absorption QC	N	Not utilizes
XI.	ICP Serial Dilution	A	(SOGN R0906270)
XII.	Sample Result Verification	N	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	\wedge	
ΧV	Field Blanks	SW	PB=PB102309-A3, Filter Block=FiltB092509-A2
lote:	A = Acceptable ND = No	compound	PB=PB102309-A3, Filter Blant=FiltB092509-A3 (R0906095) CR0905462)

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

(R0906095) D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

	water				
1	M-122B	11	PBW	21	31
2	M-122BDISS	12		22	32
3		13		23	33
4		14		24	34
5		15		25	35
6		16		26	36
7		17		27	37
8		18		28	38
9		19		29	39
10		20		30	40

Notes:	

LDC #: 22285 4 SDG #: See Cover

VALIDATION FINDINGS WORKSHEET Sample Specific Element Reference

Page: of Page: of Page: Of Pag

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1,2		Al, Sb) As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
		Al, Sh, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Ph, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn
	r	Analysis Method
ICP		(A), Sb, As, (Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe) Pb, (Mg, Mo, Mn) Hg, (Ni) Pt, (K) Se, Ag, Na, Sr) Tl, (Sn, Ti) W, U, (V, Zn)
ICP-MS		Al (SD), As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, PD, Mg, Mo, Mn, Hg, Ni, Pt) K, Se, Ag, Na, Sr, (1) Sn, Ti, (W, U) V, Zn
GFAA		Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mo, Mn, Hg, Ni, Pt, K, Se, Ag, Na, Sr, Tl, Sn, Ti, W, U, V, Zn

Comments: Mercury by CVAA if performed

VALIDATION FINDINGS WORKSHEET PB/ICB/CCB QUALIFIED SAMPLES

LDC #: 22285F4

Soil preparation factor applied: NA Associated Samples: All SDG #. See Cover METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)

Reason Code: bl

Page:<u>\</u> Reviewer:_<u>C</u> 2nd Reviewer:

Sample Co	Sample Concentration units, unless otherwise noted:	nits, unless o	otherwise not	. I	ug/L /	Associated Samples: All	es: All		
Analyte	Maximum PB ^a (mg/Kg)	Maximum PB ^a	Maximum ICB/CCB ^a	Action Limit	17	N .—			
Ba			0.7						
Be	i		0.10		0.10 / 0.30			, , , , , ,	
œ			5.2						
Fe e			3.8		8.3 / 20.0				
Mn			0.5						
Mo			1.4						
Na			29						
Sr			0.1						
Sn			2.4			2.1 / 50.0			
Sp			0.021						
///			0.04						

a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element. Note:

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET

Page: _of /

Reviewer: C/C 2nd Reviewer: C/C

Field Blanks

METHOD: Trace Metals (EPA SW846 6010B/6020/7000)

Nover field blanks identified in this SDG?

Were target analytes detected in the field blanks?

Associated sample units: ug/L Soil factor applied Sampling date: 10/23/09 Blank units: ug/L N N/A

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

Reason Code: bp

Associated Samples:

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And the second s																	
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ation																	
Sample Identification																	
Sa																	
$\Big) \Big $																	
	No Quals									0:012 / 0:020							
	Action Level		730									0.38					
Blank ID	PB102309-A3 (SDG#: R0906095)	7.0	73	0.6	1.3	4.8	1.1	103	0.5	0.005	0.02	0.038					
Analyte		В	Ca	స	Cu	Mg	Mn	Na	Sr	F	٨	כ					

SDG #: See Cover LDC #: 22285F4

VALIDATION FINDINGS WORKSHEET

Field Blanks

Page: of Reviewer: C2

METHOD: Trace Metals (EPA SW846 6010B/7000)

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

Were target analytes detected in the field blanks?

Soil factor applied NA Blank units: ug/L Associated sample units: ug/L Sampling date: 9/25/09 Soil factor applied NA

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

Associated Samples:

RECUSON: DE DC

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					:												ALL MANAGEMENT AND
ion																	
ntificati																	
Sample Identification																	
S																	
	140																

	No Qualifiers			020.0/8/0.0						0'01/8/1							
	Action Level						3980										
Blank ID	FiltB092509-A2 (SDG#: R0905462)	11.0	34	0.006	3.8	0.6	398	0.2	0.02	3.6				The state of the s			
Analyte		В	Ca	Pb	Mg	Mn	N 8	S	8	Zn							

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Data Validation Reports LDC #22285

Wet Chemistry



Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

October 21 through October 26, 2009

LDC Report Date:

January 11, 2010

Matrix:

Soil

Parameters:

Wet Chemistry

Validation Level:

Stage 4

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906056/K0910677

Sample Identification

SA52-15BSPLP2

SA52-15BSPLP3

SA52-28BSPLP2

SA52-28BSPLP3

RSAQ8-10BSPLP2

RSAQ8-10BSPLP3

RSAQ8-31BSPLP2

RSAQ8-31BSPLP3

SA34-10BSPLP2

SA34-10BSPLP3

SA34-10BSPLP3RE

SA34-31BSPLP2

SA34-31BSPLP3

RSAQ8-10BSPLP2MS

RSAQ8-10BSPLP2MSD

RSAQ8-10BSPLP2DUP

Introduction

This data review covers 16 soil samples listed on the cover sheet. The analyses were per Standard Method 2320B for Alkalinity, EPA Method 350.1 for Ammonia as Nitrogen, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 300.1 for Chlorate, EPA Method 120.1 for Conductivity, EPA SW 846 Method 7199 for Hexavalent Chromium, EPA Method 353.2 for Nitrite as Nitrogen, EPA SW 846 Method 9040B for pH, Standard Method 5540C for Surfactants, EPA Method 314.0 for Perchlorate, EPA Method 365.1 for Total Phosphorus, EPA SW 846 Method 9060 for Total Organic Carbon, Standard Method 2540C for Total Dissolved Solids, and Standard Method 2540D for Total Suspended Solids.

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 Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section X.

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. Calibration

a. Initial Calibration

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

b. Calibration Verification

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

III. Blanks

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

Method Blank ID	Analyte	Concentration	Associated Samples		
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Chloride Conductivity pH Total phosphorus Sulfate	1.8 mg/L 1.8 mg/L 0.027 mg/L 0.06 mg/L 1.45 umhos/cm 5.60 units 0.008 mg/L 0.16 mg/L	SA52-15BSPLP3 SA52-28BSPLP3 RSAQ8-10BSPLP3 RSAQ8-31BSPLP3		
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Total organic carbon Chloride Conductivity pH Total phosphorus Nitrate as N	1.2 mg/L 1.2 mg/L 0.012 mg/L 0.1 mg/L 0.08 mg/L 7.25 umhos/cm 4.98 units 0.006 mg/L 0.121 mg/L	SA52-15BSPLP2 SA52-28BSPLP2 RSAQ8-10BSPLP2 RSAQ8-31BSPLP2		

Method Blank ID	Analyte	Concentration	Associated Samples
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Chloride Conductivity pH Total phosphorus Sulfate Nitrate as N	0.9 mg/L 0.9 mg/L 0.009 mg/L 0.08 mg/L 7.35 umhos/cm 5.02 units 0.006 mg/L 1.22 mg/L 0.143 mg/L	SA34-10BSPLP2 SA34-31BSPLP2
PB (prep blank)	Chloride Conductivity pH Total phosphorus Sulfate	0.32 mg/L 1.53 umhos/cm 5.62 units 0.007 mg/L 0.78 mg/L	SA34-10BSPLP3 SA34-31BSPLP3
PB (prep blank)	Chloride	0.07 mg/L	SA34-10BSPLP3RE
ICB/CCB	Chloride	0.063 mg/L	RSAQ8-10BSPLP3 RSAQ8-31BSPLP3
ICB/CCB	Chloride	0.098 mg/L	SA52-15BSPLP3 SA52-28BSPLP3
ICB/CCB	Chloride	0.085 mg/L	RSAQ8-10BSPLP2 RSAQ8-31BSPLP2
ICB/CCB	Chloride	0.081 mg/L	SA34-10BSPLP3 SA34-31BSPLP3
ICB/CCB	Chloride	0.077 mg/L	SA34-10BSPLP2 SA34-31BSPLP2
ICB/CCB	Sulfate	0.132 mg/L	SA34-31BSPLP2
ICB/CCB	Chloride	0.074 mg/L	SA34-10BSPLP3RE

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	Analyte	Reported Concentration	Modified Final Concentration
SA52-15BSPLP3	Total phosphorus	0.022 mg/L	0.050U mg/L
SA52-28BSPLP3	Ammonia as N Total phosphorus	0.047 mg/L 0.01 mg/L	0.050U mg/L 0.050U mg/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
RSAQ8-10BSPLP3	Ammonia as N	0.032 mg/L	0.050U mg/L
	Total phosphorus	0.007 mg/L	0.050U mg/L
RSAQ8-31BSPLP3	Ammonia as N	0.049 mg/L	0.050U mg/L
	Total phosphorus	0.009 mg/L	0.050U mg/L
SA52-15BSPLP2 Ammonia as N Total organic carbon Total phosphorus Nitrate as N		0.049 mg/L 0.3 mg/L 0.035 mg/L 0.565 mg/L	0.050U mg/L 1.0U mg/L 0.050U mg/L 0.565J+ mg/L
SA52-28BSPLP2	Ammonia as N	0.018 mg/L	0.050U mg/L
	Total organic carbon	0.2 mg/L	1.0U mg/L
	Nitrate as N	0.409 mg/L	0.409J+ mg/L
RSAQ8-10BSPLP2	Ammonia as N	0.014 mg/L	0.050U mg/L
	Total organic carbon	0.1 mg/L	1.0U mg/L
	Nitrate as N	0.229 mg/L	0.229J+ mg/L
RSAQ8-31BSPLP2	Ammonia as N	0.041 mg/L	0.050U mg/L
	Total organic carbon	0.2 mg/L	1.0U mg/L
	Total phosphorus	0.009 mg/L	0.050U mg/L
	Nitrate as N	0.831 mg/L	0.831J+ mg/L
SA34-10BSPLP2	Ammonia as N	0.025 mg/L	0.050U mg/L
	Total phosphorus	0.016 mg/L	0.050U mg/L
	Sulfate	6.11 mg/L	6.11J+ mg/L
	Nitrate as N	0.250 mg/L	0.250J+ mg/L
SA34-31BSPLP2	Ammonia as N	0.024 mg/L	0.050U mg/L
	Total phosphorus	0.007 mg/L	0.050U mg/L
	Nitrate as N	0.346 mg/L	0.346J+ mg/L
SA34-10BSPLP3 Chloride		1.30 mg/L	1.30J+ mg/L
Sulfate		5.10 mg/L	5.10J+ mg/L
SA34-31BSPLP3	Total phosphorus	0.006 mg/L	0.050U mg/L

No field blanks were identified in this SDG.

IV. Matrix Spike/Matrix Spike Duplicates

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

V. Duplicates

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

VI. Laboratory Control Samples

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

VII. Surrogate Spikes

Surrogates were added to all samples and blanks as required by method 300.1. All surrogate recoveries (%R) were within QC limits.

VIII. Sample Result Verification and Project Quantitation Limit

All sample result verifications were acceptable.

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0906056/K0910677	All analytes reported below the PQL.	J (all detects)	А

IX. Overall Assessment

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

Sample	Compound	Flag	A or P
SA34-10BSPLP3	Chloride	х	А

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

X. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R0906056/K0910677

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0906056/ K0910677	SA52-15BSPLP2 SA52-15BSPLP3 SA52-28BSPLP2 SA52-28BSPLP3 RSAQ8-10BSPLP2 RSAQ8-10BSPLP3 RSAQ8-31BSPLP2 RSAQ8-31BSPLP3 SA34-10BSPLP3 SA34-10BSPLP3 SA34-10BSPLP3 SA34-31BSPLP2 SA34-31BSPLP3	All analytes reported below the PQL.	J (all detects)	А	Sample result verification (sp)
R0906056/ K0910677	SA34-10BSPLP3	Chloride	Х	Α	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R0906056/K0910677

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906056/ K0910677	SA52-15BSPLP3	Total phosphorus	0.050U mg/L	А	bl
R0906056/ K0910677	SA52-28BSPLP3	Ammonia as N Total phosphorus	0.050U mg/L 0.050U mg/L	А	bl
R0906056/ K0910677	RSAQ8-10BSPLP3	Ammonia as N Total phosphorus	0.050U mg/L 0.050U mg/L	А	bl
R0906056/ K0910677	RSAQ8-31BSPLP3	Ammonia as N Total phosphorus	0.050U mg/L 0.050U mg/L	A	bl
R0906056/ K0910677	SA52-15BSPLP2	Ammonia as N Total organic carbon Total phosphorus Nitrate as N	0.050U mg/L 1.0U mg/L 0.050U mg/L 0.565J+ mg/L	А	Ы
R0906056/ K0910677	SA52-28BSPLP2	Ammonia as N Total organic carbon Nitrate as N	0.050U mg/L 1.0U mg/L 0.409J+ mg/L	A	bl

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906056/ K0910677	RSAQ8-10BSPLP2	Ammonia as N Total organic carbon Nitrate as N	0.050U mg/L 1.0U mg/L 0.229J+ mg/L	A	bl
R0906056/ K0910677	RSAQ8-31BSPLP2	Ammonia as N Total organic carbon Total phosphorus Nitrate as N	0.050U mg/L 1.0U mg/L 0.050U mg/L 0.831J+ mg/L	A	bl
R0906056/ K0910677	SA34-10BSPLP2	Ammonia as N Total phosphorus Sulfate Nitrate as N	0.050U mg/L 0.050U mg/L 6.11J+ mg/L 0.250J+ mg/L	A	bl
R0906056/ K0910677	SA34-31BSPLP2	Ammonia as N Total phosphorus Nitrate as N	0.050U mg/L 0.050U mg/L 0.346J+ mg/L	A	bl
R0906056/ K0910677	SA34-10BSPLP3	Chloride Sulfate	1.30J+ mg/L 5.10J+ mg/L	A	bl
R0906056/ K0910677	SA34-31BSPLP3	Total phosphorus	0.050U mg/L	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R0906056/K0910677

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #: 22285A6 K0910677 SDG #: R0906056

Stage 4

Reviewer: 2nd Reviewer:

Laboratory: Columbia Analytical Services

METHOD: (Analyte) Alkalinity (SM2320B), Ammonia-N (EPA Method 350.1), Bromide, Chloride, Nitrate-N, Sulfate (EPA SW846 Method 9056), Chlorate (EPA Method 300.1), Conductivity (EPA Method 120.1), Hexavalent Chromium (EPA SW846 Method 7199), Nitrite-N (EPA Method 353.2), pH (EPA SW846 Method 9040B/9045D), Surfactants (SM5540C), Perchlorate (EPA Method 314.0), Total Phosphorus (EPA Method 365.1), TOC (Lleyd/Kahn-/EPA SW846 Method 9060), TDS (SM2540C), TSS (SM2540D)

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: 10/21/09 - 10/26/09
lla.	Initial calibration	A	
lib.	Calibration verification	A	
111.	Blanks	SW	
IV	Surrogate Spikes	A	
V	Matrix Spike/Matrix Spike Duplicates	A	ms/D
VI.	Duplicates	IA	Die,
VII.	Laboratory control samples	A	LCS/D
VIII.	Sample result verification	$\perp A$	
IX.	Overall assessment of data	SW	
X.	Field duplicates	<u> </u>	
Χı	Field blanks	<u> </u>	

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

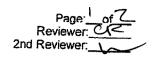
Validated Samples:

	870				
1	SA52-15BSPLP2	11	SA34-10BSPLP3RE	21	31 (PBS
2	SA52-15BSPLP3	12	SA34-31BSPLP2	22	32
3	SA52-28BSPLP2	13	SA34-31BSPLP3	23	33
4	SA52-28BSPLP3	14	RSAQ8-10BSPLP2MS	24	34
5	RSAQ8-10BSPLP2	15	RSAQ8-10BSPLP2MSD	25	35
6	RSAQ8-10BSPLP3	16	RSAQ8-10BSPLP2DUP	26	36
7	RSAQ8-31BSPLP2	17		27	37
8	RSAQ8-31BSPLP3	18		28	38
9	SA34-10BSPLP2	19		29	39
10	SA34-10BSPLP3	20		30	40

Notes:	



VALIDATION FINDINGS CHECKLIST



Method: Inorganics (EPA Method See Cover)				
Validation Area	Yes	No	NA	Findings/Comments
Litechnical holding times				
All technical holding times were met.				·
Cooler temperature criteria was met.				
Il. Calbration Constitution of the Constitutio				
Were all instruments calibrated daily, each set-up time?				
Were the proper number of standards used?				
Were all initial calibration correlation coefficients > 0.995?				
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?				
Were titrant checks performed as required? (Level IV only)	11			
Were balance checks performed as required? (Level IV only)				
III/Blanks Land Land Committee Committee Committee Committee Committee Committee Committee Committee Committee				
Was a method blank associated with every sample in this SDG?				
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	14			
IV alkatosispike/Maurisspike/dubilcates/and Dyblicates - 3 x 2 / 2 / 2 / 2 / 2 / 2 / 2 / 2 / 2 / 2		1		
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	1	-		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	1			
Were the MS/MSD or duplicate relative percent differences (RPD) \leq 20% for waters and \leq 35% for soil samples? A control limit of \leq CRDL(\leq 2X CRDL for soil) was used for samples that were \leq 5X the CRDL, including when only one of the duplicate sample values were \leq 5X the CRDL.				
V Landalory council satisfies i				
Was an LCS anaytzed for this SDG?	<u></u>			·
Was an LCS analyzed per extraction batch?	4	\perp		
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?	1			·
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		1	1	
Were the performance evaluation (PE) samples within the acceptance limits?		\mathcal{L}		

LDC #: 2285AL SDG #: <u>See cover</u>

VALIDATION FINDINGS CHECKLIST

Page: Zof Z Reviewer: CCZ 2nd Reviewer: ____

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	-	\		
Were detection limits < RL?				
VIII, Overall aggressment of data				and the second second second
Overall assessment of data was found to be acceptable.				·
IX Field duplicates				
Field duplicate pairs were identified in this SDG.				
Target analytes were detected in the field duplicates.				
X. Field blanks				
Field blanks were identified in this SDG.		7		/
Target analytes were detected in the field blanks.			7	

LDC #: 22285 A 6 SDG #: See Cover

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page:_	
Reviewer:	CR
2nd reviewer:	1~

All circled methods are applicable to each sample.

Sample ID Matrix	Parameter
1-10,1213 Sail	(Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN (Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄)
	Alk pH Br CV NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
QC:M	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
<u>i 15</u>	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
16	Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄

Comments:			

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET Blanks

Page: Lof 2nd Reviewer:__ Reviewer:__

Reason Code: bl

METHOD: Inorganics, Method See Cover

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

N N/A

Were all samples associated with a given method blank?

N N/A

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

2, 4, 6, 8

Associated Samples: Conc. units: mg/L

Analyte		Alk., Total	Alk., Bicarb	NH3-N	CI	Cond (umhos/cm)	pH (pH units)	T-P	SO4
Blank ID	PB (mg/L)	1.8	1.8	0.027	0.06	1.45	5.60	0.008	0.16
Maximum	ICB/CCB (mg/L)								
Blank	Action Limit					14.5			
	2							0.022 / 0.050	
	4			0.047 / 0.050				0.01 / 0.050	
	9			0.047 / 0.050 0.032 / 0.050 0.049 / 0.050				0.022 / 0.050 0.01 / 0.050 0.007 / 0.050 0.009 / 0.050	
	80			0.049 / 0.050				0.009 / 0.050	
Sample Ide									
Sample Identification									

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET Blanks Reason Code: bl

2nd Reviewer:_ Reviewer:_

METHOD: Inorganics, Method See Cover

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

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

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

Conc. units: mg/L

Associated Samples:

Analyte	Blank ID	Maximum	Blank					Sample Identification	ication		
	PB (mg/L)	ICB/CCB (mg/L)	Action Limit	-	က	5	7				
Alk., Total	1.2										
Alk., Bicarb	1.2										
NH3-N	0.012			0.049 / 0.050 0.01	0.018 / 0.050	8 / 0.050 0.014 / 0.050 0.041 / 0.050	0.041 / 0.050				
TOC	0.1			0.3 / 1.0	0.2 / 1.0	0.1 / 1.0	0.2 / 1.0				
o o	0.08										
Cond (umhos/cm)	7.25		72.5								
pH (pH units)	4.98										
4-T	0.006			0.035 / 0.050			0.009 / 0.050				
NO3-N	0.121		1.21	0.565 J+	0.409 J+	0.229 J+	0.831 J+				

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET Blanks

Page: Sof Seviewer: CT-

METHOD: Inorganics, Method See Cover

Reason Code: bl

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

YNNA Were all samples associated with a given method blank?
YNNA Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.

Associated Samples:

Conc. units: mg/L

										- · · ·
ion										
Sample Identification										
7,										
				50				20		
	12			0.025 / 0.050 0.024 / 0.050				0.016 / 0.050 0.007 / 0.050		
	6			0.025 / 0.050				0.016 / 0.050	6.11 J+	
Blank	Action Limit					73.5			12.2	
Maximum	ICB/CCB (mg/L)									
Blank ID	PB (mg/L)	6.0	6:0	0.009	0.08	7.35	5.02	0.006	1.22	
Analyte		Alk., Total	Alk., Bicarb	NH3-N	ō	Cond (umhos/cm)	pH (pH units)	d-1	SO4	

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET Blanks Reason Code: bl

Reviewer: CC 2nd Reviewer: ____

METHOD: Inorganics, Method See Cover

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

| N | N/A | Were all samples associated with a given method blank?
| N | N/A | Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.

Conc. units:	s: mg/L				Ass	Associated Samples:		10, 13			
Analyte	<u>m</u>		Blank					Sample Identification	ıtification		
	PB (mg/L)	ICB/CCB (mg/L)	Action Limit	10	13						
ō	0.32		3.2	1.30 J+							
Cond (umhos/cm)	1.53		15.3								
pH (pH units)	5.62										
T-P	0.007				0.006 / 0.050						
S04	0.78		7.8	5.10 J+							
Conc. units:	s: mg/L	E STATE OF THE STA			Ass	Associated Samples:	les:	7	The second secon		
Analyte	Blank ID	Maximum	Blank					Sample Identification	ıtification		
	PB (mg/L)		Action Limit	No Qualifiers							
Ö	0.07										
Conc. units:	s: mg/L				Ass	Associated Samples:	les:	8,9			
Analyte	Blank ID	Maximum					10 E	Sample Identification	ntification		
	PB (mg/L)	ICB/CCB (mg/L)	Ac	No Qualifiers							
ū		0.063									

LDC #: <u>22285A6</u> SDG #: <u>See Cover</u>

VALIDATION FINDINGS WORKSHEET Blanks

Page: St 6
Reviewer: CC
2nd Reviewer:

METHOD: Inorganics, Method See Cover

Reason Code: bl

ss "N/A".	:	If yes, please see qualifications below.
ase see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".	N/A Were all samples associated with a given method blank?	N N/A Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.
ase s	N Z	ž

Conc. units:	s: mg/L				As	Associated Samples:	2, 4		
Analyte	<u> </u>	Maximum	Blank				Sample Identification	tification	
	PB (mg/L)	ICB/CCB (mg/L)	Action Limit	No Qualifiers					
Ö		0.098							
Conc. units:	s: mg/L				As	Associated Samples:	5, 7		
Analyte	8	Maximum	Blank				Sample Identification	tification	
	PB (mg/L)	ICB/CCB (mg/L)	Action Limit	No Qualifiers					
ō		0.085							
Conc. units:	s: mg/L				As	Associated Samples:	10, 13		
Analyte	8		Blank				Sample Identification	ıtification	
	PB (mg/L)	ICB/CCB (mg/L)	Action Limit	No Qualifiers					
Ö		0.081							
Conc. units:	s: mg/L				As	Associated Samples:	9, 12		
Analyte	@	Maximum	Blank				Sample Identification	ıtification	
	PB (mg/L)	ICB/CCB (mg/L)	Action Limit	No Qualifiers					1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.
ō		0.077							

LDC #: 22285A6

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET Blanks

Page: Oof S Reviewer: C

METHOD: Inorganics, Method See Cover

Reason Code: bl

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

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

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

les: 12	Sample Identification			les: 11	Sample Identification		
12	Sample Identification				Sample Identification		
Associated Samples: 12				Associated Samples:			
		No Qualifiers				No Qualifiers	
	Blank	Action Limit			Blank	Ac	
	Maximum	ICB/CCB (mg/L)	0.132		Maximum	ICB/CCB (mg/L)	0.074
: mg/L	Blank ID	PB (mg/L)		ma/L	Blank ID	PB (mg/L)	
Conc. units: mg/L	Analyfe		804	Conc. units: ma/L	Analyte		Ö

1DC #: 722874

VALIDATION FINDINGS WORKSHEET

Overall Assessment of Data

Page: of
Reviewer: CR

METHOD: Inorganics, Method 200 Could

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

Alt 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
			J		X/A(o)
],					
Ē	Comments:				

122876 SDG#: SEE COVEY

Validatin Findings Worksheet Initial and Continuing Calibration Calculation Verification

Page: of Reviewer: C

Method: Inorganics, Method Selcord

was recalculated.Calibration date: 10/22/09 The correlation coefficient (r) for the calibration of An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = <u>Found X 100</u>

Where,

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

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

					Recalculated	Reported	Acceptable
Type of analysis	Analyte	Standard	Conc. (mg/l)	Area	r or r²	r or r²	(Y/N)
Initial calibration		s1	0	0			
		s2	0.01	224648	0.999657	0.999657	•
	*9/	s3	0.1	3238235			7
	3	84	0.5	16376437			
		s5	0.7	22244818			•
		9S	1	31530713			
Calibration verification	NOZON	CCV	0,45	10,4506	100		
Calibration verification	Shadpang	\C	8,0	0.7906	dd	-	
Calibration verification	5	CCV	\sim	3,029	101		

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

SDG #: LDC #:

VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

Page: 2nd Reviewer:

METHOD: Inorganics, Method Selcover

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

Where, %R = Found x 100

Found =

True ==

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

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

RPD = <u>1S-D|</u> x 100 Where, (S+D)/2

ii ii O 0

Original sample concentration Duplicate sample concentration

	•				Recalculated	Reported	
Sample ID	Type of Analysis	Element	round / s (units)	True / D (units)	%R / RPD	%R / RPD	Acceptable (YAN)
<u></u>	Laboratory control sample	0	(///	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \			(cris)
		5	3	3	9	8)-
	Matrix spike sample	((SSR-SR)				
)		(104	6861	2000	8	66	
	Duplicate sample					•	
<u>_</u>)	128	765	(~	
		· ·	•	<u> </u>))	•

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

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:	l	al a	
Reviewer:	C	2	_
2nd reviewer:			_

	METH	IOD: Inorganics, Metho	d_Seeco	ver_				
ĺ	Y N Y N Y N Comp	N/A Have results N/A Are results w	been reported an ithin the calibrated tion limits below the	AIK	nts?	are identified as "		9
71k= 1 Caso icaso	Concer Titras 2 Z = To	ntration = NTITEMENT X 50,0 Vsample (Phenoliph thatein tal Alk - 2(Phenol	Alk) phthalein Alk)	Recalculation: Total = Zn Phenolphalein: Carb. = 567 Bicarb = 25	=0.4mL(0.0Z	v)(50,000)/801	nL=5ML	5m
	#	Sample ID		i Analyte	Reported Concentration (mg ()	Calculated Concentration	Acceptable (Y/N)	
		5	AIK	Total	250	25.0)-	
			Alk	in Bicarb.	15.0	15.0		
			AIK	. Ca(b)	0.01	6.01		
			NY	13-11	۷،۵۱۷	0.014		
			T	Ο̈́C	0.1	0.1		
			C	_1	3.24	3.24		
				of Canhos/cn)	175	175		
				3-N	0229	0.229		
			600	DEAD pH (units)	9.22	9.22		
				TDS	94	94		
				<u>0</u>	329	32.9		
			- SA	factants	0.011	0.011	<u> </u>	
						•		

Note:	

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page A	
Reviewer:	_
2nd reviewer:	_

METHOD: Inorganics, Method Sec Please see qualifications below for all ques N N/A Have results been reported	tions answered "N". Not applic	able questions are identified as "N/A".
Y N N/A Are results within the calibr Y N N/A Are all detection limits belo Compound (analyte) results for	ated range of the instruments? w the CRQL? Su(Factort S	reported with a positive detect were
recalculated and verified using the following concentration = + bso bonce - Yintercept	•	075888 =0,006mg/L
Slope		

#	Sample ID	Analyte	Reported Concentration (Mg/L-)	Calculated Concentration (Ma(L)	Acceptable (Y/N)
	8	Alk. Total	27-1	221	7
		Alk Biach	22.1	221	1
		NHZ-N	0.049	0.049	-
		JO'C.	0,	0.1	
		<u>Cl</u>	4.39	4.39	
		Cond Cumhos/cm)	1680	1680	
		NOZIN	0.7222	0.7222	
	` .	PH (units)	8.10	8.10	
		T-P	0.009	0,009	
		TPS	1220	1220	
		TSS	1.8	1.8	
		504	721	721	
		Susactors	0.006	0.006	4
		A			

Note:	
	

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

October 22 through October 23, 2009

LDC Report Date:

January 13, 2010

Matrix:

Soil/Water

Parameters:

Wet Chemistry

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906081

Sample Identification

EB102209-SO1A3

SA112-0.5B SA112-10B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-10B RSAQ8-22B RSAQ8-31B RSAQ8-34B SA132-0.5B RSAP8-10B RSAP8-25B RSAP8-40B EB102209-SO1A3MS EB102209-SO1A3MSD EB102209-SO1A3DUP RSAR8-34BMS RSAR8-34BMSD RSAR8-34BDUP

SA132-10B SA132009-10B SA132-20B SA132-34B RSAR8-0.5B RSAR8-10B RSAR8-20B RSAR8-34B RSAP8-0.5B

Introduction

This data review covers 25 soil samples and 4 water samples listed on the cover sheet. The analyses were per Standard Method 2320B for Alkalinity, EPA Method 350.1 for Ammonia as Nitrogen, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 300.1 for Chlorate, EPA SW 846 Method 7199 for Hexavalent Chromium, EPA Method 353.2 for Nitrite as Nitrogen, EPA SW 846 Methods 9040B/9045D for pH, Standard Method 5540C for Surfactants, EPA Method 314.0 for Perchlorate, EPA Method 365.1 for Total Phosphorus, and Lloyd/Khan Method and EPA SW 846 Method 9060 for Total Organic Carbon.

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 Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section X.

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	Analyte	Total Time From Sample Collection Until Analysis	Required Holding Time From Sample Collection Until Analysis	Flag	A or P
EB102209-SO1A3	Hexavalent chromium	27 hours	24 hours	J- (all detects) UJ (all non-detects)	Р

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

II. Calibration

a. Initial Calibration

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

b. Calibration Verification

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

III. Blanks

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

Method Blank ID	Analyte	Concentration	Associated Samples
PB (prep blank)	Chloride Sulfate	0.13 mg/L 0.18 mg/L	All water samples in SDG R0906081
ICB/CCB	Chloride Sulfate Alkalinity, total Alkalinity, bicarbonate	0.154 mg/L 0.176 mg/L 0.5 mg/L 0.5 mg/L	All water samples in SDG R0906081
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate Chloride	11 mg/Kg 11 mg/Kg 1.1 mg/Kg	SA112-0.5B SA112-10B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-22B

Method Blank ID	Analyte	Concentration	Associated Samples
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate	19 mg/Kg 19 mg/Kg	RSAQ8-10B RSAQ8-31B RSAQ8-34B SA132-0.5B SA132-10B
ICB/CCB	Chloride	0.114 mg/L	RSAQ8-10B RSAQ8-31B RSAQ8-34B SA132-0.5B SA132-10B
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate Chloride	10 mg/Kg 10 mg/Kg 1.1 mg/Kg	SA132009-10B SA132-20B SA132-34B RSAR8-0.5B RSAR8-10B RSAR8-20B RSAR8-34B RSAP8-0.5B RSAP8-10B RSAP8-10B RSAP8-25B
ICB/CCB	Nitrite as N	0.0092 mg/L	SA132009-10B SA132-20B SA132-34B RSAR8-0.5B RSAR8-10B RSAR8-20B RSAR8-34B RSAP8-0.5B RSAP8-10B RSAP8-10B RSAP8-25B
PB (prep blank)	Total organic carbon	40 mg/Kg	RSAP8-25B RSAP8-40B

Method Blank ID	Analyte	Concentration	Associated Samples
PB (prep blank)	Total organic carbon	100 mg/Kg	SA112-0.5B SA112-10B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-10B RSAQ8-22B RSAQ8-31B RSAQ8-34B SA132-0.5B SA132-10B SA132-10B SA132-20B SA132-34B RSAR8-0.5B RSAR8-0.5B RSAR8-10B RSAR8-10B RSAR8-20B RSAR8-34B RSAR8-34B RSAR8-34B RSAP8-0.5B
ICB/CCB	Total organic carbon	116.0 mg/Kg	All soil samples in SDG R0906081
ICB/CCB	Alkalinity, total Alkalinity, bicarbonate	0.5 mg/L 0.5 mg/L	SA112-10B RSAP8-10B RSAP8-25B RSAP8-40B
ICB/CCB	Chloride	0.113 mg/L	SA112-34B RSAQ8-22B
ICB/CCB	Sulfate	0.064 mg/L	SA132-10B
ICB/CCB	Chloride	0.104 mg/L	SA132009-10B SA132-20B RSAP8-0.5B RSAP8-10B
ICB/CCB	Chloride	0.076 mg/L	SA112-0.5B
ICB/CCB	Chloride	0.121 mg/L	SA112-10B SA112-20B RSAQ8-0.5B
ICB/CCB	Sulfate	0.098 mg/L	RSAP8-10B
ICB/CCB	Chloride	0.075 mg/L	SA132-34B RSAR8-0.5B RSAR8-10B RSAR8-20B RSAR8-34B

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Sulfate	0.095 mg/L	SA132-34B RSAR8-0.5B RSAR8-10B RSAR8-20B RSAR8-34B RSAP8-0.5B
ICB/CCB	Sulfate	0.157 mg/L	RSAQ8-34B

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

Sample	Analyte	Reported Concentration	Modified Final Concentration
EB102209-SO1A3	Chloride Sulfate Alkalinity, total Alkalinity, bicarbonate	1.6 mg/L 1.3 mg/L 0.5 mg/L 0.5 mg/L	2.0U mg/L 2.0U mg/L 2.0U mg/L 2.0U mg/L
SA112-34B	Total organic carbon	210 mg/Kg	300U mg/Kg
RSAQ8-34B	Total organic carbon	230 mg/Kg	290U mg/Kg
SA132-34B	Total organic carbon	200 mg/Kg	290U mg/Kg

Sample EB102209-SO1A3 was identified as an equipment blank. No contaminant concentrations were found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
EB102209-SO1A3	10/22/09	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Total organic carbon Chloride Nitrate as N pH Total phosphorus Sulfate Surfactants	0.5 mg/L 0.5 mg/L 0.012 mg/L 0.2 mg/L 1.6 mg/L 0.76 mg/L 5.03 units 0.006 mg/L 1.3 mg/L 0.052 mg/L	SA112-0.5B SA112-10B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-10B RSAQ8-22B RSAQ8-31B RSAQ8-34B

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	Analyte	Reported Concentration	Modified Final Concentration
SA112-0.5B	Nitrate as N	8.35 mg/Kg	8.35J+ mg/Kg
	Surfactants	0.9 mg/Kg	2.0U mg/Kg
SA112-10B	Nitrate as N	5.31 mg/Kg	5.31J+ mg/Kg
SA112-20B	Nitrate as N	16.7 mg/Kg	16.7J+ mg/Kg
	Surfactants	1.3 mg/Kg	2.6U mg/Kg
SA112-34B	Total organic carbon	210 mg/Kg	300U mg/Kg
	Nitrate as N	1.89 mg/Kg	1.89J+ mg/Kg
RSAQ8-0.5B	Nitrate as N	13.8 mg/Kg	13.8J+ mg/Kg
	Surfactants	1.4 mg/Kg	2.1U mg/Kg
RSAQ8-10B	Nitrate as N	3.67 mg/Kg	3.67J+ mg/Kg
RSAQ8-22B	Nitrate as N	3.51 mg/Kg	3.51J+ mg/Kg
RSAQ8-31B	Nitrate as N	24.0 mg/Kg	24.0J+ mg/Kg
RSAQ8-34B	Total organic carbon	230 mg/Kg	290U mg/Kg
	Nitrate as N	3.08 mg/Kg	3.08J+ mg/Kg

Sample FB082809-SO (from SDG R0904894) was identified as a field blank. No contaminant concentrations were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
FB082809-SO	8/28/09	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Total organic carbon Chloride Nitrate as N pH Total phosphorus Sulfate	1.9 mg/L 1.9 mg/L 0.033 mg/L 0.2 mg/L 1.2 mg/L 0.68 mg/L 5.88 units 0.008 mg/L 1.4 mg/L	All soil samples in SDG R0906081

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	Analyte	Reported Concentration	Modified Final Concentration
SA112-0.5B	Nitrate as N	8.35 mg/Kg	8.35J+ mg/Kg

Sample	Analyte _	Reported Concentration	Modified Final Concentration
SA112-10B	Nitrate as N	5.31 mg/Kg	5.31J+ mg/Kg
SA112-20B	Nitrate as N	16.7 mg/Kg	16.7J+ mg/Kg
SA112-34B	Total organic carbon Nitrate as N	210 mg/Kg 1.89 mg/Kg	300U mg/Kg 1.89J+ mg/Kg
RSAQ8-0.5B	Nitrate as N	13.8 mg/Kg	13.8J+ mg/Kg
RSAQ8-10B	Nitrate as N	3.67 mg/Kg	3.67J+ mg/Kg
RSAQ8-22B	Nitrate as N	3.51 mg/Kg	3.51J+ mg/Kg
RSAQ8-31B	Nitrate as N	24.0 mg/Kg	24.0J+ mg/Kg
RSAQ8-34B	Total organic carbon Nitrate as N	230 mg/Kg 3.08 mg/Kg	290U mg/Kg 3.08J+ mg/Kg
SA132-0.5B	Nitrate as N	1.35 mg/Kg	1.35J+ mg/Kg
SA132-10B	Nitrate as N	1.06 mg/Kg	1.06J+ mg/Kg
SA132009-10B	Nitrate as N	1.04 mg/Kg	1.04J+ mg/Kg
SA132-20B	Nitrate as N	0.78 mg/Kg	0.78J+ mg/Kg
SA132-34B	Total organic carbon Nitrate as N	200 mg/Kg 3.67 mg/Kg	290U mg/Kg 3.67J+ mg/Kg
RSAR8-0.5B	Nitrate as N	8.64 mg/Kg	8.64J+ mg/Kg
RSAR8-10B	Nitrate as N	2.27 mg/Kg	2.27J+ mg/Kg
RSAR8-20B	Nitrate as N	3.29 mg/Kg	3.29J+ mg/Kg
RSAR8-34B	Nitrate as N	3.66 mg/Kg	3.66J+ mg/Kg
RSAP8-0.5B	Nitrate as N	3.11 mg/Kg	3.11J+ mg/Kg
RSAP8-10B	Nitrate as N	1.66 mg/Kg	1.66J+ mg/Kg
RSAP8-25B	Nitrate as N	1.04 mg/Kg	1.04J+ mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
RSAP8-40B	Nitrate as N	3.80 mg/Kg	3.80J+ mg/Kg

IV. Matrix Spike/Matrix Spike Duplicates

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

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Affected Analyte	Flag	A or P
RSAR8-34BMS (All soil samples in SDG R0906081)	Alkalinity, total Ammonia as N	70 (75-125) 74 (75-125)	-	-	Alkalinity, total Alkalinity, bicarbonate Ammonia as N	J- (all detects) UJ (all non-detects)	Α
RSAR8-34BMS (All soil samples in SDG R0906081)	Chloride Nitrate as N Sulfate	329 (75-125) 135 (75-125) 154 (75-125)	- - -	-	Chloride Nitrate as N Sulfate	J+ (all detects) J+ (all detects) J+ (all detects)	Α

V. Duplicates

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

VI. Laboratory Control Samples

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

VII. Surrogate Spikes

Surrogates were added to all samples and blanks as required by method 300.1. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Analyte	Flag	A or P
SA112-0.5B	Dichloroacetate	88 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	A
SA112-20B	Dichloroacetate	87 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	Α

Sample	Surrogate	%R (Limits)	Analyte	Flag	A or P
SA112-34B	Dichloroacetate	89 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	А
RSAQ8-0.5B	Dichloroacetate	87 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	А
RSAQ8-22B	Dichloroacetate	78 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	А
RSAQ8-31B	Dichloroacetate	86 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	A
RSAQ8-34B	Dichloroacetate	89 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	Α
RSAR8-0.5B	Dichloroacetate	88 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	Α
RSAR8-10B	Dichloroacetate	75 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	A
RSAR8-20B	Dichloroacetate	80 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	Α
RSAR8-34B	Dichloroacetate	88 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	Α

VIII. Sample Result Verification and Project Quantitation Limit

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0906081	All analytes reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

IX. Overall Assessment

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

X. Field Duplicates

Samples SA132-10B and SA132009-10B were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Conce	ntration				
Analyte	SA132-10B	SA132009-10B	RPD (Limits)	Difference (Limits)	Flags	A or P
Alkalinity, total	724 mg/Kg	764 mg/Kg	5 (≤50)	-	-	-
Alkalinity, bicarbonate	687 mg/Kg	707 mg/Kg	3 (≤50)	-	-	-
Alkalinity, carbonate	37 mg/Kg	57 mg/Kg	_	20 (≤22)	-	-
Chloride	4.8 mg/Kg	4.8 mg/Kg	0 (≤50)	-	-	-
Nitrate as N	1.06 mg/Kg	1.04 mg/Kg		0.02 (≤0.55)	-	-
рН	9.47 units	9.48 units	0 (≤50)	-	-	
Sulfate	108 mg/Kg	103 mg/Kg	5 (≤50)	-	-	-
Total organic carbon	400 mg/Kg	1530 mg/Kg	-	1130 (≤300)	J (all detects)	A
Total phosphorus	863 mg/Kg	842 mg/Kg	2 (≤50)	-	-	-
Chlorate	318 ug/Kg	378 ug/Kg	-	60 (≤230)	-	-
Perchlorate	2080 ug/Kg	2030 ug/Kg	2 (≤50)	-	-	_

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R0906081

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0906081	EB102209-SO1A3	Hexavalent chromium	J- (all detects) UJ (all non-detects)	Р	Technical holding time (h)
	SA112-0.5B SA112-10B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-10B RSAQ8-22B RSAQ8-31B RSAQ8-31B RSAQ8-34B SA132-0.5B SA132-10B SA132-10B SA132-20B SA132-34B RSAR8-0.5B RSAR8-0.5B RSAR8-10B RSAR8-20B RSAR8-20B RSAR8-34B RSAR8-20B RSAR8-34B RSAR8-34B RSAR8-34B RSAR8-34B RSAR8-34B RSAR8-34B RSAR8-34B RSAR8-34B RSAR8-34B RSAR8-34B RSAR8-34B RSAR8-34B	Alkalinity, total Alkalinity, bicarbonate Ammonia as N	J- (all detects) UJ (all non-detects)	A	Matrix spike analysis (%R) (m)
	SA112-0.5B SA112-10B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-10B RSAQ8-31B RSAQ8-31B RSAQ8-34B SA132-0.5B SA132-0.5B SA132-10B SA132-10B SA132-10B SA132-10B SA132-10B SA132-10B SA132-10B SA132-10B SA132-10B SAR8-0.5B SAR8-10B SAR8-10B SAR8-10B SAR8-10B SAR8-10B SAP8-10B SAP8-10B SAP8-10B SAP8-10B	Chloride Nitrate as N Sulfate	J+ (all detects) J+ (all detects) J+ (all detects)	A	Matrix spike analysis (%R) (m)

SDG	Sample	Analyte	Flag	A D	_
R09060	SA112-0.5B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-22B RSAQ8-31B RSAQ8-34B RSAR8-0.5B RSAR8-10B RSAR8-10B RSAR8-20B RSAR8-34B	Chlorate	J- (all detects) UJ (all non-detects	A or P	Reason (Code) Surrogate spikes (%R) (s)
R090608	EB102209-SO1A3 SA112-0.5B SA112-10B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-1.0B RSAQ8-22B RSAQ8-31B RSAQ8-34B SA132-0.5B SA132-10B SA132-10B SA132-20B SA132-34B RSAR8-0.5B RSAR8-0.5B RSAR8-0.5B RSAR8-0.5B RSAR8-25B RSAP8-1.0B RSAP8-25B	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)
0906081	SA132-10B SA132009-10B	Total organic carbon	J (all detects)	A F	ield duplicates Difference) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R0906081

SDG	Sample	Analyte	Modified Final Concentration		
R0906081	EB102209-SO1A3	Chloride Sulfate Alkalinity, total Alkalinity, bicarbonate	2.0U mg/L 2.0U mg/L 2.0U mg/L 2.0U mg/L	A or P	Code bi
R0906081	SA112-34B	Total organic carbon	300U mg/Kg	A	bl
R0906081	RSAQ8-34B	Total organic carbon	290U mg/Kg	A	bl

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906081	SA132-34B	Total organic carbon	290U mg/Kg	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Equipment Blank Data Qualification Summary - SDG R0906081

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906081	SA112-0.5B	Nitrate as N Surfactants	8.35J+ mg/Kg 2.0U mg/Kg	A	be
R0906081	SA112-10B	Nitrate as N	5.31J+ mg/Kg	Α	be
R0906081	SA112-20B	Nitrate as N Surfactants	16.7J+ mg/Kg 2.6U mg/Kg	А	be
R0906081	SA112-34B	Total organic carbon Nitrate as N	300U mg/Kg 1.89J+ mg/Kg	Α	be
R0906081	RSAQ8-0.5B	Nitrate as N Surfactants	13.8J+ mg/Kg 2.1U mg/Kg	А	be
R0906081	RSAQ8-10B	Nitrate as N	3.67J+ mg/Kg	A	be
R0906081	RSAQ8-22B	Nitrate as N	3.51J+ mg/Kg	А	be
R0906081	RSAQ8-31B	Nitrate as N	24.0J+ mg/Kg	А	be
R0906081	RSAQ8-34B	Total organic carbon Nitrate as N	290U mg/Kg 3.08J+ mg/Kg	А	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R0906081

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906081	SA112-0.5B	Nitrate as N	8.35J+ mg/Kg	А	bf
R0906081	SA112-10B	Nitrate as N	5.31J+ mg/Kg	Α	bf
R0906081	SA112-20B	Nitrate as N	16.7J+ mg/Kg	А	bf

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906081	SA112-34B	Total organic carbon Nitrate as N	300U mg/Kg 1.89J+ mg/Kg	А	bf
R0906081	RSAQ8-0.5B	Nitrate as N	13.8J+ mg/Kg	Α	bf
R0906081	RSAQ8-10B	Nitrate as N	3.67J+ mg/Kg	А	bf
R0906081	RSAQ8-22B	Nitrate as N	3.51J+ mg/Kg	Α	bf
R0906081	RSAQ8-31B	Nitrate as N	24.0J+ mg/Kg	А	bf
R0906081	RSAQ8-34B	Total organic carbon Nitrate as N	290U mg/Kg 3.08J+ mg/Kg	А	bf
R0906081	SA132-0.5B	Nitrate as N	1.35J+ mg/Kg	А	bf
R0906081	SA132-10B	Nitrate as N	1.06J+ mg/Kg	Α	bf
R0906081	SA132009-10B	Nitrate as N	1.04J+ mg/Kg	Α	bf
R0906081	SA132-20B	Nitrate as N	0.78J+ mg/Kg	Α	bf
R0906081	SA132-34B	Total organic carbon Nitrate as N	290U mg/Kg 3.67J+ mg/Kg	A	bf
R0906081	RSAR8-0.5B	Nitrate as N	8.64J+ mg/Kg	А	bf
R0906081	RSAR8-10B	Nitrate as N	2.27J+ mg/Kg	А	bf
R0906081	RSAR8-20B	Nitrate as N	3.29J+ mg/Kg	А	bf
R0906081	RSAR8-34B	Nitrate as N	3.66J+ mg/Kg	А	bf
R0906081	RSAP8-0.5B	Nitrate as N	3.11J+ mg/Kg	Α	bf
R0906081	RSAP8-10B	Nitrate as N	1.66J+ mg/Kg	Α	bf
R0906081	RSAP8-25B	Nitrate as N	1.04J+ mg/Kg	А	bf
R0906081	RSAP8-40B	Nitrate as N	3.80J+ mg/Kg	А	bf

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC	#: 2220000
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Stage 2B

Page: \of (Reviewer: V

SDG #: R0906081 Laboratory: Columbia Analytical Services

2nd Reviewer: \

METHOD: (Analyte) Alkalinity (SM2320B), Ammonia-N (EPA Method 350.1), Bromide, Chloride, Nitrate-N, Sulfate (EPA SW846 Method 9056), Chlorate (EPA Method 300.1), Hexavalent Chromium (EPA SW846 Method 7199), Nitrite-N (EPA Method 353.2), pH (EPA SW846 Method 9040B/9045D), Surfactants (SM5540C), Perchlorate (EPA Method 314.0), Total Phosphorus (EPA Method 365.1), TOC (Lloyd/Kahn / EPA SW846 Method 9060),

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

	Validation Area		Comments
I.	Technical holding times	SW	Sampling dates: 10122-10123109
IIa.	Initial calibration	A	
lib.	Calibration verification	A	
III.	Blanks	SW,	
IV	Surrogate Spikes	SW	
V	Matrix Spike/Matrix Spike Duplicates	BW	ms/D
VI.	Duplicates	A	DP .
VII.	Laboratory control samples	A	LCS/D
VIII.	Sample result verification	N	
IX.	Overall assessment of data	IA	
X.	Field duplicates	SW	(12,13)
XI_	Field blanks	SW	EB=1. FB= FB082809-SO CR0904894)

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: Soi\ /waxer

1	EB102209-SO1A3	W	11	SA132-0.5B	5	21-	READS 0.5B S		31	<u>985</u>
2	SA112-0.5B	5	12	SA132-10B		22	RSAP8-10B		32	POW
3	SA112-10B		13	SA132009-10B		23	RSAP8-25B		33	
4	SA112-20B		14	SA132-20B		24	RSAP8-40B		34	
5	SA112-34B		15	SA132-34B		25	EB102209-SO1A3MS \	/	35	
6	RSAQ8-0.5B		16	RSAR8-0.5B		26	EB102209-SO1A3MSD		36	
7	RSAQ8-10B		17	RSAR8-10B		27	EB102209-SO1A3DUP		37	
8	RSAQ8-22B		18	RSAR8-20B		28	RSAR8-34BMS 5		38	
9	RSAQ8-31B		19	RSAR8-34B		29	RSAR8-34BMSD		39	
10	RSAQ8-34B	1	20	RSAP8-0.5B	1	30	RSAR8-34BDUP		40	

Notes:				

LDC #: 22285 **6** 6 SDG #: See Cover

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page: __of__!

Reviewer: _____
2nd reviewer: _____

All circled methods are applicable to each sample.

Sample ID Ma	trix	Parameter Parame
B1-20224:	51W	(Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC) CN (Cr ⁶⁺ T-P MBAS)TDS TSS Cond (ClO ₃ ClO ₄)
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
QC:25		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
1 26		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
27		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
28		(Alk) pH (Br CI NO3 NO2 SO4 NH3 TOO CN (Cr8+ T-P MBAS) TDS TSS Cond CIO3 CIO4
29	***	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
1/30		(Alk pH Br CI NO3 NO2 SO4 NH3 TOC) CN (Cr6+ T-P MBAS) TDS TSS Cond CIO3 CIO4
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO $_3$ NO $_2$ SO $_4$ NH $_3$ TOC CN Cr $^{6+}$ T-P MBAS TDS TSS Cond ClO $_3$ ClO $_4$
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl $\mathrm{NO_3}$ $\mathrm{NO_2}$ $\mathrm{SO_4}$ $\mathrm{NH_3}$ TOC CN Cr^{6+} T-P MBAS TDS TSS Cond $\mathrm{ClO_3}$ $\mathrm{ClO_4}$
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond CIO3 CIO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO $_3$ NO $_2$ SO $_4$ NH $_3$ TOC CN Cr $^{6+}$ T-P MBAS TDS TSS Cond ClO $_3$ ClO $_4$
		Alk pH Br Cl NO $_3$ NO $_2$ SO $_4$ NH $_3$ TOC CN Cr $^{6+}$ T-P MBAS TDS TSS Cond ClO $_3$ ClO $_4$
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4

Comments:		 	

LDC #: 2228586 SDG #: SEC_COVEL

VALIDATION FINDINGS WORKSHEET Technical Holding Times

Page: __ot __

Reviewer: __<
2nd reviewer: ___

All circled dates have exceeded the technical holding time.

Y N N/A Were all samples preserved as applicable to each method?

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

Y N/A Were al	cooler tempera	tures Within Vail	dation criteria?_					
Method:	•	7199						
Parameters:		C(6+						
Technical holding ti	me:	ZYKrs						
Sample ID	Sampling date	Analysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier	
1	10/22/09	10123/09	(27 kg)				J-105/P	(h
V	1	V11:09	V					
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SDG #: See Cover LDC #: 22285B6

VALIDATION FINDINGS WORKSHEET Blanks

Page: of _ Reviewer: Cand Reviewer: ____

METHOD: Inorganics, Method See Cover

Reason Code: bl

Conc. units: mg/L

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

Note all samples associated with a given method blank?

Note all samples associated with a given method blank?

Note any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.

Associated Samples: All Water

Analyte	Blank ID	Maximum	Blank		Sample Identification
	PB (mg/L)	ICB/CCB (mg/L)	Action Limit	1	
ਹ	0.13	0.154		1.6/2.0	
SO4	0.18	0.176		1.3/2.0	
Alk., Total		0.5		0.5/2.0	
Alk., Bicarb.		0.5		0.5/2.0	
Conc. units: mg/Kg	s: mg/Kg			Associated Samples:	2-6, 8
Analyte	Blank ID	Maximum	Blank		Sample Identification
	PB (mg/Kg)	(mg/L)	Action Limit	No Qualifiers	
Alk., Total	11				
Alk., Bicarb.	11				
ō	1.1				

LDC #: <u>22285B6</u> SDG #: <u>See Cover</u> METHOD: Inorganics, Method See Cover

VALIDATION FINDINGS WORKSHEET Blanks

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Reason Code: bl

Y N N/A Were all samples associated with a given method blank?
X N N/A Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below. Rease see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Sample Identification Sample Identification Sample Identification 13-20, 22-24 23, 24 7, 9-12 Associated Samples: Associated Samples: Associated Samples: No Qualifiers No Qualifiers No Qualifiers Blank Action Limit Blank Action Limit Blank Action Limit Maximum ICB/CCB Maximum ICB/CCB Maximum ICB/CCB (mg/L) (mg/L) (mg/L) 0.0092 mg/Kg mg/Kg Blank ID mg/Kg PB (mg/Kg) Blank ID Blank ID PB (mg/Kg) PB (mg/Kg) 9 19 9 9 7 4 Conc. units: Conc. units: Conc. units: Alk., Bicarb. Analyte Analyte Alk., Bicarb. Alk., Total Analyte Alk., Total NO2-N 700 ರ

LDC #: <u>22285B6</u> SDG #: See Cover

VALIDATION FINDINGS WORKSHEET Blanks

Page: Of A Reviewer: Of A 2nd Reviewer:

METHOD: Inorganics, Method See Cover

Reason Code: bl

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

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

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

Conc. units:	s: mg/Kg	9			Ass	Associated Samples:	2-20, 22	22	
Analyte	Blank ID		Blank				Sample Identification	ntification	
	PB (mg/Kg)	(mg/L)	Action Limit	5	10	15			
TOC	100			210 / 300	230 / 290	200 / 290			
Conc. units:	:s:mg/Kg	g			As	Associated Samples:	All Soil		
Analyte	Blank ID	Maximum					Sample Identification	ntification	
	PB (mg/Kg)	ICB/CCB (mg/Kg)	Action Limit	5	10	15			
тос		116.0		See PB	See PB	See PB			
Conc. units:	s: mg/Kg	j.			Ass	Associated Samples:	3, 22-24		
Analyte	Blank ID	Maximum	Blank				Sample Identification	ntification	
	PB (mg/Kg)	ICB/CCB (mg/L)	Action Limit	No Qualifiers					
Alk., Total		0.5							
Alk., Bicarb.		0.5							
Conc. units:	s: mg/Kg	D.			Ase	Associated Samples:	5, 8		
Analyte	Blank ID	Maximum					Sample Identification	ntification	
	PB (mg/Kg)	ICB/CCB (mg/L)	Action Limit	No Qualifiers					
Ö		0.113					er.		

LDC #: 22285B6___SDG #: See Cover_

VALIDATION FINDINGS WORKSHEET Blanks

Reviewer:

METHOD: Inorganics, Method See Cover

Reason Code: bl

YN A/A Were all samples associated with a given method blank?
YN N/A Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below. Rease see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

	Blank	ction Limit No Qualifiers			Blank	ction Limit No Qualifiers			Blank	ction Limit No Qualifiers			Blank	ction Limit No Qualifiers	
: mg/Kg		CB/CCB Action Lin PB (mg/L) (mg/Kg)	0.064	s: mg/Kg	<u> </u>	ICB/CCB Action Lin PB (mg/L)	0.104	s: mg/Kg		ICB/CCB Action Lin	0.076	s:mg/Kg	Maximum		0.121
Conc. units: mg/Kg	Maximum	ICB/CCB Action Limit (mg/L)	0.064	Conc. units: mg/Kg	Maximum	ICB/CCB Action Limit (mg/L)	0.104	Conc. units: mg/Kg	Maximum	ICB/CCB Action Limit (mg/L)		Conc. units: mg/Kg	Maximum	PB (mg/Kg) (mg/Kg)	0.121

SDG #: See Cover LDC #: 22285B6

VALIDATION FINDINGS WORKSHEET Blanks

Page: Sof 5 2nd Reviewer: Reviewer:_

METHOD: Inorganics, Method See Cover

Reason Code: bl

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

N/A Were all samples associated with a given method blank?
N/A N/A Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below. Sample Identification Associated Samples: No Qualifiers Blank Action Limit ICB/CCB Maximum (mg/L) 0.098 Conc. units: mg/Kg Blank ID PB (mg/Kg) Analyte 804

Conc. units: mg/Kg	s: mg/Kg			Associated Samples: 15-19
Analyte	Blank ID	Blank ID Maximum	Blank	Sample Identification
	PB (mg/Kg)	ICB/CCB (mg/L)	ICB/CCB Action Limit (mg/L)	No Qualifiers
ō		0.075		
Conc. units: mg/Kg	s: mg/Kg			Associated Samples: 15-20
Analyte		Blank ID Maximum	Blank	Sample Identification
		acc/aci	TCB/CCB Action 1 imit	

Analyte	Blank ID	Blank ID Maximum	Blank	Sample Identification
	PB (mg/Kg)	ICB/CCB (mg/L)	Ac	No Qualifiers
SO4		0.095		
Conc. units: mg/Kg	»: ma/Kc			Associated Samples: 10
Analyte	Blank ID	H	Blank	Sample Identification
	PB	ICB/CCB (mg/L)	ICB/CCB Action Limit (mg/L)	No Qualifiers

0.157

SO4

(mg/Kg)

LDC #: 22285B6

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET Field Blanks

Page:

Were field blanks identified in this SDG? METHOD: Inorganics, Method See Cover Y N N/A

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

Blank units: mg/L Associated sample units: mg/Kg Sampling date: 10/22/09 Soil factor applied 10X exce

Associated Samples:_ Sampling date: 10/22/09 Soil factor applied 10X except TOC 1X Field blank type: (circle one) Field Blank / Rinsate / Other EB

Reason Code: be

2-10

Analyte	Blank ID					Sample I	Sample Identification				
	τ-	Action	2	က	4	5	9	7	8	G	10
Total alkalinity	0.5										
Bicarbonate alkalinity	0.5										
Ammonia as N	0.012										
TOC (average)	0.2					210 / 300					230 / 290
C	9.										
Nitrate as N	0.76	9/	8.35 J+	5.31 J+	16.7 J+	1.89 J+	13.8 J+	3.67 J+	3.51 J+	24.0 J+	3.08 J+
pH (pH Units)	5.03										
Total Phosphorus	0.006										
Sulfate	1.3										
Surfactants	0.052	5.2	0.9 / 2.0		1.3 / 2.6		1.4 / 2.1				

LDC #: 22285B6

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET

Field Blanks

Reviewer: 2nd Reviewer:

METHOD: Inorganics, Method See Cover

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

Were target analytes detected in the field blanks?

Blank units: mg/L Associated sample units: mg/Kg Sampling date: 8/28/09 Soil factor applied 10X exce

Associated Samples: All Soil Sampling date: 8/28/09 Soil factor applied 10X except TOC 1X Field blank type: (circle one) Field Blank) Rinsate / Other: FB

Reason Code: bf

3.80 J+ 24 <u>1.</u> 4 23 1.66 J+ 22 3.1 + 20 3.66 J+ 9 3.29 J+ 8 2.27 J+ 17 8.64 J+ 16 200 / 290 3.67 J+ 5 0.78 J+ 4 Sample Identification 1.04 1.04 5 1.06 դ 7 1.35 J+ Ξ 3.08 J+ 230 / 290 9 24.0 J+ 6 3.51 J+ ω 3.67 J+ / 13.8 7+ ဖွ 210 / 300 1.89 + 2 16.7 J+ 4 5.31 J+ ო 8.35 J+ 2 Action Level 89 FB082809-SO (SDG# R0904894) Blank ID 0.008 0.033 5.88 6. 0.68 6. 0.2 4. Total ~ Ammonia as N pH (pH Units) Total alkalinity TOC (average) Bicarbonate Nitrate as N Analyte Sulfate alkalinity ರ

LDC #: 2228506 SDG #: 542 COUPL

VALIDATION FINDINGS WORKSHEET Matrix Spike Analysis

Page: Reviewer:__ 2nd Reviewer:

METHOD: Inorganics, Method See COUL

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

N N/A Was a matrix spike analyzed for each matrix in this SDG?

N NA NA NA

Were matrix spike percent recoveries (%R) within the control limits o(75-125/85-115% for Method 300.0)? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

LEVEL IV ONLY:

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

*	Matrix Spike ID	Matrix	trix Analyte	/ %R	Associated Samples	113
	78	1.8	AIK TONGI &B	iaito. 10	A11 So, 1	5-10J/4 (m)
			N-K-V			7
			ت	229		1+0e+14
			Noscu			
	,		₽QC		>	7
S S S	Comments:					

LDC#.7778586 SDG#: SEC CORU

VALIDATION FINDINDS WORKSHEET Surrogate Recovery

Page: Lof Reviewer: Q² 2nd Reviewer: L

METHOD: Chlorate (EPA 300.1)

Are surrogates required by the method? Yes or No

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

Were surrogates spiked into all samples and blanks?
Did all surrogate recoveries (%R) meet the QC limits? Y(N) N/A

*	Date	Lab ID/Reference	Column	Surrogate Compound	%R (Limits)	Associated Samples	Qualifications
		C103		PCA	(511-06) 88	2 A	T-105/4 (S)
)	7	
					() 68	5	
					() L8	9	
					() 84	8	
					() 98	6	
					() 68	16	
					()	91	
					75 ()	716	
					30 %	81	
					(1) 88	61	>
					,		
					()		
					()		
					()		
					()		
					•		
					(
					()		
					()		
					()		
					(
	Letter Designation		Surrogate Compound	Recov	Recovery QC Limits (Soil)	Recovery QC Limits (Water)	Comments
	A	Dic	cetate				
	ю						

LDC#: <u>22285B6</u> SDG#: <u>See Cover</u>

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page: of Reviewer: 2nd Reviewer:

Inorganics, Method See Cover

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

	Concentrat	on (mg/Kg)				
Analyte	12	13	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Total Alkalinity	724	764	5			
Bicarbonate Alkalinity	687	707	3			
Carbonate Alkalinity	37	57		20	(≤22)	
Chloride	4.8	4.8	0			
Nitrate as N	1.06	1.04		0.02	(≤0.55)	
pH (pH Units)	9.47	9.48	0			
Sulfate	108	103	5			
тос	400	1530		1130	(≤300)	Jdet/A (fd)
Total Phosphorus	863	842	2			
Chlorate (ug/Kg)	318	378		60	(≤230)	
Perchlorate (ug/Kg)	2080	2030	2			

V:\FIELD DUPLICATES\FD_inorganic\22285B6.wpd

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

October 28, 2009

LDC Report Date:

January 11, 2010

Matrix:

Soil

Parameters:

Wet Chemistry

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906191

Sample Identification

RSAS8-0.5B

RSAS8-10B

RSAS8-25B

RSAS8-35B

RSAS8-35BMS

RSAS8-35BMSD

RSAS8-35BDUP

Introduction

This data review covers 7 soil samples listed on the cover sheet. The analyses were per Standard Method 2320B for Alkalinity, EPA Method 350.1 for Ammonia as Nitrogen, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 300.1 for Chlorate, EPA SW 846 Method 9012A for Cyanide, EPA SW 846 Method 7199 for Hexavalent Chromium, EPA Method 353.2 for Nitrite as Nitrogen, EPA SW 846 Method 9045D for pH, Standard Method 5540C for Surfactants, EPA Method 314.0 for Perchlorate, EPA Method 365.1 for Total Phosphorus, and Lloyd/Khan Method for Total Organic Carbon.

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 Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section X.

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. Calibration

a. Initial Calibration

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

b. Calibration Verification

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

III. Blanks

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

Method Blank ID	Analyte	Concentration	Associated Samples
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate Chloride	10 mg/Kg 10 mg/Kg 1.1 mg/Kg	All samples in SDG R0906191
ICB/CCB	Chloride Total organic carbon	0.103 mg/L 116.0 mg/Kg	All samples in SDG R0906191

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	Anaiyte	Reported Concentration	Modified Final Concentration
RSAS8-35B	Total organic carbon	170 mg/Kg	290U mg/Kg

Sample FB082809-SO (from SDG R0904894) was identified as a field blank. No contaminant concentrations were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
FB082809-SO	8/28/09	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Total organic carbon Chloride Nitrate as N pH Total phosphorus Sulfate	1.9 mg/L 1.9 mg/L 0.033 mg/L 0.2 mg/L 1.2 mg/L 0.68 mg/L 5.88 units 0.008 mg/L 1.4 mg/L	All samples in SDG R0906191

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	Analyte	Reported Concentration	Modified Final Concentration
RSAS8-0.5B	Nitrate as N	3.38 mg/Kg	3.38J+ mg/Kg
RSAS8-10B	Nitrate as N	1.85 mg/Kg	1.85J+ mg/Kg
RSAS8-25B	Nitrate as N	3.51 mg/Kg	3.51J+ mg/Kg
RSAS8-35B	Total organic carbon Nitrate as N	170 mg/Kg 5.18 mg/Kg	290U mg/Kg 5.18J+ mg/Kg

IV. Matrix Spike/Matrix Spike Duplicates

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

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
RSAS8-35BMS (All samples in SDG R0906191)	Chloride	58 (75-125)	-	-	J- (all detects) UJ (all non-detects)	Α

V. Duplicates

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

VI. Laboratory Control Samples

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

VII. Surrogate Spikes

Surrogates were added to all samples and blanks as required by method 300.1. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Analyte	Flag	A or P
RSAS8-0.5B	Dichloroacetate	86 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	A
RSAS8-25B	Dichloroacetate	84 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	A

VIII. Sample Result Verification and Project Quantitation Limit

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0906191	All analytes reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

IX. Overall Assessment

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

X. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R0906191

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0906191	RSAS8-0.5B RSAS8-10B RSAS8-25B RSAS8-35B	Chloride	J- (all detects) UJ (all non-detects)	А	Matrix spike analysis (%R) (m)
R0906191	RSAS8-0.5B RSAS8-25B	Chlorate	J- (all detects) UJ (all non-detects)	A	Surrogate spikes (%R) (s)
R0906191	RSAS8-0.5B RSAS8-10B RSAS8-25B RSAS8-35B	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R0906191

SDG	Sample	Analyte	Modified Final Concentration					
R0906191	RSAS8-35B	Total organic carbon	290U mg/Kg	A or P	Code bl			
F								

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R0906191

SDG	Sample	Analyte	Modified Final Concentration	A or P	
R0906191	RSAS8-0.5B	Nitrate as N		AOFP	Code
		I valuate as IV	3.38J+ mg/Kg	A	bf
R0906191	RSAS8-10B	Nitroto as N			
		Nitrate as N	1.85J+ mg/Kg	А	bf
R0906191	RSAS8-25B	All:			
		Nitrate as N	3.51J+ mg/Kg	А	bf
R0906191	RSAS8-35B	Total			
	300	Total organic carbon Nitrate as N	290U mg/Kg 5.18J+ mg/Kg	Α	bf

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #: 22285C6 SDG #: R0906191

Stage 2B

Laboratory: Columbia Analytical Services

Reviewer:_ 2nd Reviewer:

METHOD: (Analyte) Alkalinity (SM2320B), Ammonia-N (EPA Method 350.1), Bromide, Chloride, Nitrate-N, Sulfate (EPA SW846 Method 9056), Chlorate (EPA Method 300.1), Cyanide (EPA SW846 Method 9012A), Hexavalent Chromium (EPA SW846 Method 7199), Nitrite-N (EPA Method 353.2), pH (EPA SW846 Method 9040B/9045D), Surfactants (SM5540C), Perchlorate (EPA Method 314.0), Total Phosphorus (EPA Method 365.1), TOC (Lloyd/Kahn + EPA SW846 Method 9060), 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: 10/28/09
lla.	Initial calibration	A	
lib.	Calibration verification	A	
III.	Blanks	Sw	
IV	Surrogate Spikes	SW	
٧	Matrix Spike/Matrix Spike Duplicates	SW	ms/D
VI.	Duplicates	A	D.P.
VII.	Laboratory control samples	A	LCS/D
VIII.	Sample result verification	N	
IX.	Overall assessment of data	A	
X.	Field duplicates	\mathcal{N}	
XI	Field blanks	<u> </u>	FB = FB082809-50 (ROGO18914)

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate FB = Field blank D = Duplicate

TB = Trip blank EB = Equipment blank

Validated Samples: 1

	<u> </u>					
1	RSAS8-0.5B	11	RBS	21	31	
2	RSAS8-10B	12		22	32	
3	RSAS8-25B	13		23	33	
4	RSAS8-35B	14		24	34	
5	RSAS8-35BMS	15		25	35	
6	RSAS8-35BMSD	16		26	36	
7	RSAS8-35BDUP	17		27	37	
8		18		28	38	
9		19		29	39	
10		20		30	40	

Notes:		

LDC #: 22285 C 6 SDG #: See Cover

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page: of Reviewer: 2nd reviewer:

All circled methods are applicable to each sample.

0	Matrix	Parameter
Sample ID	SO!	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
1-5	3011	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
QC: 5		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁵⁺ T-P MBA9 TDS TSS Cond ClO ₃ ClO ₄
1 ,		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
<i>b</i>		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
W 1		
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄

Comments:	

LDC #: 22285C6

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET

Blanks

Reviewer. C

Page:

Resort: (61)

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

METHOD: Inorganics, Method See Cover

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

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

ntification					
Sample Ide					
	4				170 / 290
Blank	Action Limit				
Maximum	(mg/L)			0.103	116.0 ma/Kg
Blank ID	PB (mg/Kg)	10	10	-	
Analyte		Alk., Total	Alk., Bicarb.	ō	тос
	Analyte Blank ID Maximum Blank Sample Identification	Blank ID Maximum Blank PB (mg/L) 4	Blank ID Maximum Blank CB/CCB Action Limit 4	Blank ID (mg/Lg) Maximum (mg/Lg) Blank (mg/L) 4 4 10	Blank ID (mg/Lg) Maximum (mg/Lg) Blank (mg/Lg) 4 4 10

LDC #: 22285C6

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET

Reviewer. (2nd Reviewer. __

Page: /

Field Blanks

METHOD: Inorganics, Method See Cover

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

Were target analytes detected in the field blanks?

Blank units: mg/L___Associated sample units: mg/Kg_____Soilर्द्वह्र(or applied__10X exce

Sampling date: 8/28/09 Spikfactor applied 10X except TOC 1X Field blank type: (circle one) Field Blank 1 Rinsate / Other FB

₹ Associated Samples:_

Reason Code: bf

Analyte Blank ID	FB082809-SO (SDG# R0904894)	Total alkalinity 1.9	Bicarbonate alkalinity 1.9	Ammonia as N 0.033	TOC (average) 0.2	CI 1.2	Nitrate as N 0.68	pH (pH Units) 5.88	Si	
ID QI				53			8	80	8	1
	Action Level						89			
	-					apparamental and a second and a	3.38 J+			
	2						1.85 J+			
	3						3.51 J+			
Sample	4				170 / 290		5.18 J+			
Sample Identification										

LDC #: 2228C6 SDG #: See coel

VALIDATION FINDINGS WORKSHEET Matrix Spike Analysis

Reviewer: 2nd Reviewer:

METHOD: Inorganics, Method Sea COVE)

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

N/A Was a matrix spike analyzed for each matrix in this SDG?

X/W N/A N NA

Were matrix spike percent recoveries (%R) within the control limits ot 75-125/85-115% for Method 300.0)? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

LEVEL TH ONLY:

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

				9	Accordated Samples	Qualifications
*	Matrix Spike ID	Matrix	Analyte		= 4	T-105/4 (m)
	ረ	100	ار			
Co	Comments:					
					, , , , , , , , , , , , , , , , , , ,	

LDC #: 2228506 SDG #: SPRCARN

VALIDATION FINDINDS WORKSHEET Surrogate Recovery

2nd Reviewer: ____

Page: Lof. Reviewer: CA

METHOD: Chlorate (EPA 300.1)

Are surrogates required by the method? Yes — or No____.
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Were surrogates spiked into all samples and blanks? N N/A

Did all surrogate recoveries (%R) meet the QC limits?

#	# Date	Lab ID/Reference		Column	Surrogate Compound	%R (I	Associated Samples	Qualifications
		5010			8CA	86 (90-115) [J-10514(S)
						7) hs) 3	_)
)		
)	(
)	(
)	, ,	
)	(
)	(
)	(
)	(
)	(
)	(
)	(
)	(
						•		
)	(
)	(
)	(
)		
)		
)		
						`		
))	
	Letter Designation		Surrogate Compound	punodu	Recove	Recovery QC Limits (Soil)	Recovery QC Limits (Water)	Comments
	A	Dic	Dichloroacetate					
	60							

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

November 2, 2009

LDC Report Date:

January 11, 2010

Matrix:

Water

Parameters:

Wet Chemistry

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906270

Sample Identification

M-147B

M-147009B

EB110209-GWA3

EB110209-GWA3MS

EB110209-GWA3MSD

EB110209-GWA3DUP

Introduction

This data review covers 6 water samples listed on the cover sheet. The analyses were per Standard Method 2320B for Alkalinity, EPA Method 350.1 for Ammonia as Nitrogen, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 300.1 for Chlorate, EPA Method 120.1 for Conductivity, EPA SW 846 Method 9012A for Cyanide, EPA Method 218.6 for Dissolved Hexavalent Chromium, EPA Method 353.2 for Nitrite as Nitrogen, EPA SW 846 Method 9040B for pH, Standard Method 5540C for Surfactants, EPA Method 314.0 for Perchlorate, EPA Method 365.1 for Total Phosphorus, EPA SW 846 Method 9060 for Total Organic Carbon, Standard Method 2540C for Total Dissolved Solids, and Standard Method 2540D for Total Suspended Solids.

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 Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section X.

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	Analyte	Total Time From Sample Collection Until Analysis	Required Holding Time From Sample Collection Until Analysis	Flag	A or P
EB110209-GWA3	Hexavalent chromium	30 hours	24 hours	J- (all detects) UJ (all non-detects)	P.

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

II. Calibration

a. Initial Calibration

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

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
11/25/09	CCV (19:49)	Perchlorate	129 (85-115)	All samples in SDG R0906270	J+ (all detects)	Р

III. Blanks

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

Method Blank ID	Analyte	Concentration	Associated Samples
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate Chloride Total dissolved solids	0.8 mg/L 0.8 mg/L 0.09 mg/L 7 mg/L	All samples in SDG R0906270
ICB/CCB	Alkalinity, total Alkalinity, bicarbonate	0.8 mg/L 0.8 mg/L	All samples in SDG R0906270

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Chloride Sulfate	0.085 mg/L 0.193 mg/L	EB110209-GWA3

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	Analyte	Reported Concentration	Modified Final Concentration
EB110209-GWA3	Alkalinity, total	1.2 mg/L	2.0U mg/L
	Alkalinity, bicarbonate	1.2 mg/L	2.0U mg/L
	Chloride	0.08 mg/L	0.20U mg/L
	Total dissolved solids	9 mg/L	10U mg/L
	Sulfate	0.11 mg/L	0.20U mg/L

Sample EB110209-GWA3 was identified as an equipment blank. No contaminant concentrations were found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
EB110209-GWA3	11/2/09	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Chloride Conductivity pH Total dissolved solids Sulfate Surfactants	1.2 mg/L 1.2 mg/L 0.206 mg/L 0.08 mg/L 1.28 umhos/cm 7.20 units 9 mg/L 0.11 mg/L 0.008 mg/L	M-147B M-147009B

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	Analyte	Reported Concentration	Modified Final Concentration
M-147B	Ammonia as N	0.022 mg/L	0.050U mg/L
	Surfactants	0.010 mg/L	0.020U mg/L
M-147009B	Ammonia as N	0.031 mg/L	0.050U mg/L
	Surfactants	0.009 mg/L	0.020U mg/L

Sample PB102309-A3 (from SDG R0906095) was identified as a pump blank. No contaminant concentrations were found in this blank with the following exceptions:

Pump Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
PB102309-A3	10/23/09	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Total organic carbon Chloride Conductivity Nitrate as N pH Total dissolved solids Sulfate Chlorate	1.1 mg/L 1.1 mg/L 2.60 mg/L 0.2 mg/L 0.9 mg/L 3.83 umhos/cm 0.69 mg/L 5.79 units 9 mg/L 1.5 mg/L 23 ug/L	M-147B M-147009B

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	Analyte	Reported Concentration	Modified Final Concentration
M-147B	Ammonia as N	0.022 mg/L	0.050U mg/L
M-147009B	Ammonia as N	0.031 mg/L	0.050U mg/L

Sample FiltB092509-A2 (from SDG R0905462) was identified as a filter blank. No contaminant concentrations were found in this blank.

IV. Matrix Spike/Matrix Spike Duplicates

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

V. Duplicates

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

VI. Laboratory Control Samples

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

LCS ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
LCS	Perchlorate	75 (85-115)	All samples in SDG R0906270	J- (all detects) UJ (all non-detects)	Р

VII. Surrogate Spikes

Surrogates were added to all samples and blanks as required by method 300.1. All surrogate recoveries (%R) were within QC limits.

VIII. Sample Result Verification and Project Quantitation Limit

All analytes reported below the PQL were qualified as follows:

_			
Sample	Finding	Flag	A or P
All samples in SDG R0906270	All analytes reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

IX. Overall Assessment

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

X. Field Duplicates

Samples M-147B and M-147009B were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Conce	entration				
Analyte	M-147B	M-147009B	RPD (Limits)	Difference (Limits)	Flags	A or P
Ammonia as N	0.022 mg/Kg	0.031 mg/L	-	0.009 (≤0.050)	-	
Alkalinity, total	106 mg/L	108 mg/L	2 (≤30)	-	_	-
Alkalinity, bicarbonate	106 mg/L	108 mg/L	2 (≤30)	-	-	_
Bromide	1.4 mg/L	1.4 mg/L	-	0 (≤1.0)	-	-
Chloride	583 mg/L	572 mg/L	2 (≤30)	-	-	-
Conductivity	5170 umhos/cm	5150 umhos/cm	0 (≤30)	-	-	-
Hexavalent chromium	0.142 mg/L	0.139 mg/L	2 (≤30)	-	-	-
Nitrate as N	12.4 mg/L	12.3 mg/L	1 (≤30)	-	-	-
Nitrite as N	0.007U mg/L	0.008 mg/L	-	0.001 (≤0.010)	-	-

	Concer	ntration	222	D.//		
Analyte	M-147B	M-147009B	RPD (Limits)	Difference (Limits)	Flags	A or P
рН	7.41 units	7.48 units	1 (≤30)	-	-	-
Sulfate	2280 mg/L	2260 mg/L	1 (≤30)	-	-	-
Surfactants	0.010 mg/L	0.009 mg/L	-	0.001 (≤0.020)	-	-
Total dissolved solids	4480 mg/L	4560 mg/L	2 (≤30)	-	-	-
Total organic carbon	1.3 mg/L	1.3 mg/L	-	0 (≤1.0)	-	-
Total phosphorus	0.020 mg/L	0.019 mg/L	-	0.001 (≤0.050)	-	-
Chlorate	4530 ug/L	4590 ug/L	1 (≤30)	-	-	-
Perchlorate	35300 ug/L	35900 ug/L	2 (≤30)	-	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R0906270

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0906270	EB110209-GWA3	Hexavalent chromium	J- (all detects) UJ (all non-detects)	Р	Technical holding times (h)
R0906270	M-147B M-147009B EB110209-GWA3	Perchlorate	J+ (all detects)	Р	Calibration (CCV %R) (c)
R0906270	M-147B M-147009B EB110209-GWA3	Perchlorate	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0906270	M-147B M-147009B EB110209-GWA3	All analytes reported below the PQL.	J (all detects)	Α	Sample result verification (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R0906270

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906270	EB110209-GWA3	Alkalinity, total Alkalinity, bicarbonate Chloride Total dissolved solids Sulfate	2.0U mg/L 2.0U mg/L 0.20U mg/L 10U mg/L 0.20U mg/L	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Equipment Blank Data Qualification Summary - SDG R0906270

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906270	M-147B	Ammonia as N Surfactants	0.050U mg/L 0.020U mg/L	А	be
R0906270	M-147009B	Ammonia as N Surfactants	0.050U mg/L 0.020U mg/L	А	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Pump Blank Data Qualification Summary - SDG R0906270

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906270	M-147B	Ammonia as N	0.050U mg/L	А	bp
R0906270	M-147009B	Ammonia as N	0.050U mg/L	А	bp

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Filter Blank Data Qualification Summary - SDG R0906270

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #: 22285D6

Stage 2B

Page: 1 of Reviewer: 4 2nd Reviewer:

SDG #: R0906270 Laboratory: Columbia Analytical Services

METHOD: (Analyte) Alkalinity (SM2320B), Ammonia-N (EPA Method 350.1), Bromide, Chloride, Nitrate-N, Sulfate (EPA SW846 Method 9056), Chlorate (EPA Method 300.1), Conductivity (EPA Method 120.1), Cyanide (EPA SW846 Method 9012A), Dissolved Hexavalent Chromium (EPA Method 218.6), Nitrite-N (EPA Method 353.2), pH (EPA SW846 Method 9040B/0045D), Surfactants (SM5540C), Perchlorate (EPA Method 314.0), Total Phosphorus (EPA Method 365.1), TOC (Heyd/Kahn-+EPA SW846 Method 9060), TDS (SM2540C), TSS (SM2540D)

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

***	Validation Area		Comments
I.	Technical holding times	SW	Sampling dates: 1112409
lla.	Initial calibration	A	
lib.	Calibration verification	5W_	
III.	Blanks	SW	
IV	Surrogate Spikes	A	
V	Matrix Spike/Matrix Spike Duplicates	A	ms/0
VI.	Duplicates	A,	OP
VII.	Laboratory control samples	SW	LCS
VIII.	Sample result verification	N	
IX.	Overall assessment of data	A	
X.	Field duplicates	SW	(C1, Z)
ΧL	Field blanks	SW	EB=3, FilterBlank = FiltB092509-AZ (R09054)

Note:

A = Acceptable

N = Not provided/applicable SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank EB = Equipment blank

Validated Samples:

	water				
1	M-147B	11 PBW	21	31	
2	M-147009B	12	22	32	
3	EB110209-GWA3	13	23	33	
4	EB110209-GWA3MS	14	24	34	
5	EB110209-GWA3MSD	15	25	35	
6	EB110209-GWA3DUP	16	26	36	
7		17	27	37	
8		18	28	38	
9		19	29	39	. ,
10		20	30	40	

Notes:	

LDC #: 22285 **Q** 6 SDG #: See Cover

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page: ____ of ___ Reviewer: _____ 2nd reviewer: _____

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1-3	Water	(Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
QC:4-6		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond CIO3 CIO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond CIO3 CIO4
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond CIO3 CIO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄

Comments:	

VALIDATION FINDINGS WORKSHEET Technical Holding Times

2nd reviewer:

All circled dates have exceeded the technical holding time.

| Y N N/A | Were all samples preserved as applicable to each method?
| Y N N/A | Were all cooler temperatures within validation criteria?

Y N N/A Were all	cooler temperat		- And - Company to the second of the second					ĺ
Method:	·	CERT 186						į
Parameters:		C/6+						
Technical holding ti	me:	24hss						
Sample ID	Sampling date	Analysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier	
3	11/2/09	1113109 18:30	(30hg)				J-100/P	(1
				•				
			·					
				 				
	·							
		†						
	·							
		1						1
	.1	<u> </u>		<u> </u>		_1	وروب سيويلي	2

VALIDATION FINDINGS WORKSHEET Calibration

Page: Reviewer:_ 2nd Reviewer:

METHOD: Inorganics, EPA Method Sec COOL

Were all instruments calibrated daily, each set-up time, and were the proper number of standards used? Were all initial and continuing calibration verification percent recoveries (%R) within the control limits of 90-110%? Are all correlation coefficients ≥0.995?

NA OT AN MA

TEVEL IND ONLY:

V N/N/

Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recaluculation Worksheet for recalulations. Was a balance check conducted prior to the TDS analysis.?

Was the titrant normality checked? N/N/A

Qualifications	15+06+1P(c)												
	Associated Samples												
	%R %R	(611-61) 1-21											
	Analyte												
	Calibration ID	11125/08/CCV FT-49PM)	(19:41)										
N N L	# Date	╂╌											Comments:

LDC #: 22285D6

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET Blanks

2nd Reviewer: Reviewer:_

METHOD: Inorganics, Method See Cover

Reason Code:bl

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Y N N/A. Were all samples associated with a given method blank?

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

Conc. units: mg/L	s: mg/L			Associated Samples: All
Analyte	Blank ID	Maximum	Blank	Sample Identification
	PB (mg/L)	ICB/CCB (mg/L)	Action Limit	3
Alk., Total	0.8	0.8		1.2 / 2.0
Alk., Bicarb.	9.0	0.8		1.2 / 2.0
ō	0.09			0.08 / 0.20
TDS	7			9/10
Conc. units: mg/l	s: mg/L			Associated Samples: 3
Analyte	Blank ID	Maximum	Blank	Sample Identification
	PB (mg/L)	ICB/CCB (mg/L)	Action Limit	33 State of the st
ō		0.085		See PB
SO4		0.193		0.11/0.20

LDC #: 22285D6

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET

Field Blanks

Page:

METHOD: Inorganics, Method See Cover

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

N N/A

Sampling date: 11/2/09 Soil factor applied NA Field blank type: (circle one) Field Blank / Rinsate / Other Equipment Blank Blank units: mg/L Associated sample units: mg/L Sampling date: 11/2/09 Soil factor applied NA

Reason Code: be

Associated Samples:

cation											
Sample Identification											
The state of the s	2			0.031 / 0.050						0.009 / 0.020	
	—			0.022 / 0.050						0.010 / 0.020	
	Action Level			2.06		12.8					
Blank ID		1.2	1.2	0.206	0.08	1.28	7.20	, o	0.11	0.008	
Analyte		Total Alkalinity	Bicarbonate Alkalinity	Ammonia as N	Chloride	Conductivity (umhos/cm)	Octionary (united out)	TDS	804	Surfactants	

LDC #: 22285D6

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET Field Blanks

Reviewer: C

METHOD: Inorganics, Method See Cover

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

Were target analytes detected in the field blanks?

Blank units: mg/L Associated sample units: mg/L Sampling date: 10/23/09 Soil factor applied NA Field blank type: (circle one) Field Blank / Rinsate / Other: Pump Blank

Associated Samples:

Reason Code: bp

			1					
Analyte	Blank ID				Sample Identification	fication		
	PB102309-A3 (SDG#R0906095)	Action Level	~	2		·		
Total Alkalinity	7-							
Bicarbonate Alkalinity	1.1							
Ammonia as N	2.60	26.0	0.022 / 0.050	0.031 / 0.050				
TOC (average)	0.2							
Chloride	6.0							
(ma) sodami) vijivijanijani	3.83	38.3						
Colladativity (allitics/city)	0000	200				-		
Nitrate as Nitrogen	0.00	o o						
pH (pH Units)	5.79							
TDS	6							
SO4	1.5							
Chlorate (uq/L)	23	230						

158772 # DOT SDG #: 5-66

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Reviewer: 2nd Reviewer:

METHOD: Inorganics, Method Selcorel

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

N/A

N/A

Was a laboratory control sample (LCS) analyzed for each matrix in this SDG?

Y ON N/A

Were all LCS percent recoveries (%R) within the control limits of 80-120% (85-115% for Method LEVEL IV ONLY:

Was a laboratory control sample (LCS) analyzed for each matrix in this SDG? Were all LCS percent recoveries (%R) within the control limits of 80-720% (85-115% for Method 300.0)?

Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations. Y N (N/A)

tions	(4)														
Qualifications	5-105/6														
Associated Samples	All													The state of the s	
	75 (88-115)														
Analyte	CD4														
Matrix	Matrice 1														
	**************************************	}												Comments:	

LDC#: <u>22285D6</u> SDG#: <u>See Cover</u>

VALIDATION FINDINGS WORKSHEET Field Duplicates

Inorganics, Method See Cover

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

Analyte	Concentration (mg/L)					Qualification
	1	2	RPD (≤30)	Difference	Limits	(Parent only)
Ammonia as N	0.022	0.031		0.009	(≤0.050)	
Total Alkalinity	106	108	2			
Bicarbonate Alkalinity	106	108	2			
Bromide	1.4	1.4		0	(≤1.0)	
Chloride	583	572	2			
Conductivity (umhos/cm)	5170	5150	0			
Dissolved Hexavalent Chromium	0.142	0.139	2			
Nitrate as N	12.4	12.3	1			
Nitrite as N	0.007U	0.008		0.001	(≤0.010)	
pH (pH Units)	7.41	7.48	1			
Sulfate	2280	2260	1			
Surfactants	0.010	0.009		0.001	(≤0.020)	
TDS	4480	4560	2			
TOC, Average	1.3	1.3		0	(≤1.0)	
Total Phosphorus	0.020	0.019		0.001	(≤0.050)	
Chiorate (ug/L)	4530	4590	1			
Perchlorate (ug/L)	35300	35900	2			

V:\FIELD DUPLICATES\FD_inorganic\22285D6.wpd

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

November 5, 2009

LDC Report Date:

January 13, 2010

Matrix:

Soil

Parameters:

Wet Chemistry

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906403

Sample Identification

SA77-0.5B SA77-10B

SA77009-10B

Introduction

This data review covers 3 soil samples listed on the cover sheet. The analyses were per Standard Method 2320B for Alkalinity, EPA Method 350.1 for Ammonia as Nitrogen, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 300.1 for Chlorate, EPA SW 846 Method 9012A for Cyanide, EPA SW 846 Method 7199 for Hexavalent Chromium, EPA Method 353.2 for Nitrite as Nitrogen, EPA SW 846 Method 9045D for pH, Standard Method 5540C for Surfactants, EPA Method 314.0 for Perchlorate, EPA Method 365.1 for Total Phosphorus, and Lloyd/Khan Method for Total Organic Carbon.

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 Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section X.

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. Calibration

a. Initial Calibration

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

b. Calibration Verification

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

III. Blanks

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

Method Blank ID	Analyte	Concentration	Associated Samples
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate Chloride Total phosphorus	10 mg/Kg 10 mg/Kg 1.1 mg/Kg 1.0 mg/Kg	All samples in SDG R0906403
ICB/CCB	Total organic carbon	116.0 mg/Kg	All samples in SDG R0906403
ICB/CCB	Chloride	0.103 mg/L	SA77-0.5B
ICB/CCB	Sulfate	0.098 mg/L	SA77-10B SA77009-10B

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

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA77-10B	Total organic carbon	290 mg/Kg	290U mg/Kg

Sample FB082809-SO (from SDG R0904894) was identified as a field blank. No contaminant concentrations were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
FB082809-SO	8/28/09	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Total organic carbon Chloride Nitrate as N pH Total phosphorus Sulfate	1.9 mg/L 1.9 mg/L 0.033 mg/L 0.2 mg/L 1.2 mg/L 0.68 mg/L 5.88 units 0.008 mg/L 1.4 mg/L	All samples in SDG R0906403

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	Analyte	Reported Concentration	Modified Final Concentration
SA77-0.5B	Nitrate as N	1.11 mg/Kg	1.11J+ mg/Kg
SA77-10B	Total organic carbon Nitrate as N	290 mg/Kg 1.53 mg/Kg	290U mg/Kg 1.53J+ mg/Kg
SA77009-10B	Nitrate as N	1.51 mg/Kg	1.51J+ mg/Kg

IV. 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.

V. Duplicates

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

VI. Laboratory Control Samples

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

VII. Surrogate Spikes

Surrogates were added to all samples and blanks as required by method 300.1. All surrogate recoveries (%R) were within QC limits.

VIII. Sample Result Verification and Project Quantitation Limit

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0906403	All analytes reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

IX. Overall Assessment

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

X. Field Duplicates

Samples SA77-10B and SA77009-10B were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Concer	ntration	RPD	Difference		
Analyte	SA77-10B	SA77009-10B	(Limits)	(Limits)	Flags	A or P
Alkalinity, total	268 mg/Kg	376 mg/Kg	34 (≤50)	-	.	-
Alkalinity, bicarbonate	255 mg/Kg	358 mg/Kg	34 (≤50)	-	-	<u>-</u>
Alkalinity, carbonate	13 mg/Kg	18 mg/Kg	-	5 (≤21)	-	-
Chloride	23.3 mg/Kg	21.2 mg/Kg	9 (≤50)	-	-	_
Nitrate as N	1.53 mg/Kg	1.51 mg/Kg	-	0.02 (≤0.54)	-	-
рН	8.75 units	8.77 units	0 (≤50)	-	-	-
Sulfate	187 mg/Kg	185 mg/Kg	1 (≤50)	+	-	-
Total organic carbon	290 mg/Kg	310 mg/Kg	-	20 (≤290)	-	-
Total phosphorus	907 mg/Kg	837 mg/Kg	8 (≤50)	-	-	-
Chlorate	842 ug/Kg	982 ug/Kg	-	140 (≤220)	-	-
Perchlorate	650 ug/Kg	604 ug/Kg	-	46 (≤540)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R0906403

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0906403	SA77-0.5B SA77-10B SA77009-10B	All analytes reported below the PQL.	J (all detects)	А	Sample result verification (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R0906403

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906403	SA77-10B	Total organic carbon	290U mg/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R0906403

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906403	SA77-0.5B	Nitrate as N	1.11J+ mg/Kg	. A	be
R0906403	SA77-10B	Total organic carbon Nitrate as N	290U mg/Kg 1.53J+ mg/Kg	А	be
R0906403	SA77009-10B	Nitrate as N	1.51J+ mg/Kg	А	be

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #: 22285E6 VALIDATION CO SDG #: R0906403

Stage 2B

Page: Of Pag

Laboratory: Columbia Analytical Services

METHOD: (Analyte) Alkalinity (SM2320B), Ammonia-N (EPA Method 350.1), Bromide, Chloride, Nitrate-N, Sulfate (EPA SW846 Method 9056), Chlorate (EPA Method 300.1), Cyanide (EPA SW846 Method 9012A), Hexavalent Čhromium (EPA SW846 Method 7199), Nitrite-N (EPA Method 353.2), pH (EPA SW846 Method 9040B), Surfactants (SM5540C), Perchlorate (EPA Method 314.0), Total Phosphorus (EPA Method 365.1), TOC (Lloyd/Kahn / EPA SW846 Method 9060), 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: 11/5/09
lla.	Initial calibration	A	
lib.	Calibration verification	A	
III.	Blanks	SW	
IV	Surrogate Spikes	A	
V	Matrix Spike/Matrix Spike Duplicates		client specified
VI.	Duplicates	N	<u></u>
VII.	Laboratory control samples	A	LCS/D
VIII.	Sample result verification	N	
IX.	Overall assessment of data	A	
X.	Field duplicates	SW	(A3)
ΧL	Field blanks	5w	FB= FB082809-SO (ROG048914)

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:

	<u> </u>					
1	SA77-0.5B	11	GBS .	21	31	
2	SA77-10B	12		22	32	
3	SA77009-10B	13		23	33	
4		14		24	34	
5		15		25	35	
6		16		26	36	
7		17		27	37	
8		18		28	38	
9		19		29	39	
10		20		30	40	

Notes:	

LDC #: 22285 6 SDG #: See Cover

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page: __of __ Reviewer: ____ 2nd reviewer: ____

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
	S	(Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS) TDS TSS Cond ClO ₃ ClO ₄
1-3	<u> </u>	
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄

Comments:	

LDC #: <u>22285E6</u> SDG #: <u>See Cover</u>

VALIDATION FINDINGS WORKSHEET Blanks

Page, of Reviewer. CR. 2nd Reviewer. LV.

METHOD: Inorganics, Method See Cover

Reason Code: bl

YNNA Were all samples associated with a given method blank?
YNNNA Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Conc. units:	: mg/Kg				Associated Samples: All	
Analyte	Blank ID	Maximum	Blank		Sample Identification	
	PB (ma/Ka)	ICB/CCB (mg/L)	Action Limit	2		
Alk., Total	10					
Alk., Bicarb.	1					
ō	1.1					
d-1	1.0					
100		116.0		290 / 290		
Conc. units:	s: mg/Kg	11			Associated Samples: 1	
Analyte	@	Maximum	Blank		Sample Identification	
	PB (mg/Kg)	ICB/CCB (mg/L)	Action Limit	No Qualifiers		
ō		0.103				
Conc. units:	s: mg/Kg				Associated Samples: 2, 3	
Analyte	Blank ID	Maximum	Blank		Sample Identification	
	PB (mg/Kg)	ICB/CCB (mg/L)	¥	No Qualifiers		
SO4		0.098				

LDC #: 22285E6

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET

Reviewer: OR 2nd Reviewer: ______

Page:__

Field Blanks

METHOD: Inorganics, Method See Cover

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

Were target analytes detected in the field blanks?

Blank units: mg/L Associated sample units: mg/Kg Sampling date: 8/28/09 Soil factor applied 10X exce

Associated Samples:_ Sampling date: 8/28/09 Soil factor applied 10X except TOC 1X Field blank type: (circle one) Field Blank / Rinsate / Other: FB

Reason Code: bf

A

Analyte	Blank ID		The state of the s			Sample	Sample Identification		
	0 69	Action		2	က				
Total alkalinity	1.9								
Bicarbonate alkalinity	6:1								
Ammonia as N	0.033								
TOC (average)	0.2			290 / 290					
l)	1.2								
Nitrate as N	0.68	89	1.11 J+	1.53 J+	1.51 J+				
pH (pH Units)	5.88								
Total Phosphorus	0.008								
Chillipto	7 7								

LDC#:_22285E6 SDG#:_See Cover_

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	of
Reviewer:_	CR
2nd Reviewer:_	

Inorganics, Method See Cover

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

	Concentrati	on (mg/Kg)				Qualification
Analyte	2	3	RPD (≤50)	Difference	Limits	(Parent only)
Total Alkalinity	268	376	34			
Bicarbonate Alkalinity	255	358	34			
Carbonate Alkalinity	13	18		5	(≤21)	
Chloride	23.3	21.2	9			
Nitrate as N	1.53	1.51		0.02	(≤0.54)	
pH (pH Units)	8.75	8.77	0			
Sulfate	187	185	1			
тос	290	310		20	(≤290)	
Total Phosphorus	907	837	8			
Chlorate (ug/Kg)	842	982		140	(≤220)	
Perchlorate (ug/Kg)	650	604		46	(≤540)	

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Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

November 11, 2009

LDC Report Date:

January 11, 2010

Matrix:

Water

Parameters:

Wet Chemistry

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906477

Sample Identification

M-122B

Introduction

This data review covers one water sample listed on the cover sheet. The analyses were per Standard Method 2320B for Alkalinity, EPA Method 350.1 for Ammonia as Nitrogen, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 300.1 for Chlorate, EPA Method 120.1 for Conductivity, EPA SW 846 Method 9012A for Cyanide, EPA Method 218.6 for Dissolved Hexavalent Chromium, EPA Method 353.2 for Nitrite as Nitrogen, EPA SW 846 Method 9040B for pH, Standard Method 5540C for Surfactants, EPA Method 314.0 for Perchlorate, EPA Method 365.1 for Total Phosphorus, EPA SW 846 Method 9060 for Total Organic Carbon, Standard Method 2540C for Total Dissolved Solids, and Standard Method 2540D for Total Suspended Solids.

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 Inorganic Data Review (October 2004) as there are no current guidelines for the method stated above.

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section X.

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. Calibration

a. Initial Calibration

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

b. Calibration Verification

Calibration verification frequency and analysis criteria were met for each method when applicable with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
11/25/09	CCV (19:49)	Perchlorate	129 (85-115)	All samples in SDG R0906477	J+ (all detects)	Р

III. Blanks

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

Method Blank ID	Analyte	Concentration	Associated Samples
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate	0.5 mg/L 0.5 mg/L	All samples in SDG R0906477
ICB/CCB	Alkalinity, total Alkalinity, bicarbonate	0.5 mg/L 0.5 mg/L	All samples in SDG R0906477

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

Sample PB102309-A3 (from SDG R0906095) was identified as a pump blank. No contaminant concentrations were found in this blank with the following exceptions:

Pump Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
PB102309-A3	10/23/09	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Total organic carbon Chloride Conductivity Nitrate as N pH Total dissolved solids Sulfate Chlorate	1.1 mg/L 1.1 mg/L 2.60 mg/L 0.2 mg/L 0.9 mg/L 3.83 umhos/cm 0.69 mg/L 5.79 units 9 mg/L 1.5 mg/L 23 ug/L	All samples in SDG R0906477

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	Analyte	Reported Concentration	Modified Final Concentration
M-122B	Ammonia as N	0.061 mg/L	0.061J+ mg/L

Sample FiltB092509-A2 (from SDG R0905462) was identified as a filter blank. No contaminant concentrations were found in this blank.

IV. Matrix Spike/Matrix Spike Duplicates

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

V. Duplicates

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

VI. Laboratory Control Samples

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

LCS ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
LCS	Perchlorate	75 (85-115)	All samples in SDG R0906477	J- (all detects) UJ (all non-detects)	Р

VII. Surrogate Spikes

Surrogates were added to all samples and blanks as required by method 300.1. All surrogate recoveries (%R) were within QC limits.

VIII. Sample Result Verification and Project Quantitation Limit

All analytes reported below the PQL were qualified as follows:

Sample Sample	Finding	Flag	A or P
All samples in SDG R0906477	All analytes reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

IX. Overall Assessment

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

X. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R0906477

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0906477	M-122B	Perchlorate	J+ (all detects)	Р	Calibration (CCV %R) (c
R0906477	M-122B	Perchlorate	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0906477	M-122B	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R0906477

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Pump Blank Data Qualification Summary - SDG R0906477

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906477	M-122B	Ammonia as N	0.061J+ mg/L	А	bp

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Filter Blank Data Qualification Summary - SDG R0906477

No Sample Data Qualified in this SDG

SDG Labo	#:22285F6 #:_R0906477 ratory:_Columbia Analytica	- al Ser	LIDATIO	N COMP S	PLETEN Stage 2B			Date: 1-6-1 Page: Lof) Reviewer: 2-2 2nd Reviewer: 4-2
SW8- 9012 9040	HOD: (Analyte) Alkalinity 46 Method 9056), Chlora A), Dissolved Hexavalent B /9045B), Surfactants (S	ate (E t Chro SM554	PA Methodomium (EPA 40C), Perch	l 300.1), C A Method nlorate (EP	Conductivit 218.6), N PA Method	ty (EPA Metho itrite-N (EPA M d 314.0), Total	od 120.1), Cyanio Method 353.2), p	de (EPA SW846 Method DH (EPA SW846 Method
The s	d/Kehn./ EPA SW846 Mesamples listed below were ation findings worksheets.	e revie					. Validation findir	ngs are noted in attached
	Validation	Area_					Comments	
I.	Technical holding times			A	Sampling c	lates: 11/11/	09	
lla.	Initial calibration			A				
lib.	Calibration verification			SW_	<u> </u>			
111.	Blanks			SW				
IV				A	_			
V	Matrix Spike/Matrix Spike D	uplicat	es	A	(ROCI	06270) r	75/D	
VI.	Duplicates			A	,	11 0	Dup	
VII.	Laboratory control samples			SW	LES			
VIII.				N				
IX.	•			A				
X.	Field duplicates			\v\				
XI				54	Filer	-Bhok = Fi	1EB09 2509	1-A2 (RO905462)
Punp Blank = 88107309 -A3 C R0906095) Note: A = Acceptable								
1	M-122B	11	PBI		21		31	
2		12	1		22		32	
3		13			23		33	
4		14			24		34	
5		15			25		35	
6		16		7	26		36	
7		17			27		37	
8		18			28		38	
9		19			29		39	
10		20			30		40	

Notes:

LDC #: 22285 F 6 SDG #: See Cover

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page	of
Reviewer:	CE
2nd reviewer:	

All circled methods are applicable to each sample.

Sample ID	Matrix	<u>Parameter</u>
	W	(Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO $_3$ NO $_2$ SO $_4$ NH $_3$ TOC CN Cr $^{6+}$ T-P MBAS TDS TSS Cond ClO $_3$ ClO $_4$
		Alk pH Br Cl NO $_3$ NO $_2$ SO $_4$ NH $_3$ TOC CN Cr $^{6+}$ T-P MBAS TDS TSS Cond ClO $_3$ ClO $_4$
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
<u> </u>	L	

Comments:		

LDC # 22285 F6 SDG #: SAR COR

VALIDATION FINDINGS WORKSHEET Calibration

Page: 2nd Reviewer:_ Reviewer:

METHOD: Inorganics, EPA Method See COLO

Were all instruments calibrated daily, each set-up time, and were the proper number of standards used? Were all initial and continuing calibration verification percent recoveries (%R) within the control limits of 90-110%? Alease see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(A) N/A

Are all correlation coefficients >0.995?

EVEL HAD ONLY: N N

Y/Z/Z

Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recaluculation Worksheet for recalulations. Was a balance check conducted prior to the TDS analysis.? Was the titrant normality checked?

Ν

	Calibration (D	Analyte	%R	Associated Samples	Challicatoris
# Date		C104	(511-58) 621	71-4	J-tdox/P(c)
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	CA 511.				
					-
Comments:					
					(peril mon 1 a 1

LDC #: 22285F6

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET Blanks Reason Code:bl

Reviewer: Cand Reviewer: ____

METHOD: Inorganics, Method See Cover

YN N/A Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below. Phase see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Y N N/A Were all samples associated with a given method blank?

***************************************	ntification			
and the second s				
AII	Sample Identification	, 11, 11		
nples:				
Associated Samples:				
Ass				
		No Qualifiers		
	Blank	ICB/CCB Action Limit (mg/L)		
	Analyte Blank ID Maximum	ICB/CCB (mg/L)	0.5	0.5
: mg/L	Blank ID	PB (mg/L)	0.5	0.5
Conc. units: mg/L	Analyte		Alk Total	Alk., Bicarb.

LDC #: 22285F6

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET

Reviewer: C

Page: <u>I</u>

Field Blanks

METHOD: Inorganics, Method See Cover YNN N/A Were field blanks identified in this SDG? YN N/A

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

Blank units: mg/L Associated sample units: mg/L Sampling date: 10/23/09 Soil factor applied NA Field blank type: (circle one)(Field Blank / Rinsate / Other: Pump Blank

Reason Code: bp

₹

Associated Samples:_

)							
Analyte	Blank ID				Sample Identification	cation		
	(3 195)	Action Level	1					
Total Alkalinity	1.1							
Bicarbonate Alkalinity	1.1							
Ammonia as N	2.60	26.0	0.061 J+					
TOC (average)	0.2							
Chloride	6:0							
Conductivity (11mhos/cm)	3.83	38.3						
Nitrate as Nitrogen	69.0	6.9						
PH (pH Units)	5.79							
TDS	o							
S04	5.							
Chlorate (ug/L)	23	230						

LDC #: 2228F6 SDG #: 500 CO

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: 2nd Reviewer: Reviewer:

METHOD: Inorganics, Method See Co.

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

Was a laboratory control sample (LCS) analyzed for each matrix in this SDG?

YM N/A

Were all LCS percent recoveries (%R) within the control limits of analyzed for the control of the control

Was a laboratory control sample (LCS) analyzed for each matrix in this SDG? Were all LCS percent recoveries (%R) within the control limits م 196-120% (85-115% for Method 300.0)?

LEVEL IX ONLY:
Y N (V)A Were

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

)					
4	0.00	Matrix	li	%R (limits)	Associated Samples	Qualifications
*	S71	Cape	D104	75 (85-115)	A11	J-107/P(X)
			1			
				The state of the s		
<u> </u>						
S	Comments:					

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Data Validation Reports LDC #22285

TPH as Extractables



Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

November 22 through November 26, 2009

LDC Report Date:

January 8, 2010

Matrix:

Soil

Parameters:

Total Petroleum Hydrocarbons as Extractables

Validation Level:

Stage 4

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906056

Sample Identification

RSAQ8-10BSPLP2

RSAQ8-10BSPLP3

RSAQ8-31BSPLP2

RSAQ8-31BSPLP3

SA34-10BSPLP2

SA34-10BSPLP3

SA34-31BSPLP2

SA34-31BSPLP3

Introduction

This data review covers 8 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015B for Total Petroleum Hydrocarbons (TPH) as Extractables.

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 III.

Field duplicates are summarized in Section IX.

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. Calibration

a. Initial Calibration

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

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

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 20.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 20.0% for all compounds.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as extractable contaminants were found in the method blanks.

No field blanks were identified in this SDG.

IV. Accuracy and Precision Data

a. Surrogate Recovery

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

b. Matrix Spike/Matrix Spike Duplicates

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.

c. Laboratory Control Samples

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

V. Target Compound Identification

All target compound identifications were within validation criteria.

VI. 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 R0906056	All compounds reported below the PQL.	J (all detects)	Α

VII. System Performance

The system performance was acceptable.

VIII. Overall Assessment of Data

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

IX. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG R0906056

SDG	Sample	Compound	Flag	A or P	Reason
R0906056	RSAQ8-10BSPLP2 RSAQ8-10BSPLP3 RSAQ8-31BSPLP2 RSAQ8-31BSPLP3 SA34-10BSPLP2 SA34-10BSPLP3 SA34-31BSPLP2 SA34-31BSPLP3	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG R0906056

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG R0906056

No Sample Data Qualified in this SDG

SDG # _abora	#: 22285A8 #: R0906056 atory: Columbia Analytica	VALIDATIOI - al Services	N COMPL St	tage 4	erson WORKSHEET	Date: 12/31 Page: 1 of 1 Reviewer: 37/2 2nd Reviewer:	
The sa	AOD: GC TPH as Extracta amples listed below were tion findings worksheets.	e reviewed for ea			on areas. Validation findi	ngs are noted in attached	
	Validation	Area			Comments		
l.	Technical holding times		A s	Sampling dates:	11/22-26/09		
IIa.	Initial calibration		Ą				
IIb.	Calibration verification/ICV		A	carpa	€ 20℃		
111.	Blanks		A				
IVa.	Surrogate recovery		A				
IVb.	Matrix spike/Matrix spike dup	plicates	N	Client	9Nec		
IVc.	Laboratory control samples		A	LCS	10		
V.	Target compound identificati	ion	<u> </u>				
VI.	Compound Quantitation and	CRQLs	A				
VII.	System Performance		A				
VIII.	Overall assessment of data		A				
IX.	Field duplicates		N				
X.	Field blanks		N				
Note: A = Acceptable ND = No compounds detected D = Duplicate N = Not provided/applicable R = Rinsate TB = Trip blank SW = See worksheet FB = Field blank EB = Equipment blank /alidated Samples:							
1 ,	RSAQ8-10BSPLP2	11 9975	9-MB	21	31		
-	RSAQ8-10BSPLP3	12 2 10046	7-MB	22	32		
	RSAQ8-31BSPLP2	13 SPLP2	2 - B/1(1	11/6-7	33		
4 1	RSAQ8-31BSPLP3		3- 13/16/	18/22	34		
5	SA34-10BSPLP2	1 1 1	2- B)ky	11/64 25	35		
- >	SA34-10BSPLP3		3- B/1c7	7 /6 3 26	36		
- 21	SA34-31BSPLP2	17		27	37		
8	SA34-31BSPLP3	18		28	38		

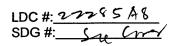
Notes:	

LDC #: 2228 CA8 SDG #: ________

VALIDATION FINDINGS CHECKLIST

Method:	GC_	HPLC

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times		-		de la companya de la companya de la companya de la companya de la companya de la companya de la companya de la
All technical holding times were met.				
Cooler temperature criteria was met.				a Constant of the Constant of
II. Initial calibration		/		
Did the laboratory perform a 5 point calibration prior to sample analysis?				
Were all percent relative standard deviations (%RSD) ≤ 20%?	/			
Was a curve fit used for evaluation?			_	
Did the initial calibration meet the curve fit acceptance criteria of 0.990?	_		-	
Were the RT windows properly established?	$ \angle $			
IV. Continuing calibration	` 		Γ	
Was a continuing calibration analyzed daily?	<u> </u>			
Were all percent differences (%D) ≤ 20%.0 or percent recoveries 80-120%?	-			
Were all the retention times within the acceptance windows?			<u> </u>	
V. Blanks	Γ/	Γ	Γ	
Was a method blank associated with every sample in this SDG?				
Was a method blank analyzed for each matrix and concentration?				·
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		/	1	
VI. Surrogate spikes	1	Γ.	т —	
Were all surrogate %R within the QC limits?	1		<u> </u>	
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	T	T	т —	I
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?	<u> </u>	/	1_	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?				
VIII. Laboratory control samples	T	J		T
Was an LCS analyzed for this SDG?	/	}-	_	
Was an LCS analyzed per extraction batch?	/	 	-	
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	1	1		
IX. Regional Quality Assurance and Quality Control	T		/	
Were performance evaluation (PE) samples performed?	-	1	+-	
Were the performance evaluation (PE) samples within the acceptance limits?	<u> </u>	<u></u>		



VALIDATION FINDINGS CHECKLIST

Page: Y of Y
Reviewer: 54/4
2nd Reviewer: ______

Validation Area	Yes	No	NA	Findings/Comments
X. Target compound identification		<i>)</i>		Spire Company
Were the retention times of reported detects within the RT windows?				
XI. Compound quantitation/CRQLs				and the second s
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?				
XII. System performance				DOS SERVICES CONTRACTOR
System performance was found to be acceptable.				
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.				
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.				
Target compounds were detected in the field duplicates.			•	
XV. Field blanks				
Field blanks were identified in this SDG.				
Target compounds were detected in the field blanks.				

アンペアチン See Cares LDC #: SDG #:

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Page: 1 of 1 2nd Reviewer: Reviewer:

> HPLC METHOD: GC_

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

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

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

				Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
#	Standard ID	Calibration Date	Compound	CF (اص ^ا std)	CF (J^V*std)	Average CF (initial)	Average CF (initial)	L	%RSD
-	1247	10/19/00	<i>p</i>	1,167 ec	1,167 eG 1167 172.6		1.158 26	3.63	3.05
	o								
2									
ь									
4									

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

5 C C C C E

1 4 28 4 4 V See Coner LDC #: SDC #:

Continuing Calibration Results Verification VALIDATION FINDINGS WORKSHEET

Page: 2nd Reviewer: Reviewer:_

> HPLC METHOD: GC_

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

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

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

					Reported	Recalculated	Reported	Recalculated
*	Standard ID	Calibration Date	Compound	Average CF(Ical)/ CCV Conc.	CF/Conc. CCV	CF/Conc. CCV	, Q%	0 %
-	CW 37	11/06/09	DRO	1.158 26	98 541 7	2, 270 2811	2.0	۵, ۷
2	ge 39	11/16/09		->	1.092 e6	1092218.9	5.7	なら
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4								

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

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# DC	.₩ .DO:#:

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

METHOD: ___GC___HPLC

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

% Recovery: SF/SS * 100
Sample ID:

Where: SF = Surrogate Found SS = Surrogate Spiked

Percent Difference		0		
Percent Recovery	Recalculated	86		
Percent Recovery	Reported	78		
Surrogate Found		31.98		
Surrogate Spiked		237		
ColumnDetector		Ś-9z		•
Surrogate		td0		

mnle ID.

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

Sample ID:

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

LDC #: 22265 48 SDG #: See Guer

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

2nd Reviewer: lof l Page: Reviewer:_

> GC HPLC METHOD:

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

% Recovery = 100* (SSC-SC)/SA RPD = I LCS - LCSD I * 2/(LCS + LCSD)

SC = Concentration

99759 LCS 12 LCS/LCSD samples:

Where: SSC = Spiked sample concentration SA = Spike added LCS = Laboratory control sample percent recovery

LCSD = Laboratory control sample duplicate percent recovery

	IS.	Spike	Spiked	Sample	SOT	S	ЭП	TCSD	rcs/	TCS/TCSD
Compound	Αααεα (μς / L	/L)	Conce (Mg	Concentration	Percent Recovery	Recovery	Percent	Percent Recovery	<u>x</u>	RPD
	SOT	LCSD	rcs	TCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)										
Diesel (8015)	8 24	503	319.33	7.025	69	63.T	12	57	a	6
Benzene (8021B)										\ \
Methane (RSK-175)										
2,4-D (8151)										
Dinoseb (8151)						-				
Naphthalene (8310)										
Anthracene (8310)										
HMX (8330)										
2,4,6-Trinitrotoluene (8330)				-						
			-				-			

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

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VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

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Example: Sample ID. (RF)(Vs or Ws)(%S/100) Concentration=

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

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

Concentration =

Compound Name_

#	Sample ID	Compound	Reported Concentrations	Recalculated Results Concentrations (Qualifications
Comments:	ents:				

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

October 22 through October 23, 2009

LDC Report Date:

January 8, 2010

Matrix:

Soil/Water

Parameters:

Total Petroleum Hydrocarbons as Extractables

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906081

Sample Identification

EB102209-SO1A3 RSAP8-10B SA112-0.5B RSAP8-25B SA112-10B RSAP8-40B SA112-20B SA112-0.5BMS SA112-34B SA112-0.5BMSD RSAQ8-0.5B RSAR8-34BMSD RSAQ8-10B RSAR8-34BMSD

RSAQ8-22B RSAQ8-31B RSAQ8-34B SA132-0.5B SA132-10B SA132-20B SA132-20B SA132-34B RSAR8-0.5B RSAR8-10B RSAR8-20B

RSAR8-34B RSAP8-0.5B

Introduction

This data review covers 26 soil samples and one water sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015B for Total Petroleum Hydrocarbons (TPH) as Extractables.

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 III.

Field duplicates are summarized in Section IX.

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. Calibration

a. Initial Calibration

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

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

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 20.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 20.0% for all compounds.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as extractable contaminants were found in the method blanks.

Sample EB102209-SO1A3 was identified as an equipment blank. No total petroleum hydrocarbons as extractable contaminants were found in this blank.

Sample FB082809-SO (from SDG R0904894) was identified as a field blank. No total petroleum hydrocarbons as extractable contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB082809-SO	8/28/09	Diesel range organics	110 ug/L	All soil samples in SDG R0906081

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

IV. Accuracy and Precision Data

a. Surrogate Recovery

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

b. Matrix Spike/Matrix Spike Duplicates

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

c. Laboratory Control Samples

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

V. Target Compound Identification

Raw data were not reviewed for this SDG.

VI. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0906081	All compounds reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

VII. System Performance

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

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

IX. Field Duplicates

Samples SA132-10B and SA132009-10B were identified as field duplicates. No total petroleum hydrocarbons as extractables were detected in any of the samples.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG R0906081

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906081	EB102209-SO1A3 SA112-0.5B SA112-10B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-10B RSAQ8-22B RSAQ8-31B RSAQ8-34B SA132-0.5B SA132-10B SA132-0B SA132-20B SA132-34B RSAR8-0.5B RSAR8-0.5B RSAR8-0.5B RSAR8-10B RSAR8-34B RSAR8-20B RSAR8-34B RSAP8-0.5B RSAP8-10B RSAP8-10B RSAP8-10B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG R0906081

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Total Petroleum Hydrocarbons as Extractables - Equipment Blank Data Qualification Summary - SDG R0906081

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG R0906081

No Sample Data Qualified in this SDG

SDG#	:22285B8 ::R0906081 atory:_Columbia_Ana	 Ivtica	_	LIDATION	COMP	LET		lenderson ESS WORI			Date: <u>) </u>	of
	OD: GC TPH as Ex				46 Metho	od 80	15B)				2nd Reviewer:	لم
								alidation area	s Validatio	n findi	ings are noted in att	ache
	imples listed below t ion findings workshe			ewed for eac	n or the r	JIIOW	ing va	aliuation area	is. Validatic	ni ililai	ings are noted in att	acrici
									<u> </u>			
	Validat		<u>Area</u>		A			ates: 10 /22	Comm		the state of the s	
l. 	Technical holding time	<u>s</u>				Sam	pling a	ates: 10 /	- 2-770]		
lla.	Initial calibration				A		C (A)	her = 20	۲,			******
Ilb.	Calibration verification/	ICV			<u>FT</u>		cv,	1W = 20	4			
111.	Blanks					_						
IVa.	Surrogate recovery				<u> </u>							
IVb.	Matrix spike/Matrix spil	ke du	plicate	s	<u> </u>							······································
IVc.	Laboratory control sam	ples	×		A	ļ	LCS	<u>/b</u>				
V.	Target compound iden	tificati	ion		N	<u> </u>						
VI.	Compound Quantitatio	n and	CRQ	_S	N							
VII.	System Performance				N .	<u> </u>						
VIII.	Overall assessment of	data			<u> </u>	ļ		- 15 15				
IX.	Field duplicates				VP	VE ?	_	= /2,/3				
Χ.	Field blanks				SW	7 t	B	I FB	= FB18	2809.	-50 (ROG04894	<u>:) </u>
Note: Validate	A = Acceptable N = Not provided/appl SW = See worksheet ed Samples:	icable		HND = No R = Rins FB = Fie		s dete	ected		olicate ip blank quipment blar	nk		
1	EB102209-SO1A3	W	11_	SA132-0.5B			21	RSAP8-10B	<u> </u>	31 /	99053-MB	
2	SA112-0.5B	S	12	SA132-10B	p		22	RSAP8-25B		32	99295-	
3	SA112-10B		13	SA132009-10	в р		23	RSAP8-40B		33 3	41299- }	
	SA112-20B		14	SA132-20B			24	SA112-0.5BMS	5	34		
	SA112-34B		15	SA132-34B			25	SA112-0.5BMS	SD	35		
	RSAQ8-0.5B		16	RSAR8-0.5B			26	RSAR8-34BMS	3	36		
	RSAQ8-10B		17	RSAR8-10B			27	RSAR8-34BMS		37		
	RSAQ8-22B	一	18	RSAR8-20B			28			38		
	RSAQ8-31B		19	RSAR8-34B		1	29			39		
	RSAQ8-34B	Ţ	20	RSAP8-0.5B			30			40		

Notes:__

SDG #: 22385 B8

VALIDATION FINDINGS WORKSHEET FILL BLANDINGS WORKSHEET

	3	>
Page:	Reviewer:_	2nd Reviewer:

METHOD:GCHPLCYN N/AWere field blanks identified in this SDG?V/NN/AWere target compounds detected in the part of the

Were target compounds detected in the field blanks?

Bfank units: 45/L Associated sample units: 45/LS Sampling date: 8/28/05
Field blank type: (circle one) Field Blank / Trip Blank / Atmospheric Blank / Ambient Blank

Associated Samples: All Co.

Sample Identification 5 Rinsate / Equipment Rinsate / Equipment Blank / Source Blank / Other Z Z e ther rdsult s Z FB 084804-50 Blank ID Blank ID 5 DRO Compound CROL

Blank units:______ Associated sample units:_____

Sampling date:

Field blank type: (circle one) Field Blank / Trip Blank/ Atmospheric Blank/ Ambient Blank

Rinsate / Equipment Rinsate / Equipment Blank / Source Blank / Other

Associated Samples:

Sample Identification Blank ID Blank ID Compound

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Samples with compound concentrations within five times the associated field blank concentration are listed above, these sample results were qualified as not detected, "U".

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

October 28, 2009

LDC Report Date:

January 8, 2010

Matrix:

Soil

Parameters:

Total Petroleum Hydrocarbons as Extractables

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906191

Sample Identification

RSAS8-0.5B

RSAS8-10B

RSAS8-25B

RSAS8-35B

RSAS8-35BMS

RSAS8-35BMSD

Introduction

This data review covers 6 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015B for Total Petroleum Hydrocarbons (TPH) as Extractables.

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 III.

Field duplicates are summarized in Section IX.

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. Calibration

a. Initial Calibration

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

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

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 20.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 20.0% for all compounds.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as extractable contaminants were found in the method blanks.

Sample FB082809-SO (from SDG R0904894) was identified as a field blank. No total petroleum hydrocarbons as extractable contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB082809-SO	8/28/09	Diesel range organics	110 ug/L	All samples in SDG R0906191

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

IV. Accuracy and Precision Data

a. Surrogate Recovery

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

b. Matrix Spike/Matrix Spike Duplicates

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

c. Laboratory Control Samples

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

V. Target Compound Identification

Raw data were not reviewed for this SDG.

VI. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0906191	All compounds reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

VII. System Performance

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

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

IX. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG R0906191

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906191	RSAS8-0.5B RSAS8-10B RSAS8-25B RSAS8-35B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG R0906191

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG R0906191

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

VALIDATION COMPLETENESS WORKSHEET LDC #: 22285C8 Stage 2B SDG #: R0906191 Laboratory: Columbia Analytical Services

Reviewer: 2nd Reviewer:

METHOD: GC TPH as Extractables (EPA SW 846 Method 8015B)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 10 /08 /09
lla.	Initial calibration	A	
IIb.	Calibration verification/ICV	A	CW/101 € 20 }
III.	Blanks	4	
IVa.	Surrogate recovery	A	
IVb.	Matrix spike/Matrix spike duplicates	A	
IVc.	Laboratory control samples	A	LCS /b
V.	Target compound identification	N	
VI.	Compound Quantitation and CRQLs	N	
VII.	System Performance	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X.	Field blanks	SW	FB = FB 08 28 09-50 (R 09 04 8 94)

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:

cail

		<u> </u>			
1	RSAS8-0.5B	11	99786-MB	21	31
2	RSAS8-10B	12		22	32
3	RSAS8-25B	13		23	33
4	RSAS8-35B	14		24	34
5	RSAS8-35BMS	15		25	35
6	RSAS8-35BMSD	16		26	36
7		17		27	37
8		18		28	38
9		19		29	39
10		20		30	40

Notes:		

LDC #: 22285 C8 ころら SDG #:

VALIDATION FINDINGS WORKSHEET Field Blanks

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Page:	Reviewer	2nd Reviewer

HPLC METHOD:

A N A

Were target compounds detected in the field blanks? Associated sample units: Worker N N/A

Sampling date:_ Blank units:

+ Bineste / Equipment Blank / Source Blank / Other Field blank type: (circle one Field Blank) Trip Blank / Atmospheric Blank / Ambient Blank

Associated Samples:_

F&082809-SD	Compound	nk ID	Blank ID Blank ID	Sample Identification
. 		208280	05-60	
	.	110		
Cac	- I			

Associated sample units:_ Blank units:

Sampling date:

Field blank type: (circle one) Field Blank / Trip Blank/ Atmospheric Blank/ Ambient Blank

Rinsate / Equipment Rinsate / Equipment Blank / Source Blank / Other

Associated Samples:

	Compound	Blank ID	Blank ID	Sample Identification
CRO				
	CROI			

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Samples with compound concentrations within five times the associated field blank concentration are listed above, these sample results were qualified as not detected, "U".

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

November 5, 2009

LDC Report Date:

January 8, 2010

Matrix:

Soil

Parameters:

Total Petroleum Hydrocarbons as Extractables

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906403

Sample Identification

SA77-0.5B

SA77-10B

SA77009-10B

SA77-0.5BMS

SA77-0.5BMSD

Introduction

This data review covers 4 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8015B for Total Petroleum Hydrocarbons (TPH) as Extractables.

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 III.

Field duplicates are summarized in Section IX.

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, 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. Calibration

a. Initial Calibration

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

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

b. Calibration Verification

Calibration verification was performed at required frequencies. The percent differences (%D) of amounts in continuing standard mixtures were within the 20.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 20.0% for all compounds.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No total petroleum hydrocarbons as extractable contaminants were found in the method blanks.

Sample FB082809-SO (from SDG R0904894) was identified as a field blank. No total petroleum hydrocarbons as extractable contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB082809-SO	8/28/09	Diesel range organics	110 ug/L	All samples in SDG R0906403

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

IV. Accuracy and Precision Data

a. Surrogate Recovery

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

b. Matrix Spike/Matrix Spike Duplicates

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

c. Laboratory Control Samples

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

V. Target Compound Identification

Raw data were not reviewed for this SDG.

VI. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0906403	All compounds reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

VII. System Performance

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

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

IX. Field Duplicates

Samples SA77-10B and SA77009-10B were identified as field duplicates. No total petroleum hydrocarbons as extractables were detected in any of the samples.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG R0906403

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906403	SA77-0.5B SA77-10B SA77009-10B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG R0906403

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Total Petroleum Hydrocarbons as Extractables - Field Blank Data Qualification Summary - SDG R0906403

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

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_DC #: 22285E8	VALIDATION COMPLETENESS WORKSHEET	Da
SDG #: R0906403	Stage 2B	Pag
Laboratory: Columbia Analytic	cal Services	Review 2nd Review

METHOD: GC TPH as Extractables (EPA SW 846 Method 8015B)

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

	Validation Area		Comments
1.	Technical holding times	A	Sampling dates: 1) /6 C / 6 g
lla.	Initial calibration	A	
lib.	Calibration verification/ICV	A	CCV/1W = 20 }
111.	Blanks	1	
IVa.	Surrogate recovery	I A	
IVb.	Matrix spike/Matrix spike duplicates	A	
IVc.	Laboratory control samples	A	LCS /p
V.	Target compound identification	N	
VI.	Compound Quantitation and CRQLs	N	
VII.	System Performance	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	ND	b = 2,3
X.	Field blanks	SW	FB = FB 08 28 09-50 (RC904894)

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:

Corl

	201				
1	SA77-0.5B	11	21	31	
2	SA77-10B 0	12	22	32	
3	SA77009-10B D	13	23	33	
4	SA77-0.5BMS	14	24	34	
5	SA77-0.5BMSD	15	25	35	
6	100483-MB	16	26	36	
7		17	27	37	
8		18	28	38	
9		19	29	39	
10		20	30	40	

Notes:		

LDC #: 77785 FY SDG #:

VALIDATION FINDINGS WORKSHEET Field Blanks

_of	36	}
Page:	Reviewer:	2nd Reviewer:

GC HPLC
Were field blanks identified in this SDG? Y N/A МЕТНОD:

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

Blank units: 49 / Associated sample units: 45 / Sampling date: 8 / 24 / 01

to / Equipment Blank / Source Blank / Other Field blank type: (circle one) Field Blank / Trip Blank / Atmospheric Blank / Ambient Blank

Associated Samples:

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	fication							
	Sample Identification							
IN / Ott 151 .								
I DIALIN / SOULCE DIALIN / SUREI.								
משוטוובווולוחל								-
Kinsate / Equipment Kirisate / Equipment								
-danbueu	Blank ID	62-108						
Kinsale / t	Riank ID	120828097	Ē	2				
	build	n nodino	All had				l Caro	Char

Associated sample units: Blank units:

Sampling date:

Rinsate / Equipment Rinsate / Equipment Blank / Source Blank / Other Field blank type: (circle one) Field Blank / Trip Blank/ Atmospheric Blank/ Ambient Blank

Associated Samples:

Sample Identification Blank ID Blank ID Compound

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Samples with compound concentrations within five times the associated field blank concentration are listed above, these sample results were qualified as not detected, "U".