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
Newport Beach, CA 92660
ATTN: Ms. Cindy Arnold

January 28, 2010

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 14, 2009. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 22234:

SDG #	Fraction
R0904329, R0905462, R0905636	Volatiles, Semivolatiles, Chlorinated
R0905693, R0905744, R0905829	Pesticides, Polychlorinated Biphenyls,
R0905882, R0905885/K0910208	Polychlorinated Biphenyls as Congeners,
R0905963, R0906024, R0906081	Metals, Wet Chemistry, TPH as
R0906095, R0906123, R0906191	Extractables, Dioxins/Dibenzofurans

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, BRC 2009
- 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
- USEPA, Contract Laboratory Program National Functional Guidelines for Polychlorinated Dioxins/Diobenzofurans Data Review, September 2005

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

Sincerely,

Erlinda T. Rauto
Operations Manager/Senior Chemist

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Attachment 1

Stage 2B/4 **LDC #22234 (Tronox LLC-Northgate, Henderson NV / Tronox Phase B 2009)**

LDC	SDG#	DATE REC'D	(3) DATE DUE	VOA (8260B)		SVOA (8270C)		Pest. (8081A)		PCBs (8082)		PCB Cong. (1668A)		Metals (SW846)		TPH-E (8015B)		Dioxins (8290)		Alk. (2320B)		NH_3-N (350.1M)		Br Cl,SO_4 (9056)		NO_2-N (353.2)		NO_3-N (9056)		CN- (9012)		Cond. (120.1)		Cr(VI) (218.6/ (7199)			
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	R0904329	12/14/09	01/07/10	2	18	0	18	0	7	0	2	0	2	0	18	0	16	0	3	0	16	0	16	0	16	0	16	0	19	0	16	-	-	0	16		
B	R0905462	12/07/09	01/07/10	8	0	3	0	3	0	-	-	-	-	-	-	-	-	-	-	3	0	3	0	3	0	3	0	3	0	3	0	3	0	4	0		
C	R0905636	12/07/09	01/07/10	7	0	4	0	6	0	-	-	-	-	-	-	-	-	-	-	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0		
D	R0905693	12/15/09	01/07/10	4	20	1	19	1	21	0	3	-	-	-	-	1	19	-	-	1	19	1	19	1	19	1	19	1	19	1	19	-	-	1	19		
E	R0905744	12/03/09	01/07/10	4	17	1	17	1	12	0	2	-	-	1	17	1	17	-	-	1	17	1	17	1	17	1	17	1	17	1	13	-	-	1	17		
F	R0905829	12/09/09	01/07/10	4	17	1	13	1	9	-	-	-	-	1	16	1	17	-	-	1	16	1	16	1	16	1	16	1	16	0	3	-	-	1	16		
G	R0905882	12/14/09	01/07/10	5	22	1	13	0	4	0	2	-	-	1	21	1	13	-	-	1	21	1	21	1	21	1	21	1	21	1	9	-	-	1	21		
H	R0905885/K0910208	12/14/09	01/07/10	0	1	0	2	0	2	-	-	-	-	0	2	0	2	-	-	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2		
I	R0905963	12/15/09	01/07/10	4	15	1	11	-	-	-	-	-	-	1	14	1	11	-	-	1	14	1	14	1	14	1	14	1	14	1	11	-	-	1	11		
J	R0906024	12/07/09	01/07/10	2	19	0	7	0	8	0	6	-	-	0	19	0	12	-	-	0	19	0	19	0	19	0	19	0	19	0	7	-	-	0	19		
K	R0906081	12/17/09	01/07/10	-	-	-	-	-	-	-	-	-	-	1	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
L	R0906095	12/09/09	01/07/10	20	0	12	0	12	0	-	-	-	-	15	0	-	-	-	-	12	0	12	0	12	0	12	0	12	0	12	0	12	0	12	0		
M	R0906123	01/07/10	01/07/10	4	18	1	12	1	21	0	2	-	-	1	18	1	12	-	-	1	18	1	18	1	18	1	13	1	18	1	7	-	-	1	18		
N	R0906191	12/15/09	01/07/10	-	-	-	-	-	-	-	-	-	-	0	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Total	T/LR			64	147	25	112	25	84	0	17	0	2	21	151	6	119	0	3	25	142	25	142	25	142	25	137	25	145	24	87	19	2	26	139	0	1906

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS/MSD, and DUPs

Stage 2B/4	LDC #22234 (Tronox LLC-Northgate, Henderson NV / Tronox Phase B 2009)																																					
LDC	SDG#	DATE REC'D	(3) DATE DUE	pH (9040 /9045)		Phos-phorus (365.1)		CLO_4 (314.0)		TSS (2540D)		TDS (2540C)		MBAS (5540C)		TOC (9060/ L/K)		Chlorate (300.1)																						
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	R0904329	12/14/09	01/07/10	0	16	0	16	0	16	-	-	-	-	0	16	0	16	0	16																				
B	R0905462	12/07/09	01/07/10	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0																				
C	R0905636	12/07/09	01/07/10	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0																				
D	R0905693	12/15/09	01/07/10	1	19	1	19	1	19	-	-	-	-	1	19	1	19	1	19																				
E	R0905744	12/03/09	01/07/10	1	17	1	17	1	17	-	-	-	-	1	17	1	17	1	17																				
F	R0905829	12/09/09	01/07/10	1	16	1	16	1	16	-	-	-	-	1	16	1	16	1	16																				
G	R0905882	12/14/09	01/07/10	1	21	1	21	1	21	-	-	-	-	1	21	1	21	1	21																				
H	R0905885/K0910208	12/14/09	01/07/10	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2																				
I	R0905963	12/15/09	01/07/10	1	11	1	11	1	11	-	-	-	-	1	11	1	11	1	11																				
J	R0906024	12/07/09	01/07/10	0	19	0	19	0	19	-	-	-	-	0	19	0	19	0	19																				
L	R0906095	12/09/09	01/07/10	12	0	12	0	-	-	12	0	12	0	12	0	12	0	12	0																				
M	R0906123	01/07/10	01/07/10	1	18	1	18	1	18	-	-	-	-	1	18	1	18	1	18																				
Total	T/LR			25	139	25	139	13	139	19	2	19	2	25	139	25	139	25	139	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1014

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS/MSD, and DUPs

EDD CHECKLIST

LDC #: 22234
SDG #: R0904329, R0905462, R0905636, R0905693
R0905744, R0905829, R0905882, R0905885/K0910208
R0905963, R0906024, R0906081, R0906095
R0906123, R0906191

Reviewer: JE
2nd Reviewer: BC

Tronox Northgate Henderson Worksheet

EDD Area	Yes	No	NA	Findings/Comments
I. Completeness				
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?	X			
III. EDD Lab Anomalies				
Were EDD anomalies identified?	X			
If yes, were they corrected or documented for the client?	X			See EDD_discrepancy_ form_LDC22234_011510.doc
IV. EDD Delivery				
Was the final EDD sent to the client?	X			

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Data Validation Reports
LDC #22234

Volatiles

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: August 4 through August 5, 2009

LDC Report Date: January 4, 2010

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0904329

Sample Identification

SA146-0.5B
SA146-10B
SA146-25B
SA146009-25B
SA146-40B
SA146-55B
SA147-0.5B
SA147-10B
SA147-25B
SA147009-25B
SA147-40B
SA147-56B
TB080409-SO1
RSAU5-0.5B
RSAU5-10B
TB080509-SO1
RSAU5-25B
RSAU5-40B
RSAU5-50B
RSAU5-55B

Introduction

This data review covers 18 soil samples and 2 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

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

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

B The analytical result may be a false positive totally attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JB The analytical result may be biased high and partially attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JK The analytical result is an estimated maximum possible concentration (EMPC).

X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.

J-TDS The analytical result is estimated based on failure of the Total Dissolved Solids (TDS) correctness check performed in accordance with the Standard Method 1030E.

J-CAB The analytical result is estimated based on failure of the cation-anion balance correctness check performed in accordance with Standard Method 1030E.

J-TDS & CAB The analytical result is unreliable based on the failure of the cation-anion balance and TDS correctness check performed in accordance with standard Method 1030E.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

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

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
6/18/09	2-Methyl-2-propanol	0.026 (≥0.05)	All water samples in SDG R0904329	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
8/12/09	Styrene	25.4	All water samples in SDG R0904329	J+ (all detects)	A

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
8/12/09	2-Methyl-2-propanol	0.024 (≥0.05)	All water samples in SDG R0904329	J (all detects) UJ (all non-detects)	A

V. Blanks

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

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
164979-MB	8/10/09	Acetone	2.9 ug/Kg	SA146-55B SA147-0.5B SA147-10B SA147-25B SA147009-25B SA147-40B SA147-56B RSAU5-0.5B RSAU5-10B RSAU5-25B RSAU5-40B RSAU5-50B
165679-MB	8/13/09	Acetone	3.2 ug/Kg	RSAU5-55B

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

Samples TB080409-SO1 and TB080509-SO1 were identified as trip blanks. No volatile contaminants were found in these blanks.

Sample FB080309-SO (from SDG R0904279) 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
FB080309-SO	8/3/09	Acetone Toluene	2.1 ug/L 0.30 ug/L	All soil samples in SDG R0904329

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
SA146-0.5B	Toluene	0.32 ug/Kg	0.32U ug/Kg
SA147-0.5B	Toluene	0.30 ug/Kg	0.30U ug/Kg
SA147-10B	Toluene	0.50 ug/Kg	0.50U ug/Kg
SA147-40B	Toluene	0.45 ug/Kg	0.45U ug/Kg
RSAU5-10B	Toluene	0.53 ug/Kg	0.53U ug/Kg
RSAU5-40B	Toluene	0.52 ug/Kg	0.52U ug/Kg
RSAU5-50B	Toluene	0.42 ug/Kg	0.42U 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 with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
165679-LCS	2-Methyl-2-propanol	126 (75-125)	RSAU5-55B 165679-MB	J+ (all detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0904329	All compounds reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

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

XVI. Field Duplicates

Samples SA146-25B and SA146009-25B and samples SA147-25B and SA147009-25B were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA146-25B	SA146009-25B				
2-Butanone	2.1	2.5	-	0.4 (≤9.5)	-	-
Acetone	11	13	-	2 (≤19)	-	-
Toluene	2.9	2.6	-	0.3 (≤4.7)	-	-

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA147-25B	SA147009-25B				
2-Butanone	2.3	1.9	-	0.4 (≤11)	-	-
Acetone	9.1	9.1	-	0 (≤23)	-	-
Toluene	2.5	1.9	-	0.6 (≤5.6)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Data Qualification Summary - SDG R0904329

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0904329	TB080409-SO1 TB080509-SO1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Initial calibration (RRF) (c)
R0904329	TB080409-SO1 TB080509-SO1	Styrene	J+ (all detects)	A	Continuing calibration (%D) (c)
R0904329	TB080409-SO1 TB080509-SO1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Continuing calibration (RRF) (c)
R0904329	RSAU5-55B	2-Methyl-2-propanol	J+ (all detects)	P	Laboratory control samples (%R) (l)
R0904329	SA146-0.5B SA146-10B SA146-25B SA146009-25B SA146-40B SA146-55B SA147-0.5B SA147-10B SA147-25B SA147009-25B SA147-40B SA147-56B TB080409-SO1 RSAU5-0.5B RSAU5-10B TB080509-SO1 RSAU5-25B RSAU5-40B RSAU5-50B RSAU5-55B	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 R0904329

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Trip Blank Data Qualification Summary - SDG R0904329

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Field Blank Data Qualification Summary - SDG R0904329

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0904329	SA146-0.5B	Toluene	0.32U ug/Kg	A	bf
R0904329	SA147-0.5B	Toluene	0.30U ug/Kg	A	bf
R0904329	SA147-10B	Toluene	0.50U ug/Kg	A	bf
R0904329	SA147-40B	Toluene	0.45U ug/Kg	A	bf
R0904329	RSAU5-10B	Toluene	0.53U ug/Kg	A	bf
R0904329	RSAU5-40B	Toluene	0.52U ug/Kg	A	bf
R0904329	RSAU5-50B	Toluene	0.42U ug/Kg	A	bf

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234A1
SDG #: R0904329
Laboratory: Columbia Analytical Services

Date: 12/26/09
Page: 1 of 1
Reviewer: VM
2nd Reviewer: V

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: 8/04-05/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	SW	% RSD ✓
IV.	Continuing calibration/~~ICV~~		CCV ≤ 25 %
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	client spec
VIII.	Laboratory control samples	SW	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	SW	D_1 = 3, 4 D_2 = 9, 10
XVII.	Field blanks	SW	*TB = 13, 16 FB = FB080309-SO (CR0904274)

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	1	SA146-0.5B	S	11	3	SA147-40B	S	21	1	164752-MB	31
2	1	SA146-10B		12	3	SA147-56B		22	2	165454-	32
3	1	SA146-25B	D1	13	2	TB080409-SO1	W	23	3	164979-	33
4	1	SA146009-25B	D1	14	3	RSAU5-0.5B	S	24	4	165679-✓	34
5	1	SA146-40B		15	3	RSAU5-10B		25			35
6	3	SA146-55B		16	2	TB080509-SO1	W	26			36
7	3	SA147-0.5B		17	3	RSAU5-25B	S	27			37
8	3	SA147-10B		18	3	RSAU5-40B		28			38
9	3	SA147-25B	D2	19	3	RSAU5-50B		29			39
10	3	SA147009-25B	D1 ✓	20	4	RSAU5-55B		30			40

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

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

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

LDC #: 22234A1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration

Reviewer: JVG
2nd Reviewer: [illegible]

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 Did the laboratory perform a 5 point calibration prior to sample analysis?
- (Y) N N/A Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's?
- (Y) N N/A Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation? $r^2 \geq 0.99$
- (Y) N N/A Did the initial calibration meet the acceptance criteria?
- Y (N) N/A Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %RSD (Limit: ≤30.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	6/18/09	ICAL-MSD	NNNN		0.026	13, 16, 165454-MB	J/UJ/A (c)

LDC #: 22234A1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: MG
2nd Reviewer: [signature]

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

#	Date	Standard ID	Compound	Finding %D (Limit: ≤25.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	8/12/09	CO130	NNNN		0.024	13, 16, 165454-MB	J/UJ/A (C)
			FF (G)	25.4		↓	J+ detects/A

LDC #: 72234A1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: MC
2nd Reviewer:

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

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

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

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.

Blank analysis date: 8/10/09 Associated Samples: 6-12, 14, 15, 17-19

Conc. units: ug/Kg

Compound	Blank ID	Sample Identification								
	16497Q-MB									
F	2.9	(All results > MB)								

5.8

Blank analysis date: 8/13/09 Associated Samples: 20

Conc. units: ug/Kg

Compound	Blank ID	Sample Identification								
	16567Q-MB									
F	3.2	(All results > MB)								

6.4

LDC #: 22234A1
SDG #: In Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

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

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

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

Blank units: ug/L **Associated sample units:** ug/kg
Field blank type: (circle one) ~~Field Blank~~ / Rinsate / Trip Blank / Other: Associated Samples: All soils (bf)

Compound	~~FB080309-SO~~ Blank ID	~~Blank ID~~	Sample Identification							
Sampling Date	8/03/09	1	7	8	11	15	18	19		
4.2 F	2.1									
0.60 CC	0.30	0.32/U	0.30/U	0.50/U	0.45/U	0.53/U	0.52/U	0.42/U		
		(All others either		ND or	> FB)					

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

Compound	Blank ID	Blank ID	Sample Identification							
Sampling Date										

LDC #: 22234 A1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer:
2nd Reviewer:

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

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

[✓ Y] N N/A Was a LCS required?
Y [✓ N] N/A Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		165679-LCS	NNNN	126 (75-125)	( )	( )	20, 165679-MB	J+ dets/P (1)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 22234A1
SDG #: Sw Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

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

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

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

Compound	Concentration (ug/kg)		RPD	Parent only
	3	4		
M	2.1	2.5	0.4 (≤ 9.5D)	-
F	11	13	2 (≤ 19D)	-
CC	2.9	2.6	0.3 (≤ 4.7D)	-

Compound	Concentration (ug/kg)		RPD	Parent only
	9	10		
M	2.3	1.9	0.4 (≤ 11D)	-
F	9.1	9.1	0 (≤ 23D)	-
CC	2.5	1.9	0.6 (≤ 5.6D)	-

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: September 24 through September 25, 2009

LDC Report Date: December 30, 2009

Matrix: Water

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905462

Sample Identification

M-89B
M-89BDL
TB092409-GW1
M-2AB
M-2ABDL
M-2009AB
M-2009ABDL
TB092509-GW1
M-89BMS
M-89BMSD

Introduction

This data review covers 10 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

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

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

B The analytical result may be a false positive totally attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JB The analytical result may be biased high and partially attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JK The analytical result is an estimated maximum possible concentration (EMPC).

X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.

J-TDS The analytical result is estimated based on failure of the Total Dissolved Solids (TDS) correctness check performed in accordance with the Standard Method 1030E.

J-CAB The analytical result is estimated based on failure of the cation-anion balance correctness check performed in accordance with Standard Method 1030E.

J-TDS & CAB The analytical result is unreliable based on the failure of the cation-anion balance and TDS correctness check performed in accordance with standard Method 1030E.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

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

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
9/18/09	2-Methyl-2-propanol	0.028 (≤0.05)	All samples in SDG R0905462	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
10/5/09	Acetone	25.3	M-89BDL M-2ABDL	J- (all detects) UJ (all non-detects)	A
	2-Butanone	26.9	M-2009ABDL M-89BMS M-89BMSD 173360-MB	J- (all detects) UJ (all non-detects)	

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
10/2/09	2-Methyl-2-propanol	0.027 (≥0.05)	M-89B TB092409-GW1 M-2AB M-2009AB TB092509-GW1 173080-MB	J (all detects) UJ (all non-detects)	A
10/5/09	2-Methyl-2-propanol	0.024 (≥0.05)	M-89BDL M-2ABDL M-2009ABDL M-89BMS M-89BMSD 173360-MB	J (all detects) UJ (all non-detects)	A

V. Blanks

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

Samples TB092409-GW1 and TB092509-GW1 were identified as trip blanks. No volatile contaminants were found in these blanks with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
TB092509-GW1	9/25/09	2-Methyl-2-propanol Acetone	3.3 ug/L 8.8 ug/L	M-2AB M-2ABDL M-2009AB M-2009ABDL

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

Sample FB080409-GW (from SDG R0904290) was identified as a field blank. No volatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB080409-GW	8/4/09	Acetone Chloromethane Dichloromethane Toluene	12 ug/L 0.31 ug/L 0.28 ug/L 0.78 ug/L	M-89B M-89BDL M-2AB M-2ABDL M-2009AB M-2009ABDL

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

Sample	Compound	Reported Concentration	Modified Final Concentration
M-2AB	Chloromethane	0.21 ug/L	0.21U ug/L

Sample PB100209-A2 (from SDG R0905636) 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
PB100209-A2	10/2/09	Acetone Dichloromethane Toluene	10 ug/L 0.42 ug/L 0.26 ug/L	M-89B M-89BDL M-2AB M-2ABDL M-2009AB M-2009ABDL

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

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 some compounds, the MSD or LCS percent recoveries (%R) were within QC limits and no data were qualified.

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

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

Sample	Compound	Finding	Criteria	Flag	A or P
M-89B M-2AB M-2009AB	Chloroform	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	A

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0905462	All compounds reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

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

Sample	Compound	Flag	A or P
M-89B M-2AB M-2009AB	Chloroform	X	A
M-89BDL M-2ABDL M-2009ABDL	All TCL compounds except Chloroform	X	A

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

XVI. Field Duplicates

Samples M-2AB and M-2009AB and samples M-2ABDL and M-2009ABDL were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-2AB	M-2009AB				
1,1-Dichloroethene	0.56	0.59	-	0.03 (≤2.0)	-	-
Bromoform	0.49	1.0U	-	0.51 (≤1.0)	-	-
Carbon tetrachloride	1.2	1.0U	-	0.20 (≤1.0)	-	-
Chloroform	1000	1000	0 (≤30)	-	-	-
Chloromethane	0.21	2.0U	-	1.79 (≤2.0)	-	-
Methyl-tert-butyl ether	0.99	0.99	-	0 (≤1.0)	-	-
Tetrachloroethene	0.50	0.59	-	0.09 (≤1.0)	-	-
Trichloroethene	16	16	0 (≤30)	-	-	-

Compound	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-2ABDL	M-2009ABDL				
Chloroform	1200	1200	0 (≤30)	-	-	-
Hexachlorobutadiene	2.8	50U	-	47.2 (≤50)	-	-
Trichloroethene	14	15	-	1 (≤10)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Data Qualification Summary - SDG R0905462

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905462	M-89B M-89BDL TB092409-GW1 M-2AB M-2ABDL M-2009AB M-2009ABDL TB092509-GW1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Initial calibration (RRF) (c)
R0905462	M-89BDL M-2ABDL M-2009ABDL	Acetone 2-Butanone	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	A	Continuing calibration (%D) (c)
R0905462	M-89B M-89BDL TB092409-GW1 M-2AB M-2ABDL M-2009AB M-2009ABDL TB092509-GW1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Continuing calibration (RRF) (c)
R0905462	M-89B M-2AB M-2009AB	Chloroform	J (all detects)	A	Project Quantitation Limit (e)
R0905462	M-89B M-89BDL TB092409-GW1 M-2AB M-2ABDL M-2009AB M-2009ABDL TB092509-GW1	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0905462	M-89B M-2AB M-2009AB	Chloroform	X	A	Overall assessment of data (o)
R0905462	M-89BDL M-2ABDL M-2009ABDL	All TCL compounds except Chloroform	X	A	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Laboratory Blank Data Qualification Summary - SDG R0905462

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Trip Blank Data Qualification Summary - SDG R0905462

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Field Blank Data Qualification Summary - SDG R0905462

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905462	M-2AB	Chloromethane	0.21U ug/L	A	bf

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Pump Blank Data Qualification Summary - SDG R0905462

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234B1
SDG #: R0905462
Laboratory: Columbia Analytical Services

Date: 12/23/09
Page: 1 of 1
Reviewer: VG
2nd Reviewer:

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 9/24-25/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	SW	%RSD r²
IV.	Continuing calibration ~~ICV~~	SW	CCV ≤ 25%
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	SW	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	SW	D_1 = 4.6 D_2 = 5.7
XVII.	Field blanks	SW	TB = *3.8 FB = FB080409-GW (R0904290) PB = PB100209-A2 (R0905636)

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-89B	11	173080-MB	21		31	
2	M-89BDL	12	173360-	22		32	
3	TB092409-GW1	13		23		33	
4	M-2AB D1	14		24		34	
5	M-2ABDL D1	15		25		35	
6	M-2009AB D1	16		26		36	
7	M-2009ABDL D1	17		27		37	
8	TB092509-GW1	18		28		38	
9	M-89BMS	19		29		39	
10	M-89BMSD	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. ~~Methylene chloride~~ Dichloromethane	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG. Acrylonitrile
F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN. 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
G. Carbon disulfide	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachloroethane	OOO. 1,3,5-Trichlorobenzene	IIII. Isobutyl alcohol
H. 1,1-Dichloroethene**	BB. 1,1,2,2-Tetrachloroethane*	VV. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
I. 1,1-Dichloroethane*	CC. Toluene**	WW. Bromobenzene	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
J. 1,2-Dichloroethene, total	DD. Chlorobenzene*	XX. 1,2,3-Trichloropropane	RRR. m,p-Xylenes	LLLL. Ethyl ether
K. Chloroform**	EE. Ethylbenzene**	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
L. 1,2-Dichloroethane	FF. Styrene	ZZ. 2-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN. 2-Methyl-2-propanol
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	OOOO.
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	PPPP.
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	QQQQ.
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
Q. 1,2-Dichloropropane**	KK. Trichlorofluoromethane	EEE. sec-Butylbenzene	YYY. tert-Butanol	SSSS.
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohol	TTTT.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-Isopropyltoluene	AAAA. Ethyl tert-butyl ether	UUUU.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	VVVV.

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

LDC #: 22234B7
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration

Reviewer: JVG
2nd Reviewer: [illegible]

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 Did the laboratory perform a 5 point calibration prior to sample analysis?
(Y) N N/A Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's?
(Y) N N/A Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation? r ≥ 0.99
(Y) N N/A Did the initial calibration meet the acceptance criteria?
Y (N) N/A Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %RSD (Limit: ≤30.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	9/18/09	ICAL -HS10	NNNN		0.028	All + Blks	J/UJ/A (C)

LDC #: 22234B7
SDG #: Sy Creek

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: JVG
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?

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

Y (N) N/A Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤25.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	10/02/09	C1190	NNNN		0.027	1, 3, 4, 6, 8, 173080-MB	J/UJ/A (c)
	10/05/09	C1217	F (-)	25.3		2, 5, 7, 9, 10, 173300-MB	J-/UJ/A
			M (-)	26.9			↓
			NNNN		0.024		J/UJ/A

CONCAL.1SB

LDC #: 22234 B1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 1 of 4
Reviewer: JV
2nd Reviewer:

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

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

Blank units: ug/L **Associated sample units:** ug/L
Field blank type: (circle one) Field Blank / Rinsate / (Trip Blank) / Other: Associated Samples: 4-7 (ND)

Compound	Blank ID 8	Blank ID	Sample Identification							
Sampling Date	9/25/09									
NNNN	3.3									
F	8.8									

Blank units: ug/L **Associated sample units:** ug/L
Field blank type: (circle one) (Field Blank) / Rinsate / Trip Blank / Other: Associated Samples: 1, 2, 4-7 (bf)

Compound	FB080409-GW Blank ID	Blank ID	Sample Identification							
Sampling Date	8/04/09		4							
F	12									
A	0.31		0.21/4							
E	0.28									
CC	0.78									

LDC #: 22234 (B)
SDG #: La Cross

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JV6
2nd Reviewer: [illegible]

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

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

Blank units: ug/L **Associated sample units:** ug/L
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: PB Associated Samples: 1, 2, 4-7 (MD)

Compound	Blank ID PB100209-A2	Blank ID	Sample Identification							
Sampling Date	10/02/09									
F	10									
E	0.92									
CC	0.26									
CRQL										

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

Compound	Blank ID	Blank ID	Sample Identification							
Sampling Date										
CRQL										

LDC #: 22234B7
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: JVG
2nd Reviewer: [signature]

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

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

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

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

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

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		9/10	K	65 (70-130)	( )	( )	1, 2	No qual (MSD in)
			FF	65 ( )	60 (70-130)	( )	↓	↓ (LCS in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
H.	1,1-Dichloroethene	59-172%	≤ 22%	61-145%	≤ 14%
S.	Trichloroethene	62-137%	≤ 24%	71-120%	≤ 14%
V.	Benzene	66-142%	≤ 21%	76-127%	≤ 11%
CC.	Toluene	59-139%	≤ 21%	76-125%	≤ 13%
DD.	Chlorobenzene	60-133%	≤ 21%	75-130%	≤ 13%

LDC #: 22234 B7
SDG #: Su Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer:
2nd Reviewer:

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

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

[✓ Y] N N/A Was a LCS required?
Y [✓ N] N/A Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		173360-LCS	VV	126 (75-125)	( )	( )	2, 5, 7, 4, 173360-MB	No qual
				( )	( )	( )		(MS/MSD in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		

LDC #: 22234B1
SDG #: Su Cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and CRQLs

Reviewer: JVG
2nd Reviewer:

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

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

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

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

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		1, 4, 6	K > cal range		J dets /A (e)

Comments: See sample calculation verification worksheet for recalculations

LDC #: 22234 B1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Reviewer: MV
2nd Reviewer: [illegible]

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

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

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

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

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		1, 4, 6	K > cal range		X /A (o)
					↓ ↓
		2, 5, 7	All except K dil		

Comments: _____

LDC #: 22234 B1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

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

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

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

Compound	Concentration (ug/L)		RPD	Parent only
	4	6		
H	0.56	0.59	0.03 (≤ 2.0 D)	-
X	0.49	1.0 U	0.51 (≤ 1.0 D)	-
O	1.2	↓	0.20 ↓	-
K	1000	1000	0 (≤ 30% RPD)	-
A	0.21	2.0 U	1.79 (≤ 2.0 D)	-
2L	0.99	0.99	0 (≤ 1.0 D)	-

Compound	Concentration ( )		RPD
AA	0.50	0.59	0.09 (≤ 1.0 D) -
S	16	16	0 (≤ 30% RPD) -

Compound	Concentration (ug/L)		RPD	Parent only
	5	7		
K	1200	1200	0 (≤ 30% RPD)	-
LL	2.8	50 U	47.2 (≤ 50 D)	-
S	14	15	1 (≤ 10 D)	-

Compound	Concentration ( )		RPD

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: October 2 through October 7, 2009

LDC Report Date: December 30, 2009

Matrix: Water

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905636

Sample Identification

PB100209-A2
M-76B
M-76009B
TB100209-GW1
TB100209-GW2
MC-94B
TB100709-GW1
M-76BMS
M-76BMSD

Introduction

This data review covers 9 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

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

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

B The analytical result may be a false positive totally attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JB The analytical result may be biased high and partially attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JK The analytical result is an estimated maximum possible concentration (EMPC).

X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.

J-TDS The analytical result is estimated based on failure of the Total Dissolved Solids (TDS) correctness check performed in accordance with the Standard Method 1030E.

J-CAB The analytical result is estimated based on failure of the cation-anion balance correctness check performed in accordance with Standard Method 1030E.

J-TDS & CAB The analytical result is unreliable based on the failure of the cation-anion balance and TDS correctness check performed in accordance with standard Method 1030E.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (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
10/12/09	2-Methyl-2-propanol	36.3	PB100209-A2 TB100209-GW1	J- (all detects) UJ (all non-detects)	A
	2-Butanone	26.0	TB100209-GW2 TB100709-GW1 174383-MB	J- (all detects) UJ (all non-detects)	

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.

Samples TB100209-GW1, TB100209-GW2, and TB100709-GW1 were identified as trip blanks. No volatile contaminants were found in these blanks with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
TB100209-GW1	10/2/09	Acetone Chloromethane	3.6 ug/L 0.20 ug/L	PB100209-A2 M-76B M-76009B
TB100209-GW2	10/2/09	Acetone	1.8 ug/L	PB100209-A2 M-76B M-76009B

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
M-76B	Acetone	6.3 ug/L	6.3U ug/L
M-76009B	Acetone	3.9 ug/L	3.9U ug/L

Sample FB080409-GW (from SDG R0904290) was identified as a field blank. No volatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB080409-GW	8/4/09	Acetone Chloromethane Dichloromethane Toluene	12 ug/L 0.31 ug/L 0.28 ug/L 0.78 ug/L	M-76B M-76009B

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

Sample	Compound	Reported Concentration	Modified Final Concentration
M-76B	Acetone	6.3 ug/L	6.3U ug/L
M-76009B	Acetone	3.9 ug/L	3.9U ug/L

Sample PB100209-A2 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
PB100209-A2	10/2/09	Acetone Dichloromethane Toluene	10 ug/L 0.42 ug/L 0.26 ug/L	M-76B M-76009B

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	Compound	Reported Concentration	Modified Final Concentration
M-76B	Acetone	6.3 ug/L	6.3U ug/L
M-76009B	Acetone	3.9 ug/L	3.9U ug/L

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
174383LCS	Dichloromethane	74 (75-125)	PB100209-A2 TB100209-GW1 TB100209-GW2 TB100709-GW1 174383-MB	J- (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0905636	All compounds reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

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

XVI. Field Duplicates

Samples M-76B and M-76009B were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-76B	M-76009B				
1,1-Dichloroethene	0.45	0.44	-	0.01 (≤1.0)	-	-
Acetone	6.3	3.9	-	2.4 (≤20)	-	-
Chloroform	120	120	0 (≤30)	-	-	-
Bromoform	1.0U	0.30	-	0.70 (≤1.0)	-	-
Carbon tetrachloride	1.0U	0.58	-	0.42 (≤1.0)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Data Qualification Summary - SDG R0905636

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905636	PB100209-A2 TB100209-GW1 TB100209-GW2 TB100709-GW1	2-Methyl-2-propanol 2-Butanone	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	A	Continuing calibration (%D) (c)
R0905636	PB100209-A2 TB100209-GW1 TB100209-GW2 TB100709-GW1	Dichloromethane	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0905636	PB100209-A2 M-76B M-76009B TB100209-GW1 TB100209-GW2 MC-94B TB100709-GW1	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Laboratory Blank Data Qualification Summary - SDG R0905636

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Trip Blank Data Qualification Summary - SDG R0905636

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905636	M-76B	Acetone	6.3U ug/L	A	bt
R0905636	M-76009B	Acetone	3.9U ug/L	A	bt

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Field Blank Data Qualification Summary - SDG R0905636

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905636	M-76B	Acetone	6.3U ug/L	A	bf
R0905636	M-76009B	Acetone	3.9U ug/L	A	bf

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Pump Blank Data Qualification Summary - SDG R0905636

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905636	M-76B	Acetone	6.3U ug/L	A	bp
R0905636	M-76009B	Acetone	3.9U ug/L	A	bp

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234C1
SDG #: R0905636
Laboratory: Columbia Analytical Services

Date: 12/23/09
Page: 1 of 1
Reviewer: JM
2nd Reviewer: [signature]

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: 10/02-07/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	2 RSD r
IV.	Continuing calibration/ICV	SW	CCV ≤ 25 %
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	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 = 2, 3
XVII.	Field blanks	SW	PB = 1 TB = 4, 5, 7* FB = FB080409-GW (R0904290)

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 Blank

Validated Samples:

Water

1	PB100209-A2	11	174383-MB	21		31	
2	M-76B D	12	174548-	22		32	
3	M-76009B D	13		23		33	
4	TB100209-GW1	14		24		34	
5	TB100209-GW2	15		25		35	
6	MC-94B	16		26		36	
7	TB100709-GW1	17		27		37	
8	M-76BMS	18		28		38	
9	M-76BMSD	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. ~~Methylene chloride~~ Dichloromethane	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG. Acrylonitrile
F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN. 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
G. Carbon disulfide	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachloroethane	OOO. 1,3,5-Trichlorobenzene	IIII. Isobutyl alcohol
H. 1,1-Dichloroethene**	BB. 1,1,2,2-Tetrachloroethane*	VV. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
I. 1,1-Dichloroethane*	CC. Toluene**	WW. Bromobenzene	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
J. 1,2-Dichloroethene, total	DD. Chlorobenzene*	XX. 1,2,3-Trichloropropane	RRR. m,p-Xylenes	LLLL. Ethyl ether
K. Chloroform**	EE. Ethylbenzene**	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
L. 1,2-Dichloroethane	FF. Styrene	ZZ. 2-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN. 2-Methyl-2-propanol
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	OOOO.
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	PPPP.
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	QQQQ.
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
Q. 1,2-Dichloropropane**	KK. Trichlorofluoromethane	EEE. sec-Butylbenzene	YYY. tert-Butanol	SSSS.
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohol	TTTT.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-Isopropyltoluene	AAAA. Ethyl tert-butyl ether	UUUU.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	VVVV.

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

LDC #: 22234C1
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: JV6
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?
Y N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?
Y N N/A Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	10/12/09	X4881	NNNN (-)	36.3		1,4,5,7,174783-MB	J-/UJ/A (C)
			M (-)	26.0			

CONCAL.1SB

LDC #: 22234 C1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

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

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

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

Blank units: ug/L **Associated sample units:** ug/L
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: PB Associated Samples: 2, 3 (6p)

Compound	Blank ID 1	Blank ID	Sample Identification							
Sampling Date	10/02/09		2	3						
F	10		6.3/U	3.9/U						
E	0.42									
CC	0.26									

Blank units: ug/L **Associated sample units:** ug/L
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: Associated Samples: 1-3 (6t)

Compound	Blank ID 4	Blank ID 5	Sample Identification							
Sampling Date	10/02	10/09	1	2	3					
F	3.6	1.8	(10)	6.3/U	3.9/U					
A	0.20									

LDC #: 22234C1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 2 of 2
Reviewer: JVG
2nd Reviewer:

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

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

Blank units: ug/L **Associated sample units:** ug/L
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other:_____ Associated Samples: 2, 3 (bf)

Compound	Blank ID FB080406-6W	Blank ID	Sample Identification							
Sampling Date	8/04/09		2	3						
F	12		6.3/U	3.9/U						
A	0.31									
E	0.28									
CC	0.78									

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

Compound	Blank ID	Blank ID	Sample Identification							
Sampling Date										

LDC #: 22234C1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: JVG
2nd Reviewer: [illegible]

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

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

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

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

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

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		8/9	MMM	44 (51-150)	( )	59 (30)	2	No qual (MSD in)
			FF	44 (70-130)	50 (70-130)	( )	↓	↓ (LCS in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
H.	1,1-Dichloroethene	59-172%	≤ 22%	61-145%	≤ 14%
S.	Trichloroethene	62-137%	≤ 24%	71-120%	≤ 14%
V.	Benzene	66-142%	≤ 21%	76-127%	≤ 11%
CC.	Toluene	59-139%	≤ 21%	76-125%	≤ 13%
DD.	Chlorobenzene	60-133%	≤ 21%	75-130%	≤ 13%

LDC #: 22234C1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: JVG
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?
Y [✓ N] N/A Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		174383 LCS	E	74 (75-125)	( )	( )	1, 4, 5, 7, 174383-MB	J-/UJ/P (l)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		

LDC #: 22234C1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: JVG
2nd reviewer: ✓

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

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

Compound	Concentration (ug/L)		RPD (parent only)
	2	3	
H	0.45	0.44	0.01 (≤1.0 D)
F	6.3	3.9	2.4 (≤20 D)
K	120	120	0 (≤30% RPD)
X	1.04	0.30	0.70 (≤1.0 D)
O	↓	0.58	0.42 ↓

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: October 6, 2009

LDC Report Date: January 4, 2010

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Stage 4

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905693

Sample Identification

EB100609-SO1A4
SA138-0.5B
SA138-10B
SA138009-10B
SA138-30B
SA138-45B
SA103-0.5B
SA103-10B
SA103009-10B
SA103-25B
SA103-25BRE
SA103-35B
RSAR5-0.5B
RSAR5-10B
RSAR5-25B
RSAR5-40B
RSAS5-0.5B
RSAS5-10B
RSAS5-25B
RSAS5-36B
RSAS5009-36B
TB100609-SO1
TB100609-SO2
TB100609-SO3
RSAR5-40BMS
RSAR5-40BMSD

Introduction

This data review covers 22 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.

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
10/15/09	Bromomethane	25.3	SA138-0.5B SA138-10B SA138009-10B SA138-30B SA138-45B SA103-0.5B SA103-10B RSAR5-40B RSAR5-40BMS RSAR5-40BMSD 174949-MB	J- (all detects) UJ (all non-detects)	A
10/15/09	Acetone	38.0	SA138-0.5B SA138-10B SA138009-10B SA138-30B SA138-45B SA103-0.5B SA103-10B RSAR5-40B RSAR5-40BMS RSAR5-40BMSD 174949-MB	J+ (all detects)	A

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

V. Blanks

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

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
174949-MB	10/15/09	Dichloromethane	1.2 ug/Kg	SA138-0.5B SA138-10B SA138009-10B SA138-30B SA138-45B SA103-0.5B SA103-10B RSAR5-40B
175080-MB	10/16/09	Dichloromethane	0.46 ug/Kg	SA103009-10B SA103-25B SA103-25BRE SA103-35B RSAR5-0.5B RSAR5-10B RSAR5-25B RSAS5-0.5B RSAS5-10B RSAS5-25B RSAS5-36B RSAS5009-36B

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
SA138-10B	Dichloromethane	0.54 ug/Kg	0.54U ug/Kg

Samples TB100609-SO1, TB100609-SO2, and TB100609-SO3 were identified as trip blanks. No volatile contaminants were found in these blanks with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
TB100609-SO3	10/6/09	Acetone	6.5 ug/L	EB100609-SO1A4 SA138-0.5B SA138-10B SA138009-10B SA138-30B SA138-45B SA103-0.5B SA103-10B SA103009-10B SA103-25B SA103-25BRE SA103-35B

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
EB100609-SO1A4	Acetone	2.5 ug/L	2.5U ug/L
SA138-0.5B	Acetone	2.3 ug/Kg	2.3U ug/Kg
SA138-10B	Acetone	6.0 ug/Kg	6.0U ug/Kg
SA138009-10B	Acetone	4.8 ug/Kg	4.8U ug/Kg
SA138-30B	Acetone	5.8 ug/Kg	5.8U ug/Kg
SA103009-10B	Acetone	2.7 ug/Kg	2.7U ug/Kg
SA103-25B	Acetone	7.0 ug/Kg	7.0U ug/Kg

Sample EB100609-SO1A4 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
EB100609-SO1A4	10/6/09	Acetone Hexachlorobutadiene Bromoform	2.5 ug/L 0.29 ug/L 0.39 ug/L	All soil samples in SDG R0905693

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

Sample	Compound	Reported Concentration	Modified Final Concentration
SA138-0.5B	Acetone	2.3 ug/Kg	2.3U ug/Kg
SA138009-10B	Acetone	4.8 ug/Kg	4.8U ug/Kg
SA103009-10B	Acetone	2.7 ug/Kg	2.7U ug/Kg
RSAR5-10B	Acetone	2.8 ug/Kg	2.8U ug/Kg
RSAR5-40B	Acetone	4.0 ug/Kg	4.0U ug/Kg
RSAS5-0.5B	Acetone	3.9 ug/Kg	3.9U ug/Kg

Sample FB080309-SO (from SDG R0904279) 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
FB080309-SO	8/3/09	Acetone Toluene	2.1 ug/L 0.30 ug/L	All soil samples in SDG R0905693

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
SA138-0.5B	Acetone	2.3 ug/Kg	2.3U ug/Kg

Sample	Compound	Reported Concentration	Modified Final Concentration
SA103009-10B	Acetone	2.7 ug/Kg	2.7U ug/Kg
RSAR5-10B	Acetone	2.8 ug/Kg	2.8U ug/Kg
RSAR5-40B	Acetone	4.0 ug/Kg	4.0U ug/Kg
RSAS5-0.5B	Acetone	3.9 ug/Kg	3.9U ug/Kg
RSAS5-10B	Toluene	0.53 ug/Kg	0.53U ug/Kg

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
175080-LCS	Acetone	137 (75-125)	SA103009-10B SA103-25B SA103-25BRE SA103-35B RSAR5-0.5B RSAR5-10B RSAR5-25B RSAS5-0.5B RSAS5-10B RSAS5-25B RSAS5-36B RSAS5009-36B 175080-MB	J+ (all detects)	P

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
175080-LCS	Carbon tetrachloride Chloromethane Hexachlorobutadiene	74 (75-125) 67 (75-125) 61 (75-125)	SA103009-10B SA103-25B SA103-25BRE SA103-35B RSAR5-0.5B RSAR5-10B RSAR5-25B RSAS5-0.5B RSAS5-10B RSAS5-25B RSAS5-36B RSAS5009-36B 175080-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:

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
SA103-25B	Pentafluorobenzene 1,4-Dichlorobenzene-d4	178670 (268036-1072144) 174783 (191752-767008)	Chloromethane Bromomethane Vinyl chloride Dichloromethane Acetone 1,1-Dichloroethene 1,1-Dichloroethane Chloroform 2-Butanone 1,1,1-Trichloroethane Dichlorodifluoromethane Trichlorofluoromethane Methyl-tert-butyl ether 2,2-Dichloropropane Bromochloromethane trans-1,2-Dichloroethene cis-1,2-Dichloroethene Di-isopropyl ether Ethyl-tert-butyl ether tert-Amyl-methyl ether 2-Methyl-2-propanol 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

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
SA103-25BRE	Pentafluorobenzene 1,4-Dichlorobenzene-d4	226153 (268036-1072144) 180040 (191752-767008)	Chloromethane Bromomethane Vinyl chloride Dichloromethane Acetone 1,1-Dichloroethene 1,1-Dichloroethane Chloroform 2-Butanone 1,1,1-Trichloroethane Dichlorodifluoromethane Trichlorofluoromethane Methyl-tert-butyl ether 2,2-Dichloropropane Bromochloromethane trans-1,2-Dichloroethene cis-1,2-Dichloroethene Di-isopropyl ether Ethyl-tert-butyl ether tert-Amyl-methyl ether 2-Methyl-2-propanol 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

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 R0905693	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 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
SA103-25BRE	All TCL compounds	X	A

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

XVI. Field Duplicates

Samples SA138-10B and SA138009-10B, samples SA103-10B and SA103009-10B, and samples RSAS5-36B and RSAS5009-36B were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA138-10B	SA138009-10B				
Acetone	6.0	4.8	-	1.2 (≤22)	-	-
Dichloromethane	0.54	4.8U	-	4.26 (≤4.8)	-	-
Toluene	0.66	0.62	-	0.04 (≤5.6)	-	-

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA103-10B	SA103009-10B				
Acetone	26U	2.7	-	23.3 (≤26)	-	-

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAS5-36B	RSAS5009-36B				
2-Butanone	14U	1.1	-	12.9 (≤14)	-	-
Acetone	28U	8.1	-	19.9 (≤28)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Data Qualification Summary - SDG R0905693

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905693	SA138-0.5B SA138-10B SA138009-10B SA138-30B SA138-45B SA103-0.5B SA103-10B RSAR5-40B	Bromomethane	J- (all detects) UJ (all non-detects)	A	Continuing calibration (RRF) (c)
R0905693	SA138-0.5B SA138-10B SA138009-10B SA138-30B SA138-45B SA103-0.5B SA103-10B RSAR5-40B	Acetone	J+ (all detects)	A	Continuing calibration (RRF) (c)
R0905693	SA103009-10B SA103-25B SA103-25BRE SA103-35B RSAR5-0.5B RSAR5-10B RSAR5-25B RSAS5-0.5B RSAS5-10B RSAS5-25B RSAS5-36B RSAS5009-36B	Acetone	J+ (all detects)	P	Laboratory control samples (%R) (l)
R0905693	SA103009-10B SA103-25B SA103-25BRE SA103-35B RSAR5-0.5B RSAR5-10B RSAR5-25B RSAS5-0.5B RSAS5-10B RSAS5-25B RSAS5-36B RSAS5009-36B	Carbon tetrachloride Chloromethane Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905693	SA103-25B SA103-25BRE	Chloromethane Bromomethane Vinyl chloride Dichloromethane Acetone 1,1-Dichloroethene 1,1-Dichloroethane Chloroform 2-Butanone 1,1,1-Trichloroethane Dichlorodifluoromethane Trichlorofluoromethane Methyl-tert-butyl ether 2,2-Dichloropropane Bromochloromethane trans-1,2-Dichloroethene cis-1,2-Dichloroethene Di-isopropyl ether Ethyl-tert-butyl ether tert-Amyl-methyl ether 2-Methyl-2-propanol 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) (i)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905693	EB100609-SO1A4 SA138-0.5B SA138-10B SA138009-10B SA138-30B SA138-45B SA103-0.5B SA103-10B SA103009-10B SA103-25B SA103-25BRE SA103-35B RSAR5-0.5B RSAR5-10B RSAR5-25B RSAR5-40B RSAS5-0.5B RSAS5-10B RSAS5-25B RSAS5-36B RSAS5009-36B TB100609-SO1 TB100609-SO2 TB100609-SO3	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (PQL) (sp)
R0905693	SA103-25BRE	All TCL compounds	X	A	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Laboratory Blank Data Qualification Summary - SDG R0905693

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905693	SA138-10B	Dichloromethane	0.54U ug/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Trip Blank Data Qualification Summary - SDG R0905693

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905693	EB100609-SO1A4	Acetone	2.5U ug/L	A	bt
R0905693	SA138-0.5B	Acetone	2.3U ug/Kg	A	bt
R0905693	SA138-10B	Acetone	6.0U ug/Kg	A	bt
R0905693	SA138009-10B	Acetone	4.8U ug/Kg	A	bt

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905693	SA138-30B	Acetone	5.8U ug/Kg	A	bt
R0905693	SA103009-10B	Acetone	2.7U ug/Kg	A	bt
R0905693	SA103-25B	Acetone	7.0U ug/Kg	A	bt

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Equipment Blank Data Qualification Summary - SDG R0905693

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905693	SA138-0.5B	Acetone	2.3U ug/Kg	A	be
R0905693	SA138009-10B	Acetone	4.8U ug/Kg	A	be
R0905693	SA103009-10B	Acetone	2.7U ug/Kg	A	be
R0905693	RSAR5-10B	Acetone	2.8U ug/Kg	A	be
R0905693	RSAR5-40B	Acetone	4.0U ug/Kg	A	be
R0905693	RSAS5-0.5B	Acetone	3.9U ug/Kg	A	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Field Blank Data Qualification Summary - SDG R0905693

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905693	SA138-0.5B	Acetone	2.3U ug/Kg	A	bf
R0905693	SA103009-10B	Acetone	2.7U ug/Kg	A	bf
R0905693	RSAR5-10B	Acetone	2.8U ug/Kg	A	bf
R0905693	RSAR5-40B	Acetone	4.0U ug/Kg	A	bf
R0905693	RSAS5-0.5B	Acetone	3.9U ug/Kg	A	bf
R0905693	RSAS5-10B	Toluene	0.53U ug/Kg	A	bf

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 4

LDC #: 22234D1
SDG #: R0905693
Laboratory: Columbia Analytical Services

Date: 12/28/09
Page: 1 of 1
Reviewer: JV6
2nd Reviewer: W

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: 10/06/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	%RSD r²
IV.	Continuing calibration/ICV	SW	CCV ≤ 25%
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	SW	
XI.	Target compound identification	A	
XII.	Compound quantitation/CRQLs	~~JVE~~ SW A	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	A	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	SW	D_1 = 3,4 D_2 = 8,9 D_3 = 20,21
XVII.	Field blanks	SW	EB = 1 TB = 22, 23, 24 FB = FB080309-SO (CR0904279)

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

1	1	EB100609-SO1A4	W	11	3	SA103-25BDL RE	S	21	3	RSAS5009-36B D_3	S	31	1	174548-MB
2	2	SA138-0.5B	S	12	3	SA103-35B		22	1	TB100609-SO1	W	32	2	174949-
3	2	SA138-10B D_1		13	3	RSAR5-0.5B		23	1	TB100609-SO2		33	3	175080-
4	2	SA138009-10B D_1		14	3	RSAR5-10B		24	1	TB100609-SO3		34		
5	2	SA138-30B		15	3	RSAR5-25B		25	2	RSAR5-40BMS	S	35		
6	2	SA138-45B		16	2	RSAR5-40B		26	2	RSAR5-40BMSD		36		
7	2	SA103-0.5B		17	3	RSAS5-0.5B		27				37		
8	2	SA103-10B D_2		18	3	RSAS5-10B		28				38		
9	3	SA103009-10B D_2		19	3	RSAS5-25B		29				39		
10	3	SA103-25B		20	2	RSAS5-36B D_3		30				40		

884
940
942

LDC #: 22234 D1
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Reviewer: NV
2nd Reviewer: V

Method: Volatiles (EPA SW 846 Method 8260B)

Validation Area	Yes	No	NA	Findings/Comments
I. 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) ≤ 30% and relative response factors (RRF) > 0.05?	✓			
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) < 25% and relative response factors (RRF) > 0.05?		✓		
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	✓			
VI. Surrogate spikes				
Were all surrogate %R within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		✓		
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			

LDC #: 22234 D1
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Reviewer: JVC
2nd Reviewer: [illegible]

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

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

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

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

PFB [redacted] DCB

LDC #: 22234D1
SDG #: Cw Creek

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG
2nd Reviewer: [illegible]

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

#	Date	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	10/15/09	H1684	B (-)	25.3		2-8, 16 25, 26,	J-/UJ/A C
			F (+)	38.0		1749 49- MB	J+ dets /A

LDC #: 22234 D1
SDG #: Sq Cmpy

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: MG
2nd Reviewer:

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

Y N N/A Was a method blank associated with every sample in this SDG?
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.

Blank analysis date: 10/15/09
Conc. units: ug/kg
Associated Samples: 2-8 16 (bl)

Compound	Blank ID	Sample Identification								
	174944-MB	3								
E	1.2	0.54/U								
		(All	others	either	ND	or >	MB)			

Blank analysis date: 10/16/09
Conc. units: ug/kg
Associated Samples: 9-15, 17-21

Compound	Blank ID	Sample Identification								
	175080-MB		(All	results	either	ND	or >	MB)		
E	0.46									

LDC #: 22334 D1
SDG #: Sc Cmpy

VALIDATION FINDINGS WORKSHEET
Field Blanks

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)
Y N /N/A Were field blanks identified in this SDG?
Y/N N/A Were target compounds detected in the field blanks?
Blank units: ug/L **Associated sample units:** ug/kg ; ug/L
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: Associated Samples: 1-12 (6t)

Compound	Blank ID 24	Blank ID	Sample Identification							
Sampling Date	10/06/09	1	2	3	4	5	9	10		
F	6.5	2.5/4	2.3/4	6.0/4	4.8/4	5.8/4	2.7/4	7.0/4		
			CAll	others	either	ND	or	TB)		
CRQL										

13.0

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

Compound	Blank ID	Blank ID	Sample Identification							
Sampling Date										
CRQL										

LDC #: 22234 DJ
SDG #: Sy Creek

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 1 of 2
Reviewer: JM
2nd Reviewer: [illegible]

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

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

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

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

Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: EB Associated Samples: All soils (6e)

Compound	Blank ID 1	Blank ID	Sample Identification							
Sampling Date	10/04/09		2	4	9	14	16	17		
5.0 F	2.5		2.3/U	4.8/U	2.7/U	2.8/U	4.0/U	3.9/U		
LLL	0.29									
X	0.39									
	(All	others	either	ND	or	>	EB)			
CRQL										

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

Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: Associated Samples: All soils (6f)

Compound	FB080309-S10 Blank ID	Blank ID	Sample Identification							
Sampling Date	8/03/09		2	9	14	16	17	18		
4.2 F	2.9		2.3/U	2.7/U	2.8/U	4.0/U	3.9/U			
0.6 CC	0.30							0.53/U		
		(All	others	either	ND	or	>	FB)		
CRQL										

LDC #: 22239D1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: JN6
2nd Reviewer:

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

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

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

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

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

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		25/26	NNN	48 (70-130)	62 (70-130)	( )	16	No qual (LLS in)
			XX	66 ( )	( )	( )		(MSD in)
			KKK	57 ( )	69 ( )	( )		(LCS in)
			Z	41 ( )	51 ( )	( )		
			Y	57 ( )	65 ( )	( )		
			JJ	58 ( )	61 ( )	( )		
			LLL	63 ( )	( )	( )		(MSD in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
H.	1,1-Dichloroethene	59-172%	< 22%	61-145%	< 14%
S.	Trichloroethene	62-137%	< 24%	71-120%	< 14%
V.	Benzene	66-142%	< 21%	76-127%	< 11%
CC.	Toluene	59-139%	< 21%	76-125%	< 13%
DD.	Chlorobenzene	60-133%	< 21%	75-130%	< 13%

LDC #: 22234D1
SDG #: See Cover

Page: 1 of 1
Reviewer: DR
2nd Reviewer: [illegible]

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

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

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		175080-LCS	F	137 (75-125)	( )	( )	9-15, 17-21,	J+ dets/P (L)
			O	74 (↓)	( )	( )	175080-MB	J-/UJ/P ↓
			A	67 ( )	( )	( )		
			LLL	61 ( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		

LDC #: 22234 D1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Internal Standards

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

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

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

Y (N) N/A Were all internal standard area counts within -50 to +100% of the associated calibration standard?

(Y) N N/A Were the retention times of the internal standards within +/- 30 seconds of the retention times of the associated calibration standard?

#	Date	Sample ID	Internal Standard	Area (Limits)	RT (Limits)	Qualifications
		10	PFB	178670 (268036 - 1072144)		J/UJ/A (i)
			4DCB	174783 (191752 - 767008)		
		11	PFB	226153		
			4DCB	180040		
						(Please see TCL for associated cpds)

(BCM) = Bromochloromethane
(DFB) = 1,4-Difluorobenzene
(CBZ) = Chlorobenzene-d5
(PFB) = Pentafluorobenzene
(4DCB) = 1,4-Dichlorobenzene-d4
(2DCB) = 1,2-Dichlorobenzene-d4
(FBZ) = Fluorobenzene

LDC #: 22234D1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Reviewer: JVG
2nd Reviewer: JV

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

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

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

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

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		11	Confirmation run	for #10	N/A (O)

Comments: _____

LDC #: 22234D1
SDG #: Su Cruz

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: JVG
2nd reviewer: [signature]

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

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

Compound	Concentration (ug/kg) 3	4	RPD (Parent only)
F	6.0	4.8	1.2 (≤ 22D) -
E	0.54	4.8 U	4.26 (≤ 4.8D) -
CC	0.66	0.62	0.04 (≤ 5.6D) -

Compound	Concentration (ug/kg) 8	9	RPD
F	26 U	2.7	23.3 (≤ 26 D) -

Compound	Concentration (ug/kg) 20	21	RPD
M	14 U	1.1	12.9 (≤ 14 D) -
F	28 U	8.1	19.9 (≤ 28 D) -

Compound	Concentration ( )		RPD

LDC #: 22234D19
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JV
2nd Reviewer: [illegible]

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

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

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

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

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

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported RRF (SD std)	Recalculated RRF (SD std)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported %RSD	Recalculated %RSD
1	ICAL MS17	9/15/09	C (1st internal standard)	0.699	0.699	0.648	0.648	6.8	6.8
			S (2nd internal standard)	0.308	0.308	0.306	0.307	4.4	4.4
			EE (3rd internal standard)	0.571	0.571	0.558	0.558	3.7	3.7
2			BB (1st internal standard)	0.594	0.594	0.581	0.581	4.3	4.3
			(2nd internal standard)						
			(3rd internal standard)						
3	ICAL MS 7	9/13/09	C (1st internal standard)	0.422	0.422	0.414	0.414	11.9	11.9
			S (2nd internal standard)	0.327	0.327	0.319	0.319	11.7	11.7
			EE (3rd internal standard)	1.576	1.576	1.497	1.497	9.2	9.2
4			BB (1st internal standard)	1.159	1.159	1.143	1.143	10.8	10.8
			(2nd internal standard)						
			(3rd internal standard)						

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

LDC #: 22234Q1
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: JVC
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
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	X4909	10/13/09	C (1st internal standard)	0.648	0.649	0.649	0.2	0.2
			S (2nd internal standard)	0.306	0.311	0.311	1.6	1.6
			EE (3rd internal standard)	0.558	0.544	0.544	2.5	2.5
			BB (4th internal standard)	0.581	0.475	0.475	18.2	18.2
2	H1684	10/15/09	C (1st internal standard)	0.414	0.333	0.333	19.6	19.6
			S (2nd internal standard)	0.319	0.286	0.286	10.3	10.3
			EE (3rd internal standard)	1.417	1.395	1.395	6.8	6.8
			BB (4th internal standard)	1.143	1.017	1.017	11.0	11.0
3	H1713	10/16/09	C (1st internal standard)		0.412	0.412	0.5	0.5
			S (2nd internal standard)		0.359	0.359	12.5	12.6
			EE (3rd internal standard)		1.661	1.661	11.0	11.0
			BB (4th internal standard)	↓	1.152	1.152	0.8	0.8
4			(1st internal standard)					
			(2nd internal standard)					
			(3rd internal standard)					
			(4th internal standard)					

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

LDC #: 22234D1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

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

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

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

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: #1

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8	50	52.68	105	105	0
Bromofluorobenzene		52.49	105	105	
1,2-Dichloroethane-d4					
Dibromofluoromethane		53.48	107	107	

Sample ID:

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

Sample ID:

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

Sample ID:

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

Sample ID:

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

LDC #: 22234 D1
SDG #: Sw Cmer

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: JV
2nd Reviewer: [signature]

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

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

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

Where: SSC = Spiked sample concentration; SA = Spike added; SC = Sample concentration

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

MSC = Matrix spike percent recovery; MSDC = Matrix spike duplicate percent recovery

MS/MSD sample: 25/26

Compound	Spike Added (ug/kg)		Sample Concentration (ug/kg)	Spiked Sample Concentration (ug/kg)		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	----	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
1,1-Dichloroethene	86.7	90.8	0	79.6	86.7	92	92	95	95	9	9
Trichloroethene	↓	↓		69.8	76.6	80	80	84	84	9	9
Benzene				69.1	76.8	80	80	85	85	10	11
Toluene				69.6	81.5	80	80	90	90	16	16
Chlorobenzene	↓	↓		65.2	75.2	75	75	83	83	14	14

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

LDC #: 22234 D7
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Page: 1 of 1
Reviewer: JVG
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

RPD = I LCS - LCSD I * 2/(LCS + LCSD) LCS = Laboraotry control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS ID: 174598LCS

Compound	Spike Added (ug/L)		Spiked Sample Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
1,1-Dichloroethene	20.0	NA	24.8	NA	124	124				
Trichloroethene			21.1		105	105				
Benzene			20.5		102	102				
Toluene			21.4		107	107				
Chlorobenzene			21.2		106	106				

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 #: 22234D7
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: JVG
2nd reviewer:

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

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

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

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

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

RRF = Relative response factor of the calibration standard.

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

Df = Dilution factor.

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

Example:

Sample I.D. # 5 , K :

Conc. = $\frac{(24038)(50)(5\ ml)}{(497281)(0.902)(0.624)(5.13g)}$

= 4.18

≈ 4.2 ug/kg

#	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 7 through October 8, 2009

LDC Report Date: January 4, 2010

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905744

Sample Identification

RSAP5-0.5B
RSAP5-10B
RSAP5009-10B
RSAP5-25B
RSAP5-39B
SA192-0.5B
SA192-10B
SA192-25B
SA192-39B
TB100709-SO1
EB100809-SO1A3
SA130-0.5B
SA130-10B
SA130-25B
SA130-43B
RSAP6-0.5B
RSAP6-10B
RSAP6-25B
RSAP6-44B
TB100809-SO1
TB100809-SO3
SA192-10BMS
SA192-10BMSD

Introduction

This data review covers 19 soil samples and 4 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

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

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

B The analytical result may be a false positive totally attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JB The analytical result may be biased high and partially attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JK The analytical result is an estimated maximum possible concentration (EMPC).

X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.

J-TDS The analytical result is estimated based on failure of the Total Dissolved Solids (TDS) correctness check performed in accordance with the Standard Method 1030E.

J-CAB The analytical result is estimated based on failure of the cation-anion balance correctness check performed in accordance with Standard Method 1030E.

J-TDS & CAB The analytical result is unreliable based on the failure of the cation-anion balance and TDS correctness check performed in accordance with standard Method 1030E.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

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

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
9/18/09	2-Methyl-2-propanol	0.028 (≥0.05)	All water samples in SDG R0905744	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
10/19/09	Dichlorodifluoromethane	29.5	RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-39B SA192-0.5B SA192-10B SA192-25B SA192-39B SA130-0.5B SA130-10B SA130-25B SA130-43B RSAP6-10B RSAP6-25B SA192-10BMS SA192-10BMSD 175353-MB	J- (all detects) UJ (all non-detects)	A
10/20/09	Bromomethane Trichlorofluoromethane	28.6 25.6	RSAP5-25B RSAP6-0.5B RSAP6-44B 175570-MB	J+ (all detects) J+ (all detects)	A

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
10/15/09	2-Methyl-2-propanol	0.026 (≥0.05)	All water samples in SDG R0905744	J (all detects) UJ (all non-detects)	A

V. Blanks

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

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
175353-MB	10/19/09	Dichloromethane	0.45 ug/Kg	RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-39B SA192-0.5B SA192-10B SA192-25B SA192-39B SA130-0.5B SA130-10B SA130-25B SA130-43B RSAP6-10B RSAP6-25B
175570-MB	10/20/09	Acetone Dichloromethane	2.5 ug/Kg 0.47 ug/Kg	RSAP5-25B RSAP6-0.5B RSAP6-44B

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

Samples TB100709-SO1, TB100809-SO1, and TB100809-SO3 were identified as trip blanks. No volatile contaminants were found in these blanks with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
TB100709-SO1	10/7/09	Bromoform	0.44 ug/L	RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-25B RSAP5-39B SA192-0.5B SA192-10B SA192-25B SA192-39B
TB100809-SO1	10/8/09	Bromoform	0.46 ug/L	SA130-0.5B SA130-10B SA130-25B SA130-43B RSAP6-0.5B RSAP6-10B RSAP6-25B RSAP6-44B

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

Sample EB100809-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
EB100809-SO1A3	10/8/09	Acetone	4.3 ug/L	SA130-0.5B SA130-10B SA130-25B SA130-43B RSAP6-0.5B RSAP6-10B RSAP6-25B RSAP6-44B

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

Sample	Compound	Reported Concentration	Modified Final Concentration
RSAP6-10B	Acetone	6.9 ug/Kg	6.9U ug/Kg

Samples FB080309-SO (from SDG R0904279) and FB082809-SO (from SDG R0904894) were identified as field blanks. No volatile contaminants were found in these blanks with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB080309-SO	8/3/09	Acetone Toluene	2.1 ug/L 0.30 ug/L	RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-25B RSAP5-39B SA192-0.5B SA192-10B SA192-25B SA192-39B
FB082809-SO	8/28/09	Acetone Toluene	9.2 ug/L 0.44 ug/L	SA130-0.5B SA130-10B SA130-25B SA130-43B RSAP6-0.5B RSAP6-10B RSAP6-25B RSAP6-44B

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
RSAP5-10B	Acetone	2.9 ug/Kg	2.9U ug/Kg
SA130-0.5B	Acetone	11 ug/Kg	11U ug/Kg
SA130-10B	Acetone Toluene	8.9 ug/Kg 0.37 ug/Kg	8.9U ug/Kg 0.37U ug/Kg
SA130-25B	Toluene	0.69 ug/Kg	0.69U ug/Kg
SA130-43B	Acetone	12 ug/Kg	12U ug/Kg
RSAP6-0.5B	Acetone	15 ug/Kg	15U ug/Kg
RSAP6-10B	Acetone	6.9 ug/Kg	6.9U ug/Kg
RSAP6-44B	Acetone	9.0 ug/Kg	9.0U ug/Kg

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
175570LCS	1,1-Dichloroethene	137 (75-125)	RSAP5-25B RSAP6-0.5B RSAP6-44B 175570-MB	J+ (all detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0905744	All compounds reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

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

XVI. Field Duplicates

Samples RSAP5-10B and RSAP5009-10B were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAP5-10B	RSAP5009-10B				
Acetone	2.9	7.7	-	4.8 (≤21)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Data Qualification Summary - SDG R0905744

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905744	TB100709-SO1 EB100809-SO1A3 TB100809-SO1 TB100809-SO3	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Initial calibration (RRF) (c)
R0905744	RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-39B SA192-0.5B SA192-10B SA192-25B SA192-39B SA130-0.5B SA130-10B SA130-25B SA130-43B RSAP6-10B RSAP6-25B	Dichlorodifluoromethane	J- (all detects) UJ (all non-detects)	A	Continuing calibration (%D) (c)
R0905744	RSAP5-25B RSAP6-0.5B RSAP6-44B	Bromomethane Trichlorofluoromethane	J+ (all detects) J+ (all detects)	A	Continuing calibration (%D) (c)
R0905744	TB100709-SO1 EB100809-SO1A3 TB100809-SO1 TB100809-SO3	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Continuing calibration (RRF) (c)
R0905744	RSAP5-25B RSAP6-0.5B RSAP6-44B	1,1-Dichloroethene	J+ (all detects)	P	Laboratory control samples (%R) (l)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905744	RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-25B RSAP5-39B SA192-0.5B SA192-10B SA192-25B SA192-39B TB100709-SO1 EB100809-SO1A3 SA130-0.5B SA130-10B SA130-25B SA130-43B RSAP6-0.5B RSAP6-10B RSAP6-25B RSAP6-44B TB100809-SO1 TB100809-SO3	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (PQL) (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Laboratory Blank Data Qualification Summary - SDG R0905744

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Trip Blank Data Qualification Summary - SDG R0905744

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Equipment Blank Data Qualification Summary - SDG R0905744

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905744	RSAP6-10B	Acetone	6.9U ug/Kg	A	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Field Blank Data Qualification Summary - SDG R0905744

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905744	RSAP5-10B	Acetone	2.9U ug/Kg	A	bf
R0905744	SA130-0.5B	Acetone	11U ug/Kg	A	bf

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905744	SA130-10B	Acetone Toluene	8.9U ug/Kg 0.37U ug/Kg	A	bf
R0905744	SA130-25B	Toluene	0.69U ug/Kg	A	bf
R0905744	SA130-43B	Acetone	12U ug/Kg	A	bf
R0905744	RSAP6-0.5B	Acetone	15U ug/Kg	A	bf
R0905744	RSAP6-10B	Acetone	6.9U ug/Kg	A	bf
R0905744	RSAP6-44B	Acetone	9.0U ug/Kg	A	bf

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234E1
SDG #: R0905744
Laboratory: Columbia Analytical Services

Date: 12/24/09
Page: 1 of 1
Reviewer: JVC
2nd Reviewer: W

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: 10/07-08/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	SW	2 RSD ≤
IV.	Continuing calibration/~~ICV~~	SW	CCV ≤ 25%
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	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 = 2, 3
XVII.	Field blanks	SW	TB = 10, 20, 21 EB = 11 FB = FB080309-SO (R0904279) ↓ FB082806-SO (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: Soil + Water

1	1	RSAP5-0.5B	S	11	3	EB100809-SO1A3	W	21	3	TB100809-SO3	W	31	1	175353-MB	0111
2	1	RSAP5-10B	D	12	1	SA130-0.5B	S	22	1	SA192-10BMS	S	32	1	175570-	0184
3	1	RSAP5009-10B	D	13	1	SA130-10B		23	1	SA192-10BMSD	↓	33	3	175030-	0457
4	1	RSAP5-25B		14	1	SA130-25B		24				34			
5	1	RSAP5-39B		15	1	SA130-43B		25				35			
6	1	SA192-0.5B		16	2	RSAP6-0.5B		26				36			
7	1	SA192-10B		17	1	RSAP6-10B		27				37			
8	1	SA192-25B		18	1	RSAP6-25B		28				38			
9	1	SA192-39B	↓	19	2	RSAP6-44B	↓	29				39			
10	3	TB100709-SO1	W	20	3	TB100809-SO1	W	30				40			

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

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

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

LDC #: 22234 E1
SDG #: Su Cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration

Reviewer: JVG
2nd Reviewer: L

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

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

(Y) N N/A Did the laboratory perform a 5 point calibration prior to sample analysis?
(Y) N N/A Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's?
(Y) N N/A Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation? r² ≥ 0.99
(Y) N N/A Did the initial calibration meet the acceptance criteria?
Y (N) N/A Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %RSD (Limit: ≤30.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	9/18/09	ICAL-MS10	NNNN		0.028	10, 11, 20, 21, 175030-MB	J/UJ/A (C)

LDC #: 22234 E1
SDG #: Eq Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: JV
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?
Y N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?
Y N N/A Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤25.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	10/15/09	C1458	NNNN		0.026	10, 11, 20, 21, 175030-MB	J/UJ/A (c)
	10/19/09	X5038	JJ (-)	29.5		1-3, 5-9, 12-15, 17, 18, 22, 23, 175353-MB	J-/UJ/A
	10/20/09	X5066	B (+)	28.6		4, 16, 19, 175570-MB	J+ dets/A
			kk (+)	25.6			

LDC #: 22234E1
SDG #: Sc Canyon

VALIDATION FINDINGS WORKSHEET
Blanks

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

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

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

Y N N/A Was a method blank associated with every sample in this SDG?
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.

Blank analysis date: 10/19/09
Conc. units: ug/kg
Associated Samples: 1-3, 5-9, 12-15, 17, 18 (ND)

Compound	Blank ID	Sample Identification								
	175353-MB									
E	0.45									

Blank analysis date: 10/20/09
Conc. units: ug/kg
Associated Samples: 4, 16, 19

Compound	Blank ID	Sample Identification								
	175570-MB									
F	2.5	(All results either ND or > MB)								
E	0.47									

LDC #: 22224 E1
SDG #: see Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 1 of 3
Reviewer: VG
2nd Reviewer: [illegible]

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

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

Blank units: ug/L **Associated sample units:** ug/kg
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: EB Associated Samples: 12 - 19 (be)

Compound	Blank ID 11	Blank ID	Sample Identification							
Sampling Date	10/08/09		17							
e.g. F	4.3		6.9/14							
			(All others > EB)							

Blank units: ug/L **Associated sample units:** ug/kg
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: Associated Samples: 1 - 9 (ND)

Compound	Blank ID 10	Blank ID	Sample Identification							
Sampling Date	10/07/09									
X	0.44									

LDC #: 22234E1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JM
2nd Reviewer: [signature]

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

(Y) N /N/A Were field blanks identified in this SDG?
~~Y~~ N N/A Were target compounds detected in the field blanks?

Blank units: ug/L **Associated sample units:** ug/L
Field blank type: (circle one) Field Blank / Rinsate / (Trip Blank) / Other: _____ Associated Samples: 12-19 (ND)

Compound	Blank ID 20	Blank ID	Sample Identification							
Sampling Date	10/08/09									
X	0.96									

Blank units: ug/L **Associated ~~sample~~ units:** ug/kg
Field blank type: (circle one) ~~Field Blank~~ / Rinsate / Trip Blank / Other: _____ Associated Samples: 1-9 (bf)

Compound	Blank ID FB080309-SO	Blank ID	Sample Identification							
Sampling Date	8/03/09		2							
4.7 F	2.1		2.9/U							
0.60 CC	0.30									
			(All others either ND or > FB)							

LDC #: 22234E1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: OK
2nd Reviewer: [signature]

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

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

Blank units: ug/L **Associated sample units:** ug/kg
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: _____ Associated Samples: 12 – 19 (6 f)

Compound	Blank ID FB082809-SO	Blank ID	Sample Identification							
Sampling Date	8/28/09		12	13	14	15	16	17	19	
F	9.2		11/U	8.9/U		12/U	15/U	6.9/U	9.0/U	
CC	0.44			0.37/U	0.69/U					

Blank units: ug/L **Associated sample units:** _____
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: _____ Associated Samples: _____

Compound	Blank ID	Blank ID	Sample Identification							
Sampling Date										

LDC #: 22234E1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

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

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

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

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

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

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

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		22/23	Several compounds outside limits (See attached Summary)	( )	( )	( )	7	No qual (either MS/MSD or LCS in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
H.	1,1-Dichloroethene	59-172%	< 22%	61-145%	< 14%
S.	Trichloroethene	62-137%	< 24%	71-120%	< 14%
V.	Benzene	66-142%	< 21%	76-127%	< 11%
CC.	Toluene	59-139%	< 21%	76-125%	< 13%
DD.	Chlorobenzene	60-133%	< 21%	75-130%	< 13%

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Northgate Environmental
Project: Tronox LLC Henderson/2027.001
Sample Matrix: Soil

Service Request: R0905744
Date Collected: 10/7/09
Date Received: 10/8/09
Date Analyzed: 10/19/09

Matrix Spike Summary
Volatile Organic Compounds by GC/MS

Sample Name: SA192-10B
Lab Code: R0905744-007

Units: µg/Kg
Basis: Dry

Analytical Method: 8260B

Analyte Name	Sample Result	Matrix Spike RQ0910111-03 Result	Amount	% Rec		Duplicate Matrix Spike RQ0910111-04 Result	Amount	% Rec		% Rec Limits	RPD		RPD Limit
1,1,1,2-Tetrachloroethane	ND	54.3	54.3	100		51.8	59.7	87		70 - 130	5		30
1,1,1-Trichloroethane (TCA)	ND	53.5	54.3	99		54.3	59.7	91		70 - 130	1		30
1,1,2,2-Tetrachloroethane	ND	41.7	54.3	77		45.5	59.7	76		70 - 130	9		30
1,1,2-Trichloroethane	ND	48.5	54.3	89		50.2	59.7	84		70 - 130	3		30
1,1-Dichloroethane (1,1-DCA)	ND	49.3	54.3	91		50.7	59.7	85		70 - 130	3		30
1,1-Dichloroethene (1,1-DCE)	ND	52.8	54.3	97		53.3	59.7	89		70 - 130	1		30
1,1-Dichloropropene	ND	45.5	54.3	84		46.3	59.7	78		70 - 130	2		30
1,2,3-Trichlorobenzene	ND	43.8	54.3	81		36.8	59.7	62	*	70 - 130	18		30
1,2,3-Trichloropropane	ND	45.4	54.3	84		49.0	59.7	82		70 - 130	8		30
1,2,4-Trichlorobenzene	ND	39.7	54.3	73		33.5	59.7	56	*	70 - 130	17		30
1,2,4-Trimethylbenzene	ND	44.1	54.3	81		33.2	59.7	56	*	70 - 130	28		30
1,2-Dibromo-3-chloropropane (DBC	ND	42.9	54.3	79		50.2	59.7	84		50 - 150	16		30
1,2-Dibromoethane	ND	45.0	54.3	83		50.1	59.7	84		70 - 130	11		30
1,2-Dichlorobenzene	ND	45.5	54.3	84		39.6	59.7	66	*	70 - 130	14		30
1,2-Dichloroethane	ND	51.7	54.3	95		54.3	59.7	91		70 - 130	5		30
1,2-Dichloropropane	ND	46.8	54.3	86		48.6	59.7	81		70 - 130	4		30
1,3,5-Trimethylbenzene	ND	44.8	54.3	83		33.7	59.7	56	*	70 - 130	28		30
1,3-Dichlorobenzene	ND	43.8	54.3	81		34.4	59.7	58	*	70 - 130	24		30
1,3-Dichloropropane	ND	47.0	54.3	87		48.6	59.7	81		70 - 130	3		30
1,4-Dichlorobenzene	ND	46.1	54.3	85		36.5	59.7	61	*	70 - 130	23		30
2,2-Dichloropropane	ND	50.7	54.3	93		54.4	59.7	91		70 - 130	7		30
2-Butanone (MEK)	ND	41.2	54.3	76		48.0	59.7	80		50 - 150	15		30
2-Chlorotoluene	ND	43.5	54.3	80		34.8	59.7	58	*	70 - 130	22		30
2-Hexanone	ND	31.9	54.3	59	*	39.7	59.7	66	*	70 - 130	22		30
2-Methyl-2-propanol	ND	927	1090	85		1180	1190	99		50 - 150	24		30
4-Chlorotoluene	ND	45.2	54.3	83		34.8	59.7	58	*	70 - 130	26		30
4-Isopropyltoluene	ND	45.0	54.3	83		30.0	59.7	50	*	70 - 130	40	*	30
4-Methyl-2-pentanone	ND	41.3	54.3	76		48.0	59.7	80		70 - 130	15		30
Acetone	6.5	61.9	54.3	102		67.6	59.7	102		50 - 150	9		30
Benzene	ND	45.7	54.3	84		47.1	59.7	79		70 - 130	3		30
Bromobenzene	ND	44.2	54.3	81		39.5	59.7	66	*	70 - 130	11		30
Bromochloromethane	ND	49.7	54.3	92		50.0	59.7	84		70 - 130	1		30
Bromodichloromethane	ND	51.3	54.3	95		52.4	59.7	88		70 - 130	2		30

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Northgate Environmental
Project: Tronox LLC Henderson/2027.001
Sample Matrix: Soil

Service Request: R0905744
Date Collected: 10/7/09
Date Received: 10/8/09
Date Analyzed: 10/19/09

Matrix Spike Summary
Volatile Organic Compounds by GC/MS

Sample Name: SA192-10B
Lab Code: R0905744-007

Units: µg/Kg
Basis: Dry

Analytical Method: 8260B

Analyte Name	Sample Result	Matrix Spike RQ0910111-03 Result	Amount	% Rec		Duplicate Matrix Spike RQ0910111-04 Result	Amount	% Rec		% Rec Limits	RPD		RPD Limit
Bromoform	ND	46.8	54.3	86		49.5	59.7	83		70 - 130	5		30
Bromomethane	ND	53.1	54.3	98		48.3	59.7	81		50 - 150	9		30
Carbon Tetrachloride	ND	54.7	54.3	101		57.4	59.7	96		70 - 130	5		30
Chlorobenzene	ND	50.1	54.3	92		44.6	59.7	75		70 - 130	12		30
Chloroethane	ND	48.1	54.3	89		49.8	59.7	83		70 - 130	3		30
Chloroform	ND	52.9	54.3	97		53.1	59.7	89		70 - 130	0		30
Chloromethane	ND	44.1	54.3	81		45.1	59.7	76		70 - 130	2		30
Dibromochloromethane	ND	53.5	54.3	99		54.7	59.7	92		70 - 130	2		30
Dibromomethane	ND	47.1	54.3	87		51.6	59.7	86		70 - 130	9		30
Dichlorodifluoromethane (CFC 12)	ND	32.2	54.3	59	*	33.4	59.7	56	*	70 - 130	4		30
Dichloromethane	ND	46.9	54.3	86		50.2	59.7	84		70 - 130	7		30
Diisopropyl Ether	ND	45.0	54.3	83		47.7	59.7	80		70 - 130	6		30
Ethyl tert-Butyl Ether	ND	43.9	54.3	81		47.8	59.7	80		70 - 130	8		30
Ethylbenzene	ND	48.8	54.3	90		41.3	59.7	69	*	70 - 130	17		30
Hexachlorobutadiene	ND	44.0	54.3	81		26.1	59.7	44	*	70 - 130	51	*	30
Isopropylbenzene (Cumene)	ND	45.5	54.3	84		35.9	59.7	60	*	70 - 130	24		30
Methyl tert-Butyl Ether	ND	45.2	54.3	83		49.6	59.7	83		70 - 130	9		30
Naphthalene	ND	44.0	54.3	81		44.1	59.7	74		50 - 150	0		30
Styrene	ND	52.7	54.3	97		44.7	59.7	75		70 - 130	16		30
Tetrachloroethene (PCE)	ND	54.3	54.3	100		47.2	59.7	79		70 - 130	14		30
Toluene	ND	48.5	54.3	89		45.3	59.7	76		70 - 130	7		30
Trichloroethene (TCE)	ND	51.9	54.3	96		50.0	59.7	84		70 - 130	4		30
Trichlorofluoromethane (CFC 11)	ND	54.6	54.3	101		56.7	59.7	95		70 - 130	4		30
Vinyl Chloride	ND	48.5	54.3	89		48.9	59.7	82		70 - 130	1		30
cis-1,2-Dichloroethene	ND	46.4	54.3	86		46.9	59.7	78		70 - 130	1		30
cis-1,3-Dichloropropene	ND	45.5	54.3	84		46.1	59.7	77		70 - 130	1		30
m,p-Xylenes	ND	103	109	94		84.7	119	71		70 - 130	19		30
n-Butylbenzene	ND	43.1	54.3	79		25.9	59.7	43	*	70 - 130	50	*	30
n-Propylbenzene	ND	43.6	54.3	80		32.3	59.7	54	*	70 - 130	30		30
o-Xylene	ND	48.6	54.3	90		40.9	59.7	69	*	70 - 130	17		30
sec-Butylbenzene	ND	43.7	54.3	81		30.3	59.7	51	*	70 - 130	36	*	30
tert-Amyl Methyl Ether	ND	41.2	54.3	76		44.2	59.7	74		70 - 130	7		30
tert-Butylbenzene	ND	44.9	54.3	83		33.3	59.7	56	*	70 - 130	30		30
trans-1,2-Dichloroethene	ND	48.3	54.3	89		46.9	59.7	78		70 - 130	3		30

Comments:

LDC #: 22234 E1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

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

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

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		175353-LCS	NNNN	127 (75-125)	( )	( )	1-3, 5-9, 12-15,	NO qual (MS/MSD in)
			B	70 ( )	( )	( )	17, 18, 175353-MB	↓
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		175570 - LCS	H	137 (↓)	( )	( )	4, 16, 19, 175570-MB	J+ dets/p (l)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 22234 E)
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: JVG
2nd reviewer:

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

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

Compound	Concentration (ug/kg)		RPD
	2	3	
F	2.9	7.7	9.8 (≤21 D)

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: October 9 through October 12, 2009

LDC Report Date: January 4, 2010

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905829

Sample Identification

SA39-0.5B
SA39-0.5BRE
SA39-10B
SA39-25B
SA39-41B
SA137-0.5B
SA137-15B
SA137-31B
TB100909-SO1
EB101209-SO1A3
RSAR7-0.5B
RSAR7-9B
RSAR7009-9B
RSAR7-20B
RSAR7-34B
RSAO7-9B
RSAO7-19B
RSAO7-29B
RSAO7-47B
TB101209-SO1
TB101209-SO3
SA39-25BMS
SA39-25BMSD

Introduction

This data review covers 19 soil samples and 4 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

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

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

B The analytical result may be a false positive totally attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JB The analytical result may be biased high and partially attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JK The analytical result is an estimated maximum possible concentration (EMPC).

X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.

J-TDS The analytical result is estimated based on failure of the Total Dissolved Solids (TDS) correctness check performed in accordance with the Standard Method 1030E.

J-CAB The analytical result is estimated based on failure of the cation-anion balance correctness check performed in accordance with Standard Method 1030E.

J-TDS & CAB The analytical result is unreliable based on the failure of the cation-anion balance and TDS correctness check performed in accordance with standard Method 1030E.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

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

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
9/18/09	2-Methyl-2-propanol	0.028 (≥0.05)	All water samples in SDG R0905829	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
10/16/09	Acetone 2-Hexanone	26.4 27.3	All water samples in SDG R0905829	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	A
10/20/09	Bromomethane Trichlorofluoromethane	28.6 25.6	SA39-0.5BRE SA39-25B SA39-25BMS SA39-25BMSD 175570-MB	J+ (all detects) J+ (all detects)	A

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
10/16/09	2-Methyl-2-propanol	0.025 (≥0.05)	All water samples in SDG R0905829	J (all detects) UJ (all non-detects)	A

V. Blanks

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

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
175170-MB	10/16/09	Acetone	2.3 ug/Kg	SA39-0.5B SA39-10B SA39-41B SA137-0.5B SA137-15B SA137-31B RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B
175570-MB	10/20/09	Acetone Dichloromethane	2.5 ug/Kg 0.47 ug/Kg	SA39-0.5BRE SA39-25B

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
SA137-15B	Acetone	3.3 ug/Kg	3.3U ug/Kg
RSAO7-9B	Acetone	2.5 ug/Kg	2.5U ug/Kg

Samples TB100909-SO1, TB101209-SO1, and TB101209-SO3 were identified as trip blanks. No volatile contaminants were found in these blanks with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
TB100909-SO1	10/9/09	Acetone	3.0 ug/L	SA39-0.5B SA39-0.5BRE SA39-10B SA39-25B SA39-41B SA137-0.5B SA137-15B SA137-31B

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

Sample	Compound	Reported Concentration	Modified Final Concentration
SA39-0.5BRE	Acetone	5.6 ug/Kg	5.6U ug/Kg
SA137-15B	Acetone	3.3 ug/Kg	3.3U ug/Kg

Sample EB101209-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
EB101209-SO1A3	10/12/09	Acetone	4.5 ug/L	RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B

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

Sample	Compound	Reported Concentration	Modified Final Concentration
RSAR7-9B	Acetone	7.3 ug/Kg	7.3U ug/Kg
RSAO7-9B	Acetone	2.5 ug/Kg	2.5U ug/Kg

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 R0905829

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
SA39-0.5B	Acetone	7.5 ug/Kg	7.5U ug/Kg
SA39-0.5BRE	Acetone Toluene	5.6 ug/Kg 0.44 ug/Kg	5.6U ug/Kg 0.44U ug/Kg
SA39-10B	Acetone Toluene	7.3 ug/Kg 0.47 ug/Kg	7.3U ug/Kg 0.47U ug/Kg
SA39-25B	Acetone Toluene	13 ug/Kg 0.37 ug/Kg	13U ug/Kg 0.37U ug/Kg

Sample	Compound	Reported Concentration	Modified Final Concentration
SA39-41B	Acetone	14 ug/Kg	14U ug/Kg
SA137-15B	Acetone	3.3 ug/Kg	3.3U ug/Kg
RSAR7-0.5B	Acetone Toluene	10 ug/Kg 0.58 ug/Kg	10U ug/Kg 0.58U ug/Kg
RSAR7-9B	Acetone Toluene	7.3 ug/Kg 0.44 ug/Kg	7.3U ug/Kg 0.44U ug/Kg
RSAR7009-9B	Toluene	0.83 ug/Kg	0.83U ug/Kg
RSAR7-20B	Acetone	14 ug/Kg	14U ug/Kg
RSAR7-34B	Acetone	12 ug/Kg	12U ug/Kg
RSAO7-9B	Acetone	2.5 ug/Kg	2.5U ug/Kg
RSAO7-29B	Acetone Toluene	16 ug/Kg 0.35 ug/Kg	16U ug/Kg 0.35U ug/Kg
RSAO7-47B	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 with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
SA39-0.5B	Bromofluorobenzene	56 (70-130)	All TCL compounds	J- (all detects) UJ (all non-detects)	A
SA39-0.5BRE	Bromofluorobenzene	49 (70-130)	All TCL compounds	J- (all detects) UJ (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. 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) were within QC limits with the following exceptions:

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
175612LCS	2-Hexanone 4-Methyl-2-pentanone	71 (75-125) 74 (75-125)	All water samples in SDG R0905829	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	P
175170LCS	2-Methyl-2-propanol Acetone	131 (75-125) 129 (75-125)	SA39-0.5B SA39-0.5BRE SA39-10B SA39-41B SA137-0.5B SA137-15B SA137-31B RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B 175570-MB	J+ (all detects) J+ (all detects)	P
175170LCS	Bromomethane	70 (75-125)	SA39-0.5B SA39-0.5BRE SA39-10B SA39-41B SA137-0.5B SA137-15B SA137-31B RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B 175570-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:

Sample	Internal Standards	Area (Limits)	Compound	Flag	A or P
SA39-0.5B	1,4-Dichlorobenzene-d4	86506 (129624-518494)	Bromoform 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene 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 Bromobenzene	J (all detects) UJ (all non-detects)	A
SA39-0.5BRE	1,4-Dichlorobenzene-d4	67273 (134578-538312)	Bromoform 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene 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 Bromobenzene	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 R0905829	All compounds reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

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

Sample	Compound	Flag	A or P
SA39-0.5BRE	All TCL compounds	X	A

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

XVI. Field Duplicates

Samples RSAR7-9B and RSAR7009-9B were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAR7-9B	RSAR7009-9B				
Acetone	7.3	42	-	34.7 (≤23)	J (all detects)	A
Chloroform	3.6	2.2	-	1.4 (≤5.7)	-	-
Toluene	0.44	0.83	-	0.39 (≤5.7)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Data Qualification Summary - SDG R0905829

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905829	TB100909-SO1 EB101209-SO1A3 TB101209-SO1 TB101209-SO3	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Initial calibration (RRF) (c)
R0905829	TB100909-SO1 EB101209-SO1A3 TB101209-SO1 TB101209-SO3	Acetone 2-Hexanone	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	A	Continuing calibration (%D) (c)
R0905829	SA39-0.5BRE SA39-25B	Bromomethane Trichlorofluoromethane	J+ (all detects) J+ (all detects)	A	Continuing calibration (%D) (c)
R0905829	TB100909-SO1 EB101209-SO1A3 TB101209-SO1 TB101209-SO3	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Continuing calibration (RRF) (c)
R0905829	SA39-0.5B SA39-0.5BRE	All TCL compounds	J- (all detects) UJ (all non-detects)	A	Surrogate spikes (%R) (s)
R0905829	TB100909-SO1 EB101209-SO1A3 TB101209-SO1 TB101209-SO3	2-Hexanone 4-Methyl-2-pentanone	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0905829	SA39-0.5B SA39-0.5BRE SA39-10B SA39-41B SA137-0.5B SA137-15B SA137-31B RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B	2-Methyl-2-propanol Acetone	J+ (all detects) J+ (all detects)	P	Laboratory control samples (%R) (l)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905829	SA39-0.5B SA39-0.5BRE SA39-10B SA39-41B SA137-0.5B SA137-15B SA137-31B RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B	Bromomethane	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0905829	SA39-0.5B SA39-0.5BRE	Bromoform 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane Isopropylbenzene 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 Bromobenzene	J (all detects) UJ (all non-detects)	A	Internal standards (area) (i)
R0905829	SA39-0.5B SA39-0.5BRE SA39-10B SA39-25B SA39-41B SA137-0.5B SA137-15B SA137-31B TB100909-SO1 EB101209-SO1A3 RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B TB101209-SO1 TB101209-SO3	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (PQL) (sp)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905829	SA39-0.5BRE	All TCL compounds	X	A	Overall assessment of data (o)
R0905829	RSAR7-9B RSAR7009-9B	Acetone	J (all detects)	A	Field duplicates (Difference) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Laboratory Blank Data Qualification Summary - SDG R0905829

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905829	SA137-15B	Acetone	3.3U ug/Kg	A	bl
R0905829	RSAO7-9B	Acetone	2.5U ug/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Trip Blank Data Qualification Summary - SDG R0905829

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905829	SA39-0.5BRE	Acetone	5.6U ug/Kg	A	bt
R0905829	SA137-15B	Acetone	3.3U ug/Kg	A	bt

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Equipment Blank Data Qualification Summary - SDG R0905829

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905829	RSAR7-9B	Acetone	7.3U ug/Kg	A	be
R0905829	RSAO7-9B	Acetone	2.5U ug/Kg	A	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Field Blank Data Qualification Summary - SDG R0905829

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905829	SA39-0.5B	Acetone	7.5U ug/Kg	A	bf
R0905829	SA39-0.5BRE	Acetone Toluene	5.6U ug/Kg 0.44U ug/Kg	A	bf
R0905829	SA39-10B	Acetone Toluene	7.3U ug/Kg 0.47U ug/Kg	A	bf
R0905829	SA39-25B	Acetone Toluene	13U ug/Kg 0.37U ug/Kg	A	bf
R0905829	SA39-41B	Acetone	14U ug/Kg	A	bf
R0905829	SA137-15B	Acetone	3.3U ug/Kg	A	bf
R0905829	RSAR7-0.5B	Acetone Toluene	10U ug/Kg 0.58U ug/Kg	A	bf
R0905829	RSAR7-9B	Acetone Toluene	7.3U ug/Kg 0.44U ug/Kg	A	bf
R0905829	RSAR7009-9B	Toluene	0.83U ug/Kg	A	bf
R0905829	RSAR7-20B	Acetone	14U ug/Kg	A	bf
R0905829	RSAR7-34B	Acetone	12U ug/Kg	A	bf
R0905829	RSAO7-9B	Acetone	2.5U ug/Kg	A	bf
R0905829	RSAO7-29B	Acetone Toluene	16U ug/Kg 0.35U ug/Kg	A	bf
R0905829	RSAO7-47B	Acetone	11U ug/Kg	A	bf

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234F1
SDG #: R0905829
Laboratory: Columbia Analytical Services

Date: 12/21/09
Page: 1 of 1
Reviewer: JVL
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: 10/09 - 12/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	SW	2 RSD ✓
IV.	Continuing calibration/~~ICV~~	SW	CCV ≤ 25 %
V.	Blanks	SW	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	SW	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	SW	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	SW	D = 12, 13
XVII.	Field blanks	SW	TB = 9, 20*, 21* EB = 10 FB = FB082804-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: Soil + Water

1	1	SA39-0.5B	S	11	1	RSAR7-0.5B	S	21	3	TB101209-SO3	W	31	1	175170 - MB
2	1	SA39-0.5BDL RE		12	1	RSAR7-9B	D	22	1	SA39-25BMS	S	32	1	175570 -
3	1	SA39-10B		13	1	RSAR7009-9B	D	23	1	SA39-25BMSD	↓	33	3	175162 -
4	2	SA39-25B		14	1	RSAR7-20B		24				34		
5	1	SA39-41B		15	1	RSAR7-34B		25				35		
6	1	SA137-0.5B		16	1	RSAO7-9B		26				36		
7	1	SA137-15B		17	1	RSAO7-19B		27				37		
8	1	SA137-31B	↓	18	1	RSAO7-29B		28				38		
+ 9	3	TB100909-SO1	W	19	1	RSAO7-47B	↓	29				39		
+ 10	3	EB101209-SO1A3	↓	- 20	3	TB101209-SO1	W	30				40		

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

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

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

(4DCB)

LDC #: 22234F1
SDG #: Lee Comy

Reviewer: JVG
2nd Reviewer: [illegible]

VALIDATION FINDINGS WORKSHEET
Initial Calibration

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

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

- (Y) N N/A Did the laboratory perform a 5 point calibration prior to sample analysis?
- (Y) N N/A Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's?
- (Y) N N/A Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation? $r^2 \geq 0.99$
- (Y) N N/A Did the initial calibration meet the acceptance criteria?
- Y (N) N/A Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %RSD (Limit: <30.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	9/18/09	ICAL	NNNN		0.028	9, 10, 20, 21, 175162-MB	J/UJ/A (C)

LDC #: 22234F1
SDG #: Ce Cuvy

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: JVG
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?
(Y) N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?
Y (N) N/A Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	10/16/09	C1485	F (-)	26.4		9,10,20,21,175162-MB	J-/NJ/A (c)
			NNNN		0.025		J/UJ/A
			Z (-)	27.3			J-/NJ/A
	10/20/09	X5066	B (+)	28.6		2,4,22,23,175570-MB	J+ A.qts/A
			KK (+)	25.6			

LDC #: 22234 F1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

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

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

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

Y N N/A Was a method blank associated with every sample in this SDG?
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.

(6 pt)

Blank analysis date: 10/16/09
Conc. units: ug/kg
Associated Samples: 1, 3 5-8 11-19

Compound	Blank ID	Sample Identification								
	175170-MB	7	16							
4.6 F	2, 3	3.3/U	2.5/U							
		CAll	others	either	ND	or >	MB)			

Blank analysis date: 10/20/09
Conc. units: ug/kg
Associated Samples: 2 4

Compound	Blank ID	Sample Identification								
	175570-MB	CAll	results	either	ND	or >	MB)			
5.0 F	2,5									
E	0,47									

LDC #: 22234F1
SDG #: Sa Cmer

VALIDATION FINDINGS WORKSHEET
Field Blanks

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

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

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

Blank units: ug/L **Associated sample units:** ug/kg
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: EB Associated Samples: 11 - 19 (be)

Compound	Blank ID 10	Blank ID	Sample Identification							
Sampling Date	10/12/09		12	16						
9.0 F	4.5		7.3 /U	2.5 /U						
		CAll	others	either	ND or	> EB)				

Blank units: ug/L **Associated sample units:** ug/kg
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: Associated Samples: 1 - 8 (bt)

Compound	Blank ID 9	Blank ID	Sample Identification							
Sampling Date	10/09/09		2	7						
6.0 F	3.0		5.6 /U	3.3 /U						
		(All	others	either	ND or	> TB)				

LDC #: 32234 FJ
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 2 of 2
Reviewer: OVG
2nd Reviewer:

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

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

Blank units: ug/L **Associated sample units:** ug/kg
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: _____ Associated Samples: All soils (bf)

Compound	FB082809-SO Blank ID	Blank ID	Sample Identification							
Sampling Date	8/28/09		1	2	3	4	5	7	11	12
18.4 F	9.2		7.5/U	5.6/U	7.3/U	13/U	14/U	3.3/U	10/U	7.3/U
0.88 CC	0.44			0.44/U	0.97/U	0.37/U			0.58/U	0.44/U
			(All	others	either	ND	or	> FB)		

Blank units: _____ **Associated sample units:** Same as above
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: _____ Associated Samples: _____

Compound	FB082809-SO Blank ID	Blank ID	Sample Identification							
Sampling Date	8/28/09		13	14	15	16	18	19		
F	9.2			14/U	12/U	2.5/U	16/U	11/U		
CC	0.44		0.83/U	~~U~~			0.35/U			

LDC #: 22234 F1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Spikes

Page: 1 of 1
Reviewer: JVC
2nd Reviewer: [illegible]

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

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

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

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

#	Date	Sample ID	Surrogate	%Recovery (Limits)	Qualifications
		1	BFB	56 (70-130)	J- /NJ (S)
		2	BFB	49 ( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

	QC Limits (Soil)	QC Limits (Water)
SMC1 (TOL) = Toluene-d8	81-117	88-110
SMC2 (BFB) = Bromofluorobenzene	74-121	86-115
SMC3 (DCE) = 1,2-Dichloroethane-d4	80-120	80-120
SMC4 (DFM) = Dibromofluoromethane	80-120	86-118

LDC #: 22234 F1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: SV6
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?
Y N N/A Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		175162 LCS	Z	71 (75-125)	( )	( )	9, 10, 20, 21, 175162-MB	J-/UJ/P (l)
			Y	74 ( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		175170 LCS	NNNN	131 ( )	( )	( )	1, 3, 5-8, 11-19, 175570-MB	J+/UJ/P
			F	129 ( )	( )	( )		
			B	70 ( )	( )	( )		J-/UJ/P ✓
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		175570 LCS	H	137 ( )	( )	( )	2, 4, 175570-MB	No qual CMS/MSDup
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 22234F1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Internal Standards

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

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

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

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

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

#	Date	Sample ID	Internal Standard	Area (Limits)	RT (Limits)	Qualifications
		1	4DCB	86506 (129624 - 518494)		J/UJ/A (i)
25		2		67273 (134578 - 538312)		
						~~J~~ (Please see TCL for associated qds)

(BCM) = Bromochloromethane
(DFB) = 1,4-Difluorobenzene
(CBZ) = Chlorobenzene-d5
(PFB) = Pentafluorobenzene
(4DCB) = 1,4-Dichlorobenzene-d4
(2DCB) = 1,2-Dichlorobenzene-d4
(FBZ) = Fluorobenzene

LDC #: 22234F1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: JVL
2nd Reviewer: [illegible]

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

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

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

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

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		2	Confirmation run for #1 (Surr & IS out)		X/A (o)

Comments: _____

OVR.1SB

LDC #: 22234F1
SDG #: Sy Creek

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: JVB
2nd reviewer: [signature]

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

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

Compound	Concentration (ug/kg)		RPD (Parent only)
	12	13	
F	7.3	42	34.7 (≤ 23 D) J dets/A (fd)
K	3.6	2.2	1.4 (≤ 5.7 D) —
CC	0.44	0.83	0.39 —

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: October 13 through October 15, 2009

LDC Report Date: January 4, 2010

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905882

Sample Identification

RSAN8-0.5B
RSAN8-10B
RSAN8-20B
RSAN8-28B
TB101309-SO1
EB101409-SO1A3
SA160-0.5B
SA160-10B
SA160-20B
SA160-34B
SA178-0.5B
SA178-10B
SA178-17B
SA178-25B
SA178-43B
SA178-43BDL
TB101409-SO1
TB101409-SO3
SA141-14B
SA141009-14B
SA141-24B
SA141-30B
SA143-24B
SA143-34B
SA143-50B
SA143009-50B
TB101509-SO1
SA160-10BMS
SA160-10BMSD

Introduction

This data review covers 24 soil samples and 5 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

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

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

B The analytical result may be a false positive totally attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JB The analytical result may be biased high and partially attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JK The analytical result is an estimated maximum possible concentration (EMPC).

X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.

J-TDS The analytical result is estimated based on failure of the Total Dissolved Solids (TDS) correctness check performed in accordance with the Standard Method 1030E.

J-CAB The analytical result is estimated based on failure of the cation-anion balance correctness check performed in accordance with Standard Method 1030E.

J-TDS & CAB The analytical result is unreliable based on the failure of the cation-anion balance and TDS correctness check performed in accordance with standard Method 1030E.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

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

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
9/18/09	2-Methyl-2-propanol	0.028 (≥0.05)	TB101309-SO1 EB101409-SO1A3 SA178-43BDL TB101409-SO1 TB101409-SO3 TB101509-SO1 175551-MB 176371-MB	J (all detects) UJ (all non-detects)	A

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

Date	Compound	%D	Associated Samples	Flag	A or P
10/20/09 (C1584)	Dichlorodifluoromethane	26.8	All water samples in SDG R0905882	J+ (all detects)	A
10/20/09 (X5066)	Bromomethane Trichlorofluoromethane	28.6 25.6	RSAN8-0.5B RSAN8-10B RSAN8-20B RSAN8-28B SA160-0.5B SA160-20B SA160-34B SA178-0.5B SA178-10B SA178-17B SA178-25B 175570-MB	J+ (all detects) J+ (all detects)	A
10/21/09	Acetone	26.4	SA160-10B SA178-43B SA141-14B SA141009-14B SA141-24B SA141-30B SA143-24B SA143-34B SA143-50B SA143009-50B SA160-10BMS SA160-10BMSD 175749-MB	J+ (all detects)	A

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
10/20/09 (C1584)	2-Methyl-2-propanol	0.026 (≥0.05)	All water samples in SDG R0905882	J (all detects) UJ (all non-detects)	A
10/23/09	2-Methyl-2-propanol	0.025 (≥0.05)	SA178-43BDL 176371-MB	J (all detects) UJ (all non-detects)	A

V. Blanks

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

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
175570-MB	10/20/09	Acetone Dichloromethane	2.5 ug/Kg 0.47 ug/Kg	RSAN8-0.5B RSAN8-10B RSAN8-20B RSAN8-28B SA160-0.5B SA160-20B SA160-34B SA178-0.5B SA178-10B SA178-17B SA178-25B
175551-MB	10/20/09	1,4-Dichlorobenzene	0.40 ug/L	All water samples in SDG R0905882
175749-MB	10/21/09	Acetone	2.3 ug/Kg	SA160-10B SA178-43B SA141-14B SA141009-14B SA141-24B SA141-30B SA143-24B SA143-34B SA143-50B SA143009-50B
176371-MB	10/23/09	2-Butanone	79 ug/Kg	SA178-43BDL

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
RSAN8-0.5B	Acetone	4.9 ug/Kg	4.9U ug/Kg
RSAN8-10B	Dichloromethane	0.93 ug/Kg	0.93U ug/Kg
SA178-0.5B	Dichloromethane	0.72 ug/Kg	0.72U ug/Kg
SA143-34B	Acetone	3.6 ug/Kg	3.6U ug/Kg
SA178-43BDL	2-Butanone	220 ug/Kg	220U ug/Kg

Samples TB101309-SO1, TB101409-SO1, TB101409-SO3, and TB101509-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
TB101409-SO3	10/14/09	Bromoform Chloromethane	0.20 ug/L 0.22 ug/L	EB101409-SO1A3 SA160-0.5B SA160-10B SA160-20B SA160-34B SA178-0.5B SA178-10B SA178-17B SA178-25B SA178-43B SA178-43BDL
TB101509-SO1	10/15/09	Chloromethane	0.28 ug/L	SA141-14B SA141009-14B SA141-24B SA141-30B SA143-24B SA143-34B SA143-50B SA143009-50B

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

Sample EB101409-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
EB101409-SO1A3	10/14/09	Acetone	6.3 ug/L	SA160-0.5B SA160-10B SA160-20B SA160-34B SA178-0.5B SA178-10B SA178-17B SA178-25B SA178-43B SA178-43BDL

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

Sample	Compound	Reported Concentration	Modified Final Concentration
SA178-10B	Acetone	10 ug/Kg	10U ug/Kg
SA178-25B	Acetone	7.1 ug/Kg	7.1U ug/Kg
SA178-43B	Acetone	7.9 ug/Kg	7.9U ug/Kg

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 R0905882

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
RSAN8-0.5B	Acetone Toluene	4.9 ug/Kg 0.35 ug/Kg	4.9U ug/Kg 0.35U ug/Kg
RSAN8-10B	Acetone Toluene	7.1 ug/Kg 0.35 ug/Kg	7.1U ug/Kg 0.35U ug/Kg
RSAN8-28B	Acetone Toluene	14 ug/Kg 0.54 ug/Kg	14U ug/Kg 0.54U ug/Kg
SA160-0.5B	Toluene	0.55 ug/Kg	0.55U ug/Kg
SA160-10B	Acetone	15 ug/Kg	15U ug/Kg
SA160-20B	Acetone	15 ug/Kg	15U ug/Kg
SA178-10B	Acetone	10 ug/Kg	10U ug/Kg
SA178-25B	Acetone	7.1 ug/Kg	7.1U ug/Kg
SA178-43B	Acetone	7.9 ug/Kg	7.9U ug/Kg

Sample	Compound	Reported Concentration	Modified Final Concentration
SA141-14B	Acetone	6.8 ug/Kg	6.8U ug/Kg
SA141009-14B	Acetone Toluene	7.1 ug/Kg 0.53 ug/Kg	7.1U ug/Kg 0.53U ug/Kg
SA141-24B	Acetone	5.2 ug/Kg	5.2U ug/Kg
SA141-30B	Acetone	9.2 ug/Kg	9.2U ug/Kg
SA143-34B	Acetone	3.6 ug/Kg	3.6U ug/Kg
SA143-50B	Acetone	5.9 ug/Kg	5.9U ug/Kg
SA143009-50B	Toluene	0.43 ug/Kg	0.43U 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.

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
175570LCS	1,1-Dichloroethene	137 (75-125)	RSAN8-0.5B RSAN8-10B RSAN8-20B RSAN8-28B SA160-0.5B SA160-20B SA160-34B SA178-0.5B SA178-10B SA178-17B SA178-25B 175570-MB	J+ (all detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

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

Sample	Compound	Finding	Criteria	Flag	A or P
SA178-43B	Chloroform	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	A

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0905882	All compounds reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

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

Sample	Compound	Flag	A or P
SA178-43B	Chloroform	X	A
SA178-43BDL	All TCL compounds except Chloroform	X	A

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

XVI. Field Duplicates

Samples SA141-14B and SA141009-14B and samples SA143-50B and SA143009-50B were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA141-14B	SA141009-14B				
Acetone	6.8	7.1	-	0.3 (≤21)	-	-
Chloroform	1.5	0.96	-	0.54 (≤5.2)	-	-
Dichloromethane	0.98	0.82	-	0.16 (≤5.2)	-	-

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA143-50B	SA143009-50B				
2-Butanone	10U	1.5	-	8.5 (≤10)	-	-
Acetone	5.9	38	-	32.1 (≤21)	-	-
Chloroform	1.6	2.1	-	0.5 (≤5.1)	-	-
Dichloromethane	5.1U	0.91	-	4.19 (≤5.1)	-	-
Vinyl chloride	5.1U	0.43	-	4.67 (≤5.1)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Data Qualification Summary - SDG R0905882

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905882	TB101309-SO1 EB101409-SO1A3 SA178-43BDL TB101409-SO1 TB101409-SO3 TB101509-SO1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Initial calibration (RRF) (c)
R0905882	TB101309-SO1 EB101409-SO1A3 TB101409-SO1 TB101409-SO3 TB101509-SO1	Dichlorodifluoromethane	J+ (all detects)	A	Continuing calibration (%D) (c)
R0905882	RSAN8-0.5B RSAN8-10B RSAN8-20B RSAN8-28B SA160-0.5B SA160-20B SA160-34B SA178-0.5B SA178-10B SA178-17B SA178-25B	Bromomethane Trichlorofluoromethane	J+ (all detects) J+ (all detects)	A	Continuing calibration (%D) (c)
R0905882	SA160-10B SA178-43B SA141-14B SA141009-14B SA141-24B SA141-30B SA143-24B SA143-34B SA143-50B SA143009-50B	Acetone	J+ (all detects)	A	Continuing calibration (%D) (c)
R0905882	TB101309-SO1 EB101409-SO1A3 SA178-43BDL TB101409-SO1 TB101409-SO3 TB101509-SO1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Continuing calibration (RRF) (c)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905882	RSAN8-0.5B RSAN8-10B RSAN8-20B RSAN8-28B SA160-0.5B SA160-20B SA160-34B SA178-0.5B SA178-10B SA178-17B SA178-25B	1,1-Dichloroethene	J+ (all detects)	P	Laboratory control samples (%R) (l)
R0905882	SA178-43B	Chloroform	J (all detects)	A	Project Quantitation Limit (e)
R0905882	RSAN8-0.5B RSAN8-10B RSAN8-20B RSAN8-28B TB101309-SO1 EB101409-SO1A3 SA160-0.5B SA160-10B SA160-20B SA160-34B SA178-0.5B SA178-10B SA178-17B SA178-25B SA178-43B SA178-43BDL TB101409-SO1 TB101409-SO3 SA141-14B SA141009-14B SA141-24B SA141-30B SA143-24B SA143-34B SA143-50B SA143009-50B TB101509-SO1	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (PQL) (sp)
R0905882	SA178-43B	Chloroform	X	A	Overall assessment of data (o)
R0905882	SA178-43BDL	All TCL compounds except Chloroform	X	A	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Laboratory Blank Data Qualification Summary - SDG R0905882

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905882	RSAN8-0.5B	Acetone	4.9U ug/Kg	A	bl
R0905882	RSAN8-10B	Dichloromethane	0.93U ug/Kg	A	bl
R0905882	SA178-0.5B	Dichloromethane	0.72U ug/Kg	A	bl
R0905882	SA143-34B	Acetone	3.6U ug/Kg	A	bl
R0905882	SA178-43BDL	2-Butanone	220U ug/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Trip Blank Data Qualification Summary - SDG R0905882

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Equipment Blank Data Qualification Summary - SDG R0905882

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905882	SA178-10B	Acetone	10U ug/Kg	A	be
R0905882	SA178-25B	Acetone	7.1U ug/Kg	A	be
R0905882	SA178-43B	Acetone	7.9U ug/Kg	A	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Field Blank Data Qualification Summary - SDG R0905882

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905882	RSAN8-0.5B	Acetone Toluene	4.9U ug/Kg 0.35U ug/Kg	A	bf
R0905882	RSAN8-10B	Acetone Toluene	7.1U ug/Kg 0.35U ug/Kg	A	bf

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905882	RSAN8-28B	Acetone Toluene	14U ug/Kg 0.54U ug/Kg	A	bf
R0905882	SA160-0.5B	Toluene	0.55U ug/Kg	A	bf
R0905882	SA160-10B	Acetone	15U ug/Kg	A	bf
R0905882	SA160-20B	Acetone	15U ug/Kg	A	bf
R0905882	SA178-10B	Acetone	10U ug/Kg	A	bf
R0905882	SA178-25B	Acetone	7.1U ug/Kg	A	bf
R0905882	SA178-43B	Acetone	7.9U ug/Kg	A	bf
R0905882	SA141-14B	Acetone	6.8U ug/Kg	A	bf
R0905882	SA141009-14B	Acetone Toluene	7.1U ug/Kg 0.53U ug/Kg	A	bf
R0905882	SA141-24B	Acetone	5.2U ug/Kg	A	bf
R0905882	SA141-30B	Acetone	9.2U ug/Kg	A	bf
R0905882	SA143-34B	Acetone	3.6U ug/Kg	A	bf
R0905882	SA143-50B	Acetone	5.9U ug/Kg	A	bf
R0905882	SA143009-50B	Toluene	0.43U ug/Kg	A	bf

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234G1
SDG #: R0905882
Laboratory: Columbia Analytical Services

Date: 12/24/09
Page: 1 of 1
Reviewer: JVG
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: 10/13 - 15/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	SW	2 RSD rr
IV.	Continuing calibration/~~ICV~~	SW	CCV ∈ 25 2
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	SW	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	SW	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	SW	D_1 = 19, 20 D_2 = 25, 26
XVII.	Field blanks	SW	TB = 5, 17, 18, 27 EB = 6 FB = FB082804SO (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: Soil + Water

1	1	RSAN8-0.5B	S	11	1	SA178-0.5B	S	21	3	SA141-24B	S	31	1	175570 - MB	184
2	1	RSAN8-10B		12	1	SA178-10B		22	3	SA141-30B		32	2	17551 -	630
3	1	RSAN8-20B		13	1	SA178-17B		23	3	SA143-24B		33	3	175749 -	218
4	1	RSAN8-28B		14	1	SA178-25B		24	3	SA143-34B		34	4	176371 -	727
5	2	TB101309-SO1	W	15	3	SA178-43B		25	3	SA143-50B	D_2	35			
6	2	EB101409-SO1A3		16	1	SA178-43BDL		26	3	SA143009-50B	D_2	36			
7	1	SA160-0.5B	S	17	2	TB101409-SO1	W	27	2	TB101509-SO1	W	37			
8	3	SA160-10B		18	2	TB101409-SO3		28	3	SA160-10BMS	S	38			
9	1	SA160-20B		19	3	SA141-14B	D_1 S	29	3	SA160-10BMSD		39			
10	1	SA160-34B		20	3	SA141009-14B	D_1	30				40			

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

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

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

LDC #: 22234 G1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration

Reviewer: SVL
2nd Reviewer: [illegible]

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 Did the laboratory perform a 5 point calibration prior to sample analysis?
(Y) N N/A Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's?
(Y) N N/A Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation? $r^2 \geq 0.99$
(Y) N N/A Did the initial calibration meet the acceptance criteria?
Y (N) N/A Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %RSD (Limit: ≤30.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	9/18/09	ICAL-MS10	NNNN		0.028	5,6, 17,18, 27, 16, 175551-MB, 176371-MB	J/UJ/A (c)

INICAL.1SB

LDC #: 22234 G1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: VG
2nd Reviewer: [signature]

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

#	Date	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	10/20/09	C1584	JJ (+)	26.8		5,6,17,18,27,175555-MB	J+ dets/A (c)
			NNNN		0.026	↓	J/UJ/A
	10/20/09	X5066	B (+)	28.6		1-4,7,9-14,175570-MB	J+ dets/A
			KK (+)	25.6		↓	↓
	10/21/09	X5104	F (+)	26.4		8,15,19-26,28,29,175749-MB	J+ dets/A
	10/23/09	C1696	NNNN		0.025	16,176371-MB	J/UJ/A

CONCAL.1SB

LDC #: 22234G1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

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

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

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

Y N N/A Was a method blank associated with every sample in this SDG?
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.

Blank analysis date: 10/20/09
Conc. units: ug/Kg
Associated Samples: 1-4, 7, 9-14 (bl)

Compound	Blank ID	Sample Identification								
	175570-MB	1	2	11						
F	2.5	4.9/4								
5.0 E	0.47		0.93/4	0.72/4						
0.94										
		(All others either ND or < MB)								

Blank analysis date: 10/20/09
Conc. units: ug/L
Associated Samples: 5, 6, 17, 18, 27 (ND)

Compound	Blank ID	Sample Identification								
	175551-MB									
HHH	0.40									

LDC #: 22234 G1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 2 of 2
Reviewer: JVG
2nd Reviewer:

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

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

Y N N/A Was a method blank associated with every sample in this SDG?
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.

Blank analysis date: 10/21/09
Conc. units: ug/kg
Associated Samples: 8, 15, 19 – 26 (6)

Compound	Blank ID	Sample Identification								
	175749-MB	24								
4.6 F	2.3	3.6/U								
		(All others > MB)								

Blank analysis date: 10/23/09
Conc. units: ug/kg
Associated Samples: 16 (6)

Compound	(50x) Blank ID	(166x) Sample Identification								
	176371-MB	16								
158 M	79	220/U								

LDC #: 22234 G1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JV6
2nd Reviewer:

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

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

Blank units: ug/L **Associated sample units:** ug/kg
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: EB Associated Samples: 7-16 (be)

Compound	Blank ID 6	Blank ID	Sample Identification							
Sampling Date	10/14/09		12	14	15					
F	6.3		10/U	7.1/U	7.9/U					
		(All others either ND or > EB)								

12,6

Blank units: ug/L **Associated sample units:** ug/kg ; ug/L
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: Associated Samples: 6-16 (ND)

Compound	Blank ID 18	Blank ID	Sample Identification							
Sampling Date	10/14/09									
X	0.20									
A	0.22									

LDC #: 22234 G1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JVG
2nd Reviewer:

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

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

Blank units: ug/L **Associated sample units:** ug/kg
Field blank type: (circle one) Field Blank / Rinsate / (Trip Blank) / Other: Associated Samples: 19 – 26 (ND)

Compound	Blank ID 27	Blank ID	Sample Identification							
Sampling Date	10/15/09									
A	0.28									

Blank units: ug/L **Associated sample units:** ug/kg
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: Associated Samples: All soils (6 f)

Compound	Blank ID FB082809-S0	Blank ID	Sample Identification							
Sampling Date	8/28/09		1	2	4	7	8	9	12	14
F	9.2		4.9/U	7.1/U	14/U		15/U	15/U	10/U	7.1/U
CC	0.44		0.35/U	0.35/U	0.54/U	0.55/U				

LDC #: 22234 G1
SDG #: Su Conv

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JVG
2nd Reviewer: [illegible]

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

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

Blank units: ug/L **Associated sample units:** ug/kg
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: Associated Samples: All Soils (6 of)

Compound	Blank ID FB082809-SO	Blank ID	Sample Identification							
Sampling Date	8/28/09		15	19	26	21	22	24	25	26
F	9.2		7.9/U	6.8/U	7.1/U	5.2/U	9.2/U	3.6/U	5.9/U	
CC	0.44				0.53/U					0.93/U

cont'd from p2

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

Compound	Blank ID	Blank ID	Sample Identification							
Sampling Date										

LDC #: 22234G1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: JVG
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?
Y [✓ N] N/A Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		175570 LCS	H	137 (75-125)	( )	( )	1-4, 7, 9-14, 175570-MB	J+ dets/P (I)
				( )	( )	( )		
				( )	( )	( )		
		175749 LCS	NNNN	137 (75-125)	( )	( )	8, 15, 19-26, 175749-MB	No qual (MS/MSD in)
			F	131 (↓)	( )	( )	↓	↓
			D	126 (↓)	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 22234G1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and CRQLs

Reviewer: JVG
2nd Reviewer: LA

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

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

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

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

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

Comments: See sample calculation verification worksheet for recalculations

LDC #: 22234 G1
SDG #: Sq Cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

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

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

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

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

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

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		15	K > cal range		X/A (O)
		16	All except K dil		

Comments: _____

LDC #: 22239 G1
SDG #: 3Q Conv

VALIDATION FINDINGS WORKSHEET
Field Duplicates

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

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

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

Compound	Concentration (ug/kg)		RPD (Parent only)
	19	20	
F	6.8	7.1	0.3 (≤ 2ID) –
K	1.5	0.96	0.54 (≤ 5.2D) –
E	0.98	0.82	0.16 –

Compound	Concentration (ug/kg)		RPD (Parent only)
	25	26	
M	10 U	1.5	85 (≤ 10 D) –
F	5.9	38	32.1 (≤ 2ID) –
K	1.6	2.1	0.5 (≤ 5.1D) –
E	5.1U	0.91	4.19 –
CE	↓	0.43	4.67 –

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: October 13, 2009

LDC Report Date: January 4, 2010

Matrix: Soil

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905885

Sample Identification

RSAN8-10BSPLP3

Samples in this SDG underwent SPLP extraction

Introduction

This data review covers one soil 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 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)	RSAN8-10BSPLP3 177768-MB	J (all detects) UJ (all non-detects)	A
10/31/09	2-Methyl-2-propanol	0.028 (≥0.05)	SPLP3-BLK	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
11/4/09	Bromomethane	28.8	RSAN8-10BSPLP3 177768-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
11/4/09	2-Methyl-2-propanol	0.018 (≥0.05)	RSAN8-10BSPLP3 177768-MB	J (all detects) UJ (all non-detects)	A
11/5/09	2-Methyl-2-propanol	0.028 (≥0.05)	SPLP3-BLK	J (all detects) UJ (all non-detects)	A

V. Blanks

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

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
SPLP3-BLK	11/5/09	Chloroform	0.24 ug/L	All samples in SDG R0905885

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
RSAN8-10BSPLP3	Chloroform	0.22 ug/L	0.22U ug/L

No field blanks were identified in this SDG.

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

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 R0905885	All compounds reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

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

XVI. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Data Qualification Summary - SDG R0905885

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905885	RSAN8-10BSPLP3	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Initial calibration (RRF) (c)
R0905885	RSAN8-10BSPLP3	Bromomethane	J- (all detects) UJ (all non-detects)	A	Continuing calibration (%D) (c)
R0905885	RSAN8-10BSPLP3	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Continuing calibration (RRF) (c)
R0905885	RSAN8-10BSPLP3	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 R0905885

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905885	RSAN8-10BSPLP3	Chloroform	0.22U ug/L	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Field Blank Data Qualification Summary - SDG R0905885

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234H1
SDG #: R0905885
Laboratory: Columbia Analytical Services

Date: 12/23/09
Page: 1 of 1
Reviewer: JVG
2nd Reviewer: [signature]

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: 10/13/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	SW	%RSD r²
IV.	Continuing calibration/~~ICV~~	SW	CCV ≤ 25%
V.	Blanks	SW	/
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	Client Spec
VIII.	Laboratory control samples	A	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	
XVII.	Field blanks	N	

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

Validated Samples: Soil

1	S RAN8-10BSPLP3	− 11	177768-MB	21		31	
2	^	+ 12	SPLP3-Blk	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-Chlorohexane
B. Bromomethane	V. Benzene	PP. Bromochloromethane	JJJ. 1,2-Dichlorobenzene	DDDD. Isopropyl alcohol
C. Vinyl choride**	W. trans-1,3-Dichloropropene	QQ. 1,1-Dichloropropene	KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
D. Chloroethane	X. Bromoform*	RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF. Acrolein
E. ~~Methylene chloride~~ Dichloromethane	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG. Acrylonitrile
F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN. 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
G. Carbon disulfide	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachloroethane	OOO. 1,3,5-Trichlorobenzene	IIII. Isobutyl alcohol
H. 1,1-Dichloroethene**	BB. 1,1,2,2-Tetrachloroethane*	VV. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
I. 1,1-Dichloroethane*	CC. Toluene**	WW. Bromobenzene	QQQ. cis-1,2-Dichloroethene	KKKK. Propionitrile
J. 1,2-Dichloroethene, total	DD. Chlorobenzene*	XX. 1,2,3-Trichloropropane	RRR. m,p-Xylenes	LLLL. Ethyl ether
K. Chloroform**	EE. Ethylbenzene**	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
L. 1,2-Dichloroethane	FF. Styrene	ZZ. 2-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN. 2-Methyl-2-propanol
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	OOOO.
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	PPPP.
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	QQQQ.
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR.
Q. 1,2-Dichloropropane**	KK. Trichlorofluoromethane	EEE. sec-Butylbenzene	YYY. tert-Butanol	SSSS.
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohol	TTTT.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-Isopropyltoluene	AAAA. Ethyl tert-butyl ether	UUUU.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	VVVV.

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

LDC #: 22234H1
SDG #: Su Canal

VALIDATION FINDINGS WORKSHEET
Initial Calibration

Page: 1 of 1
Reviewer: JNG
2nd Reviewer: [illegible]

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 Did the laboratory perform a 5 point calibration prior to sample analysis?
Y N N/A Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's?
Y N N/A Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation? $r^2 \geq 0.99$
Y N N/A Did the initial calibration meet the acceptance criteria?
Y N N/A Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %RSD (Limit: <30.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	10/27/09	ICAL-MS8	NNNN		0.017	All + ~~B~~ 237768-MB	J/NJ/A (c)
	10/31/09	ICAL-MS10	NNNN		0.028	SPLP3-Blk	

INICAL.1SB

LDC #: 22334H1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG
2nd Reviewer: [signature]

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

#	Date	Standard ID	Compound	Finding %D (Limit: ≤25.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	11/04/09	F3940	B (-)	28.8		1, 177768-MB	J-/UJ/A (c)
			NNNN		0.018	↓	J/UJ/A
	11/05/09	C2053	NNNN		0.028	SPLP3-Blk	J/UJ/A

LDC #: 22234 H1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: JV6
2nd Reviewer:

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

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

Y N N/A Was a method blank associated with every sample in this SDG?
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.

SPLP **Blank analysis date:** 11/05/09 (6l)
Conc. units: ug/L Associated Samples: 1

Compound	Blank ID	Sample Identification								
	SPLP3-BLK	1								
K	0.24	0.22/U								

Blank analysis date:
Conc. units: Associated Samples:

Compound	Blank ID	Sample Identification								

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: October 16 through October 19, 2009

LDC Report Date: January 4, 2010

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905963

Sample Identification

SA108-20B	SA108-20BMSD
SA108-30B	
SA108-45B	
SA142-20.5B	
SA142009-20.5B	
SA142-30.5B	
SA142-51B	
TB101609-SO1	
EB101909-SO1A3	
SA157-10B	
SA157-25B	
SA157-44B	
SA157-44BDL	
SA171-5B	
SA171-15B	
SA171-30B	
SA171-41B	
TB101909-SO1	
TB101909-SO3	
SA108-20BMS	

Introduction

This data review covers 17 soil samples and 4 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

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

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

B The analytical result may be a false positive totally attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JB The analytical result may be biased high and partially attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JK The analytical result is an estimated maximum possible concentration (EMPC).

X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.

J-TDS The analytical result is estimated based on failure of the Total Dissolved Solids (TDS) correctness check performed in accordance with the Standard Method 1030E.

J-CAB The analytical result is estimated based on failure of the cation-anion balance correctness check performed in accordance with Standard Method 1030E.

J-TDS & CAB The analytical result is unreliable based on the failure of the cation-anion balance and TDS correctness check performed in accordance with standard Method 1030E.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

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

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
9/18/09	2-Methyl-2-propanol	0.028 (≥0.05)	SA157-44BDL 176371-MB	J (all detects) UJ (all non-detects)	A

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

Date	Compound	%D	Associated Samples	Flag	A or P
10/22/09	2-Methyl-2-propanol	33.4	SA108-20B SA108-30B SA108-45B SA142-20.5B SA142009-20.5B SA142-30.5B SA142-51B SA157-10B SA157-25B SA157-44B SA171-5B SA171-15B SA171-30B SA108-20BMS SA108-20BMSD 175993-MB	J+ (all detects)	A
10/23/09 (H1857)	Acetone	29.1	SA171-41B 176069-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
10/23/09 (C1696)	2-Methyl-2-propanol	0.025 (≥0.05)	SA157-44BDL 176371-MB	J (all detects) UJ (all non-detects)	A

V. Blanks

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

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
175993-MB	10/22/09	Acetone	1.7 ug/Kg	SA108-20B SA108-30B SA108-45B SA142-20.5B SA142009-20.5B SA142-30.5B SA142-51B SA157-10B SA157-25B SA157-44B SA171-5B SA171-15B SA171-30B
176371-MB	10/23/09	2-Butanone	79 ug/Kg	SA157-44BDL

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
SA157-44BDL	2-Butanone	150 ug/Kg	150U ug/Kg

Samples TB101609-SO1, TB101909-SO1, and TB101909-SO3 were identified as trip blanks. No volatile contaminants were found in these blanks with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
TB101909-SO1	10/19/09	Acetone	2.0 ug/L	EB101909-SO1A3 SA157-10B SA157-25B SA157-44B SA157-44BDL SA171-5B SA171-15B SA171-30B SA171-41B
TB101909-SO3	10/19/09	Acetone	1.9 ug/L	EB101909-SO1A3 SA157-10B SA157-25B SA157-44B SA157-44BDL SA171-5B SA171-15B SA171-30B SA171-41B

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

Sample EB101909-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
EB101909-SO1A3	10/19/09	Acetone Chloroform	5.2 ug/L 0.37 ug/L	SA157-10B SA157-25B SA157-44B SA157-44BDL SA171-5B SA171-15B SA171-30B SA171-41B

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

Sample	Compound	Reported Concentration	Modified Final Concentration
SA157-10B	Acetone	9.6 ug/Kg	9.6U ug/Kg
SA171-5B	Acetone	8.4 ug/Kg	8.4U ug/Kg
SA171-15B	Acetone	10 ug/Kg	10U ug/Kg
SA171-41B	Chloroform	0.63 ug/Kg	0.63U ug/Kg

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 R0905963

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
SA108-20B	Acetone	16 ug/Kg	16U ug/Kg
SA108-30B	Acetone	13 ug/Kg	13U ug/Kg
SA108-45B	Acetone	11 ug/Kg	11U ug/Kg
SA142-20.5B	Acetone Toluene	17 ug/Kg 0.40 ug/Kg	17U ug/Kg 0.40U ug/Kg
SA142-30.5B	Toluene	0.38 ug/Kg	0.38U ug/Kg
SA157-10B	Acetone Toluene	9.6 ug/Kg 0.47 ug/Kg	9.6U ug/Kg 0.47U ug/Kg
SA157-25B	Acetone Toluene	18 ug/Kg 0.57 ug/Kg	18U ug/Kg 0.57U ug/Kg
SA171-5B	Acetone	8.4 ug/Kg	8.4U ug/Kg
SA171-15B	Acetone	10 ug/Kg	10U ug/Kg
SA171-30B	Toluene	0.48 ug/Kg	0.48U ug/Kg
SA171-41B	Toluene	0.43 ug/Kg	0.43U ug/Kg

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
176069LCS	2-Butanone	128 (75-125)	SA171-41B	J+ (all detects)	P
	2-Hexanone	129 (75-125)	176069-MB	J+ (all detects)	
	Acetone	128 (75-125)		J+ (all detects)	
	Chloromethane	128 (75-125)		J+ (all detects)	
	Ethyl-tert-butyl ether	127 (75-125)		J+ (all detects)	
	Trichlorofluoromethane	126 (75-125)		J+ (all detects)	
	n-Butylbenzene	127 (75-125)		J+ (all detects)	
	tert-Amyl-methyl ether	126 (75-125)		J+ (all 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 project quantitation limits were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
SA157-44B	Chloroform	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	A

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0905963	All compounds reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

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

Sample	Compound	Flag	A or P
SA157-44B	Chloroform	X	A
SA157-44BDL	All TCL compounds except Chloroform	X	A

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

XVI. Field Duplicates

Samples SA142-20.5B and SA142009-20.5B were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA142-20.5B	SA142009-20.5B				
Acetone	17	19	-	2 (≤22)	-	-
Toluene	0.40	5.6U	-	5.2 (≤5.6)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Data Qualification Summary - SDG R0905963

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905963	SA157-44BDL	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Initial calibration (RRF) (c)
R0905963	SA108-20B SA108-30B SA108-45B SA142-20.5B SA142009-20.5B SA142-30.5B SA142-51B SA157-10B SA157-25B SA157-44B SA171-5B SA171-15B SA171-30B	2-Methyl-2-propanol	J+ (all detects)	A	Continuing calibration (%D) (c)
R0905963	SA171-41B	Acetone	J- (all detects) UJ (all non-detects)	A	Continuing calibration (%D) (c)
R0905963	SA157-44BDL	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Continuing calibration (RRF) (c)
R0905963	SA171-41B	2-Butanone 2-Hexanone Acetone Chloromethane Ethyl-tert-butyl ether Trichlorofluoromethane n-Butylbenzene tert-Amyl-methyl ether	J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects)	P	Laboratory control samples (%R) (l)
R0905963	SA157-44B	Chloroform	J (all detects)	A	Project Quantitation Limit (e)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905963	SA108-20B SA108-30B SA108-45B SA142-20.5B SA142009-20.5B SA142-30.5B SA142-51B TB101609-SO1 EB101909-SO1A3 SA157-10B SA157-25B SA157-44B SA157-44BDL SA171-5B SA171-15B SA171-30B SA171-41B TB101909-SO1 TB101909-SO3	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (PQL) (sp)
R0905963	SA157-44B	Chloroform	X	A	Overall assessment of data (o)
R0905963	SA157-44BDL	All TCL compounds except Chloroform	X	A	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Laboratory Blank Data Qualification Summary - SDG R0905963

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R090963	SA157-44BDL	2-Butanone	150U ug/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Trip Blank Data Qualification Summary - SDG R0905963

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Equipment Blank Data Qualification Summary - SDG R0905963

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905963	SA157-10B	Acetone	9.6U ug/Kg	A	be
R0905963	SA171-5B	Acetone	8.4U ug/Kg	A	be

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905963	SA171-15B	Acetone	10U ug/Kg	A	be
R0905963	SA171-41B	Chloroform	0.63U ug/Kg	A	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Field Blank Data Qualification Summary - SDG R0905963

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905963	SA108-20B	Acetone	16U ug/Kg	A	bf
R0905963	SA108-30B	Acetone	13U ug/Kg	A	bf
R0905963	SA108-45B	Acetone	11U ug/Kg	A	bf
R0905963	SA142-20.5B	Acetone Toluene	17U ug/Kg 0.40U ug/Kg	A	bf
R0905963	SA142-30.5B	Toluene	0.38U ug/Kg	A	bf
R0905963	SA157-10B	Acetone Toluene	9.6U ug/Kg 0.47U ug/Kg	A	bf
R0905963	SA157-25B	Acetone Toluene	18U ug/Kg 0.57U ug/Kg	A	bf
R0905963	SA171-5B	Acetone	8.4U ug/Kg	A	bf
R0905963	SA171-15B	Acetone	10U ug/Kg	A	bf
R0905963	SA171-30B	Toluene	0.48U ug/Kg	A	bf
R0905963	SA171-41B	Toluene	0.43U ug/Kg	A	bf

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234I1
SDG #: R0905963
Laboratory: Columbia Analytical Services

Date: 12/23/09
Page: 1 of 1
Reviewer: JW
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: 10/16 - 19/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	SW	%RSD r ✓
IV.	Continuing calibration/~~ICV~~	SW	CCV ≤ 25 %
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	LCS/D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	SW	D = 4, 5
XVII.	Field blanks	SW	EB = 9 TB = 8, 18, 19 FB = FB082809-SO (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: soil + Water

1	1	SA108-20B	S	11	1	SA157-25B	S	21	1	SA108-20BMSD	S
2	1	SA108-30B		12	1	SA157-44B		22			
3	1	SA108-45B		13	3	SA157-44BDL		23			
4	1	SA142-20.5B	D	14	1	SA171-5B		24			
5	1	SA142009-20.5B	D	15	1	SA171-15B		25			
6	1	SA142-30.5B		16	1	SA171-30B		26			
7	1	SA142-51B		17	2	SA171-41B		27			
8	4	TB101609-SO1	W	18	4	TB101909-SO1	W	28			
9	9	EB101909-SO1A3		19	4	TB101909-SO3		29			
10	1	SA157-10B	S	20	1	SA108-20BMS	S	30			

31	1	175993-MB
32	2	176069-
33	3	176371-
34	4	176619-
35		
36		
37		
38		
39		
40		

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

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

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

LDC #: 22234 I1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration

Reviewer: NG
2nd Reviewer: [illegible]

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 — Did the laboratory perform a 5 point calibration prior to sample analysis?
- (Y) N N/A — Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's?
- (Y) N N/A — Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation? $r^2 \geq 0.99$
- (Y) N N/A — Did the initial calibration meet the acceptance criteria?
- Y (N) N/A — Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %RSD (Limit: ≤30.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	9/18/09	ICAL-MS10	NNNN		0.028	13, 176371-MD	J/UJ/A (c)

LDC #: 22234 I1
SDG #: Sc Conv

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG
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?
Y N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?
Y (N) N/A Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤25.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	10/22/09	X5137	NNNN (+)	33.4		1-7, 10-12, 14-16, 20, 21, 175993-MB	J+ (all detects)/A (C)
	10/23/09	H1857	F (-)	29.1		17, 176069-MB	J-/UJ/A
	10/23/09	C1896	NNNN		0.025	13, 176371-MB	J/UJ/A

CONCAL.1SB

LDC #: 22234I1
SDG #: Seq Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: JVG
2nd Reviewer: L

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

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

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

Blank analysis date: 10/22/09
Conc. units: ug/Kg
Associated Samples: 1-7, 10-12, 14-16

Compound	Blank ID	Sample Identification								
	175993-MB									
3.4 F	1.7	(All results > MB)								

Blank analysis date: 10/23/09
Conc. units: ug/Kg
Associated Samples: 13 (bl)

Compound	Blank ID	Sample Identification								
	176371-MB	13								
158 M	79	150/U								

LDC #: 22234I1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 1 of 4
Reviewer: JVG
2nd Reviewer:

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

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

Blank units: ug/L **Associated sample units:** ug/kg
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: EB Associated Samples: 10 - 17 (be)

Compound	Blank ID 9	Blank ID	Sample Identification							
Sampling Date	10/19/09		10	14	15	17				
F	5.2		9.6/4	8.4/4	10/4					
K	0.37					0.63/4				
			(All others either ND or > EB)							

Blank units: ug/L **Associated sample units:** ug/L ; ug/kg
Field blank type: (circle one) Field Blank / Rinsate / (Trip Blank) / Other: Associated Samples: 9 - 17

Compound	Blank ID 18	Blank ID 19	Sample Identification							
Sampling Date	10/19/09 →									
F	2.0	1.9	(All results either ND or > TB)							

4.0

LDC #: 22234 I1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 2 of 7
Reviewer: JVB
2nd Reviewer:

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

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

Blank units: ug/L **Associated sample units:** ug/kg
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: _____ Associated Samples: All soils (bf)

Compound	Blank ID FB082809-SO	Blank ID	Sample Identification							
Sampling Date	8/28/09		1	2	3	4	6	10	11	14
F	9.2		16/4	13/4	11/4	17/4		9.6/4	18/4	8.4/4
CC	0.44					0.40/4	0.38/4	0.47/4	0.57/4	

18.4
0.88

Blank units: _____ **Associated sample units:** Same as above
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: _____ Associated Samples: (bf)

Compound	Blank ID FB082809-SO	Blank ID	Sample Identification							
Sampling Date	8/28/09		15	16	17					
F	9.2		10/4							
CC	0.44			0.48/4	0.43/4					

LDC #: 22234I1
SDG #: Ca Cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

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

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

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

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

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

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

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		20/21	Several compounds outside limits				1	No qual (either MS, MSD or LCS in)
			(See attached summary)	( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
H.	1,1-Dichloroethene	59-172%	< 22%	61-145%	< 14%
S.	Trichloroethene	62-137%	< 24%	71-120%	< 14%
V.	Benzene	66-142%	< 21%	76-127%	< 11%
CC.	Toluene	59-139%	< 21%	76-125%	< 13%
DD.	Chlorobenzene	60-133%	< 21%	75-130%	< 13%

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Northgate Environmental
Project: Tronox LLC Henderson/2027.001
Sample Matrix: Soil

Service Request: R0905963
Date Collected: 10/16/09
Date Received: 10/17/09
Date Analyzed: 10/23/09

Matrix Spike Summary
Volatile Organic Compounds by GC/MS

Sample Name: SA108-20B
Lab Code: R0905963-001

Units: µg/Kg
Basis: Dry

Analytical Method: 8260B

Analyte Name	Sample Result	Matrix Spike RQ0910276-03 Result	Matrix Spike Amount	Matrix Spike % Rec		Duplicate Matrix Spike RQ0910276-04 Result	Duplicate Matrix Spike Amount	Duplicate Matrix Spike % Rec		% Rec Limits	RPD	RPD Limit
1,1,1,2-Tetrachloroethane	ND	56.8	58.0	98		54.3	56.9	95		70 - 130	4	30
1,1,1-Trichloroethane (TCA)	ND	61.3	58.0	106		59.7	56.9	105		70 - 130	3	30
1,1,2,2-Tetrachloroethane	ND	49.5	58.0	85		46.3	56.9	81		70 - 130	7	30
1,1,2-Trichloroethane	ND	56.1	58.0	97		52.7	56.9	93		70 - 130	6	30
1,1-Dichloroethane (1,1-DCA)	ND	56.8	58.0	98		56.1	56.9	98		70 - 130	1	30
1,1-Dichloroethene (1,1-DCE)	ND	62.1	58.0	107		61.6	56.9	108		70 - 130	1	30
1,1-Dichloropropene	ND	54.8	58.0	94		52.3	56.9	92		70 - 130	5	30
1,2,3-Trichlorobenzene	ND	44.3	58.0	76		38.8	56.9	68	*	70 - 130	13	30
1,2,3-Trichloropropane	ND	51.0	58.0	88		50.7	56.9	89		70 - 130	1	30
1,2,4-Trichlorobenzene	ND	40.1	58.0	69	*	34.6	56.9	61	*	70 - 130	15	30
1,2,4-Trimethylbenzene	ND	44.6	58.0	77		35.5	56.9	62	*	70 - 130	23	30
1,2-Dibromo-3-chloropropane (DBC	ND	48.9	58.0	84		46.2	56.9	81		50 - 150	6	30
1,2-Dibromoethane	ND	53.4	58.0	92		51.9	56.9	91		70 - 130	3	30
1,2-Dichlorobenzene	ND	48.4	58.0	83		40.8	56.9	72		70 - 130	17	30
1,2-Dichloroethane	ND	61.2	58.0	106		57.5	56.9	101		70 - 130	6	30
1,2-Dichloropropane	ND	54.2	58.0	93		50.3	56.9	88		70 - 130	8	30
1,3,5-Trimethylbenzene	ND	45.2	58.0	78		37.5	56.9	66	*	70 - 130	19	30
1,3-Dichlorobenzene	ND	45.1	58.0	78		36.1	56.9	63	*	70 - 130	22	30
1,3-Dichloropropane	ND	52.6	58.0	91		51.5	56.9	90		70 - 130	2	30
1,4-Dichlorobenzene	ND	46.1	58.0	79		37.8	56.9	66	*	70 - 130	20	30
2,2-Dichloropropane	ND	58.2	58.0	100		58.6	56.9	103		70 - 130	1	30
2-Butanone (MEK)	ND	61.3	58.0	106		60.1	56.9	105		50 - 150	2	30
2-Chlorotoluene	ND	43.6	58.0	75		37.2	56.9	65	*	70 - 130	16	30
2-Hexanone	ND	54.0	58.0	93		54.1	56.9	95		70 - 130	0	30
2-Methyl-2-propanol	ND	1250	1160	107		1290	1140	113		50 - 150	3	30
4-Chlorotoluene	ND	45.2	58.0	78		37.3	56.9	66	*	70 - 130	19	30
4-Isopropyltoluene	ND	43.4	58.0	75		34.4	56.9	60	*	70 - 130	23	30
4-Methyl-2-pentanone	ND	56.3	58.0	97		52.6	56.9	92		70 - 130	7	30
Acetone	16	86.2	58.0	120		109	56.9	163	*	50 - 150	23	30
Benzene	ND	54.2	58.0	93		50.5	56.9	89		70 - 130	7	30
Bromobenzene	ND	46.7	58.0	81		41.6	56.9	73		70 - 130	12	30
Bromochloromethane	ND	59.7	58.0	103		56.2	56.9	99		70 - 130	6	30
Bromodichloromethane	ND	59.3	58.0	102		54.1	56.9	95		70 - 130	9	30
Bromoform	ND	50.4	58.0	87		50.8	56.9	89		70 - 130	1	30

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Northgate Environmental
Project: Tronox LLC Henderson/2027.001
Sample Matrix: Soil

Service Request: R0905963
Date Collected: 10/16/09
Date Received: 10/17/09
Date Analyzed: 10/23/09

Matrix Spike Summary
Volatile Organic Compounds by GC/MS

Sample Name: SA108-20B
Lab Code: R0905963-001

Units: µg/Kg
Basis: Dry

Analytical Method: 8260B

Analyte Name	Sample Result	Matrix Spike RQ0910276-03 Result	Matrix Spike Amount	Matrix Spike % Rec	Duplicate Matrix Spike RQ0910276-04 Result	Duplicate Matrix Spike Amount	Duplicate Matrix Spike % Rec	% Rec Limits	RPD	RPD Limit
Bromomethane	ND	68.2	58.0	117	58.1	56.9	102	50 - 150	16	30
Carbon Tetrachloride	ND	65.8	58.0	113	63.2	56.9	111	70 - 130	4	30
Chlorobenzene	ND	53.5	58.0	92	48.2	56.9	85	70 - 130	10	30
Chloroethane	ND	58.9	58.0	102	57.4	56.9	101	70 - 130	3	30
Chloroform	ND	59.4	58.0	102	56.7	56.9	100	70 - 130	5	30
Chloromethane	ND	61.2	58.0	106	59.9	56.9	105	70 - 130	2	30
Dibromochloromethane	ND	59.5	58.0	103	57.0	56.9	100	70 - 130	4	30
Dibromomethane	ND	57.2	58.0	99	53.9	56.9	95	70 - 130	6	30
Dichlorodifluoromethane (CFC 12)	ND	54.0	58.0	93	55.1	56.9	97	70 - 130	2	30
Dichloromethane	ND	55.4	58.0	95	55.5	56.9	97	70 - 130	0	30
Diisopropyl Ether	ND	54.6	58.0	94	55.0	56.9	97	70 - 130	1	30
Ethyl tert-Butyl Ether	ND	54.1	58.0	93	54.6	56.9	96	70 - 130	1	30
Ethylbenzene	ND	53.5	58.0	92	45.7	56.9	80	70 - 130	16	30
Hexachlorobutadiene	ND	43.0	58.0	74	30.1	56.9	53	* 70 - 130	35 *	30
Isopropylbenzene (Cumene)	ND	45.7	58.0	79	39.1	56.9	69	* 70 - 130	16	30
Methyl tert-Butyl Ether	ND	54.4	58.0	94	54.7	56.9	96	70 - 130	1	30
Naphthalene	ND	47.9	58.0	83	44.3	56.9	78	50 - 150	8	30
Styrene	ND	57.0	58.0	98	49.3	56.9	87	70 - 130	14	30
Tetrachloroethene (PCE)	ND	60.3	58.0	104	53.0	56.9	93	70 - 130	13	30
Toluene	ND	54.6	58.0	94	49.2	56.9	86	70 - 130	10	30
Trichloroethene (TCE)	ND	58.7	58.0	101	53.2	56.9	93	70 - 130	10	30
Trichlorofluoromethane (CFC 11)	ND	67.7	58.0	117	64.6	56.9	113	70 - 130	5	30
Vinyl Chloride	ND	63.2	58.0	109	60.9	56.9	107	70 - 130	4	30
cis-1,2-Dichloroethene	ND	53.7	58.0	93	52.2	56.9	92	70 - 130	3	30
cis-1,3-Dichloropropene	ND	52.2	58.0	90	48.7	56.9	86	70 - 130	7	30
m,p-Xylenes	ND	111	116	96	95.0	114	83	70 - 130	15	30
n-Butylbenzene	ND	41.3	58.0	71	29.6	56.9	52	* 70 - 130	33 *	30
n-Propylbenzene	ND	44.5	58.0	77	35.2	56.9	62	* 70 - 130	24	30
o-Xylene	ND	51.4	58.0	89	45.9	56.9	81	70 - 130	11	30
sec-Butylbenzene	ND	43.0	58.0	74	34.5	56.9	61	* 70 - 130	22	30
tert-Amyl Methyl Ether	ND	50.4	58.0	87	49.6	56.9	87	70 - 130	2	30
tert-Butylbenzene	ND	44.4	58.0	77	37.2	56.9	65	* 70 - 130	18	30
trans-1,2-Dichloroethene	ND	58.1	58.0	100	55.6	56.9	98	70 - 130	5	30
trans-1,3-Dichloropropene	ND	54.0	58.0	93	50.2	56.9	88	70 - 130	7	30

Comments:

LDC #: 22234 I 1
SDG #: Su Corr ✓

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

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

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

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

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

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		175993 LCS	NNNN	128 (75-125)	( )	( )	1-7, 10-12, 14-16, 175993-MB	No qual (MS/MSD in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		176069 LCS	M	128 ( )	( )	( )	17, 176069-MB	J+ dets/ND (L)
			Z	129 ( )	( )	( )		
			F	128 ( )	( )	( )		
			A	128 ( )	( )	( )		
			AAAA	127 ( )	( )	( )		
			KK	126 ( )	( )	( )		
			III	127 ( )	( )	( )		
			BBBB	126 ( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		176619-LCSD	B	126 (75-125)	( )	( )	8, 9, 18, 19, 176619-MB	No qual (LCSD in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 22234I1
SDG #: Sq Comp

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and CRQLs

Reviewer: JVG
2nd Reviewer: [illegible]

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

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

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

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

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

Comments: See sample calculation verification worksheet for recalculations

LDC #: 22234I1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Reviewer: DVR
2nd Reviewer: [signature]

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

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

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

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

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		12	K > Cal range		X/A (O)
					↓ ↓
		13	All except K dil		↓

Comments: _____

LDC #: 22234 I1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

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

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

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

Compound	Concentration (ug/kg)		RPD
	4	5	
F	17	19	2 (≤22 D)
CC	0.40	5.6 U	5.2 (≤5.6 D)

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: October 20 through October 21, 2009

LDC Report Date: January 4, 2010

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906024

Sample Identification

SA33-0.5B
SA33009-0.5B
SA33-10B
SA33-20B
SA33-33B
SA156-0.5B
SA156-10B
SA156-30B
SA156-35B
SA156-45B
SA157-0.5B
SA157009-0.5B
TB102009-SO1
SA52-15B
SA52-28B
SA52-43B
SA149-22B
SA149-32B
SA149-45B
SA149009-45B
TB102109-SO1

Introduction

This data review covers 19 soil samples and 2 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

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

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

B The analytical result may be a false positive totally attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JB The analytical result may be biased high and partially attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JK The analytical result is an estimated maximum possible concentration (EMPC).

X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.

J-TDS The analytical result is estimated based on failure of the Total Dissolved Solids (TDS) correctness check performed in accordance with the Standard Method 1030E.

J-CAB The analytical result is estimated based on failure of the cation-anion balance correctness check performed in accordance with Standard Method 1030E.

J-TDS & CAB The analytical result is unreliable based on the failure of the cation-anion balance and TDS correctness check performed in accordance with standard Method 1030E.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

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

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
10/31/09	2-Methyl-2-propanol	0.028 (≥0.05)	All water samples in SDG R0906024	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
10/23/09	Acetone	29.1	SA33-0.5B SA33009-0.5B SA33-10B SA33-20B SA33-33B SA156-0.5B SA156-10B SA156-30B SA156-35B 176069-MB	J- (all detects) UJ (all non-detects)	A
10/28/09	Chloromethane Acetone	28.9 36.7	SA156-45B SA157-0.5B SA157009-0.5B SA52-15B SA52-28B SA52-43B SA149-22B SA149-32B 176692-MB	J+ (all detects) J+ (all detects)	A

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

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
11/1/09	2-Methyl-2-propanol	0.029 (≥0.05)	All water samples in SDG R0906024	J (all detects) UJ (all non-detects)	A

V. Blanks

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

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
176691-MB	10/29/09	Dichloromethane	0.38 ug/Kg	SA149-45B SA149009-45B
177315-MB	11/1/09	1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene	0.37 ug/L 0.30 ug/L 0.45 ug/L	All water samples in SDG R0906024

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

Samples TB102009-SO1 and TB102109-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
TB102009-SO1	10/20/09	Chloromethane	0.21 ug/L	SA33-0.5B SA33009-0.5B SA33-10B SA33-20B SA33-33B SA156-0.5B SA156-10B SA156-30B SA156-35B SA156-45B SA157-0.5B SA157009-0.5B
TB102109-SO1	10/21/09	Chloromethane	0.25 ug/L	SA52-15B SA52-28B SA52-43B SA149-22B SA149-32B SA149-45B SA149009-45B

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

Samples FB080309-SO (from SDG R0904279) and FB082809-SO (from SDG R0904894) were identified as field blanks. No volatile contaminants were found in these blanks with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB080309-SO	8/3/09	Acetone Toluene	2.1 ug/L 0.30 ug/L	SA156-0.5B SA156-10B SA156-30B SA156-35B SA156-45B

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB082809-SO	8/28/09	Acetone Toluene	9.2 ug/L 0.44 ug/L	SA33-0.5B SA33009-0.5B SA33-10B SA33-20B SA33-33B SA157-0.5B SA157009-0.5B SA52-15B SA52-28B SA52-43B SA149-22B SA149-32B SA149-45B SA149009-45B

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
SA33-0.5B	Acetone	4.1 ug/Kg	4.1U ug/Kg
SA33-10B	Acetone Toluene	9.5 ug/Kg 0.71 ug/Kg	9.5U ug/Kg 0.71U ug/Kg
SA157-0.5B	Toluene	0.67 ug/Kg	0.67U ug/Kg
SA157009-0.5B	Acetone Toluene	11 ug/Kg 0.40 ug/Kg	11U ug/Kg 0.40U ug/Kg
SA52-28B	Toluene	0.44 ug/Kg	0.44U ug/Kg
SA52-43B	Toluene	0.81 ug/Kg	0.81U ug/Kg
SA149-45B	Acetone	12 ug/Kg	12U ug/Kg
SA156-30B	Toluene	0.42 ug/Kg	0.42U 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) 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
176691-LCS (SA149-45B SA149009-45B 176691-MB)	1,1,1,2-Tetrachloroethane 1,2,3-Trichloropropane Bromomethane Carbon tetrachloride Hexachlorobutadiene	71 (75-125) 73 (75-125) 64 (75-125) 72 (75-125) 73 (75-125)	- - - - -	- - - - -	J- (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0906024	All compounds reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment of Data

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

XVI. Field Duplicates

Samples SA33-0.5B and SA33009-0.5B, samples SA157-0.5B and SA157009-0.5B, samples SA149-45B and SA149009-45B were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA33-0.5B	SA33009-0.5B				
2-Butanone	2.5	5.5	-	3.0 (≤8.2)	-	-
2-Hexanone	0.66	0.66	-	0 (≤8.2)	-	-
Acetone	4.1	22	-	17.9 (≤16)	J (all detects)	A

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA157-0.5B	SA157009-0.5B				
Chloroform	1.0	1.6	-	0.6 (≤10)	-	-
Toluene	0.67	0.40	-	0.27 (≤10)	-	-
2-Butanone	20U	1.5	-	18.5 (≤20)	-	-
Acetone	41U	11	-	30 (≤41)	-	-

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA149-45B	SA149009-45B				
2-Butanone	1.2	14U	-	12.8 (≤14)	-	-
Acetone	12	29U	-	17 (≤29)	-	-
Chloroform	40	78	64 (≤50)	-	J (all detects)	A

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA149-45B	SA149009-45B				
Methylene chloride	1.2	1.4	-	0.2 (≤7.2)	-	-
Tetrachloroethene	0.73	1.5	-	0.77 (≤7.2)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Data Qualification Summary - SDG R0906024

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906024	TB102009-SO1 TB102109-SO1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Initial calibration (RRF) (c)
R0906024	SA33-0.5B SA33009-0.5B SA33-10B SA33-20B SA33-33B SA156-0.5B SA156-10B SA156-30B SA156-35B	Acetone	J- (all detects) UJ (all non-detects)	A	Continuing calibration (%D) (c)
R0906024	SA156-45B SA157-0.5B SA157009-0.5B SA52-15B SA52-28B SA52-43B SA149-22B SA149-32B	Chloromethane Acetone	J+ (all detects) J+ (all detects)	A	Continuing calibration (%D) (c)
R0906024	TB102009-SO1 TB102109-SO1	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Continuing calibration (RRF) (c)
R0906024	SA149-45B SA149009-45B	1,1,1,2-Tetrachloroethane 1,2,3-Trichloropropane Bromomethane Carbon tetrachloride Hexachlorobutadiene	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0906024	SA33-0.5B SA33009-0.5B SA33-10B SA33-20B SA33-33B SA156-0.5B SA156-10B SA156-30B SA156-35B SA156-45B SA157-0.5B SA157009-0.5B TB102009-SO1 SA52-15B SA52-28B SA52-43B SA149-22B SA149-32B SA149-45B SA149009-45B TB102109-SO1	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (PQL) (sp)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906024	SA33-0.5B SA33009-0.5B	Acetone	J (all detects)	A	Field duplicates (Difference) (fd)
R0906024	SA149-45B SA149009-45B	Chloroform	J (all detects)	A	Field duplicates (RPD) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Laboratory Blank Data Qualification Summary - SDG R0906024

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Trip Blank Data Qualification Summary - SDG R0906024

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Field Blank Data Qualification Summary - SDG R0906024

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0906024	SA33-0.5B	Acetone	4.1U ug/Kg	A	bf
R0906024	SA33-10B	Acetone Toluene	9.5U ug/Kg 0.71U ug/Kg	A	bf
R0906024	SA157-0.5B	Toluene	0.67U ug/Kg	A	bf
R0906024	SA157009-0.5B	Acetone Toluene	11U ug/Kg 0.40U ug/Kg	A	bf
R0906024	SA52-28B	Toluene	0.44U ug/Kg	A	bf
R0906024	SA52-43B	Toluene	0.81U ug/Kg	A	bf
R0906024	SA149-45B	Acetone	12U ug/Kg	A	bf
R0906024	SA156-30B	Toluene	0.42U ug/Kg	A	bf

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234J1
SDG #: R0906024
Laboratory: Columbia Analytical Services

Date: 12/23/09
Page: 1 of 1
Reviewer: JVC
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: 10/20 - 21/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	SW	2 RSD rr
IV.	Continuing calibration ~~/ICV~~	SW	CCV ∈ 25 %
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	client spec
VIII.	Laboratory control samples	SW	LCS / D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D_1 = 1, 2 D_2 = 11, 12 D_3 = 19, 20
XVII.	Field blanks	SW	TB = 13, 21 FB = FB082809-SO (R0904894) FB080309-SO (R0904279)

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

Validated Samples: Soil + Water

1	SA33-0.5B	D_1 S	11	SA157-0.5B	D_2 S	21	TB102109-SO1	W	31	176069-MB	393
2	SA33009-0.5B	D_1	12	SA157009-0.5B	D_2	22			32	176692-MB	SDG
3	SA33-10B		13	TB102009-SO1	W	23			33	176691-MB	SO1
4	SA33-20B		14	SA52-15B	S	24			34	177315-MB	
5	SA33-33B		15	SA52-28B		25			35		
6	SA156-0.5B		16	SA52-43B		26			36		
7	SA156-10B		17	SA149-22B		27			37		
8	SA156-30B		18	SA149-32B		28			38		
9	SA156-35B		19	SA149-45B	D_3	29			39		
10	SA156-45B		20	SA149009-45B	D_3	30			40		

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

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

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

LDC #: 22234 J1
SDG #: Su Cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration

Reviewer: JVG
2nd Reviewer: [signature]

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 Did the laboratory perform a 5 point calibration prior to sample analysis?
(Y) N N/A Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's?
(Y) N N/A Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation? $r^2 \geq 0.99$
(Y) N N/A Did the initial calibration meet the acceptance criteria?
Y (N) N/A Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %RSD (Limit: ≤30.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	10/31/09	ICAL-MS10	NNNN		0.028	13, 21, 177315-MB	J/UJ/A (C)

INICAL.1SB

LDC #: 22239 J1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: JG
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?

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

Y (N) N/A Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	10/27/09	H1857	F (-)	29.1		1-9, 176069-MB	J-/UJ/A (c)
	10/28/09	H1957	A (+)	28.9		10-12, 14-18, 176692-MB	J+ dets/A
			F (+)	36.7			
	11/01/09	C1917	NNNN		0.029	13, 21, 177315-MB	J/UJ/A

CONCAL.1SB

LDC #: 22234 J1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: JVG
2nd Reviewer:

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

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

Y N N/A Was a method blank associated with every sample in this SDG?
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.

Blank analysis date: 10/29/09
Conc. units: ug/kg
Associated Samples: 19, 20

Compound	Blank ID	Sample Identification								
	176691-MB	19	20							
E	0.38	(1.2)	(1.4)							

Blank analysis date: 11/01/09
Conc. units: ug/L
Associated Samples: 13, 21 (ND)

Compound	Blank ID	Sample Identification								
	177315-MB									
NNN	0.37									
KKK	0.30									
LLL	0.45									

LDC #: 22234 J1
SDG #: Lu Cmx

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 1 of 2
Reviewer: JV6
2nd Reviewer:

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

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

Blank units: ug/L **Associated sample units:** ug/Kg
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: Associated Samples: 1 - 12 (NB)

Compound	Blank ID 13	Blank ID	Sample Identification							
Sampling Date:	10/20/09									
A	0.21									

Blank units: ug/L **Associated sample units:** ug/Kg
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: Associated Samples: 14 - 20 (NB)

Compound	Blank ID 21	Blank ID	Sample Identification							
Sampling Date:	10/21/09									
A	0.25									

LDC #: 22234J1
SDG #: Su Cross

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: MG
2nd Reviewer:

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

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

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

Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: Associated Samples: 1-5, 11-12, 14-20 (bf)

Compound	FB082809-SO Blank ID	Blank ID	Sample Identification							
Sampling Date	8/28/09		1	3	~~11~~	12	15	16	19	
F	9.2		4.1/U	9.5/U		11/U			12/U	
CC	0.94			0.71/U	0.67/U	0.90/U	0.44/U	0.81/U		

18.4
0.88

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

Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: Associated Samples: 6-10 (bf)

Compound	FB080301-SO Blank ID	Blank ID	Sample Identification							
Sampling Date	8/03/09		8							
F	2.1									
CC	0.30		0.42/U							
		CAN	others	either	ND or	> FB)				

LDC #: 22234 J1
SDG #: Sed Coral

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

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

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

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		176069-LCS	M	128 (75-125)	( )	( )	1-9, 176069-MB	No qual
			Z	129 ( )	( )	( )		(2nd set of LCS/D in)
			F	128 ( )	( )	( )		
			A	128 ( )	( )	( )		
			AAAA	127 ( )	( )	( )		
			KK	126 ( )	( )	( )		
			III	127 ( )	( )	( )		
			BBBB	126 ( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
(2nd set)		176069-LCS/D	F	136 ( )	( )	( )		No qual (LCSD in)
				( )	( )	( )		
				( )	( )	( )		
		176691-LCS	UU	71 ( )	( )	( )	19, 20, 176691-MB	J- (MJP) (l)
			XX	73 ( )	( )	( )		
			B	64 ( )	( )	( )		
			O	72 ( )	( )	( )		
			LLL	73 (✓)	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 22234J1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

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

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

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

Compound	Concentration (ug/kg) 1	Concentration (ug/kg) ✓	RPD (Parent only)
M	2.5	5.5	3.0 (≤ 8.2D) -
Z	0.66	0.66	0 ↓ -
F	4.1	22	17.9 (≤ 16D) J det/A (fd)

Compound	Concentration (ug/kg) 11	Concentration (ug/kg) 12	RPD (Parent only)
K	1.0	1.6	0.6 (≤ 10D) -
CC	0.67	0.40	0.27 ↓ -
M	20 U	1.5	18.5 (≤ 20D) -
F	41 U	11	30 (≤ 41D) -

Compound	Concentration (ug/kg) 19	Concentration (ug/kg) 20	RPD (Parent only)
M	1.2	14 U	12.8 (≤ 14D) -
F	12	29 U	17 (≤ 29D) -
K	40	78	~~BB~~ 64 (≤ 50 2 RPD) J det/A (fd)
E	1.2	1.4	0.2 (≤ 7.2D) -
AA	0.73	1.5	0.77 ↓ -

Compound	Concentration ( )	Concentration ( )	RPD

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: October 23 through October 30, 2009

LDC Report Date: December 29, 2009

Matrix: Water

Parameters: Volatiles

Validation Level: Stage 4

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906095

Sample Identification

M-141B
M-141BDL
M-141009B
M-141009BDL
PB102309-A3
TB102309-GW1
M-139B
M-145B
TB102609-GW1
M-144B
M-146B
TB102709-GW1
M-138B
M-138009B
TB102809-GW1
M-148B
M-137B
TB-102909-GW1
EB103009-GWA4
TB103009-GWA3

Introduction

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

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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 R0906095	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.

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
11/5/09	2-Methyl-2-propanol	0.028 (≥0.05)	PB102309-A3 TB102309-GW1 178073-MB	J (all detects) UJ (all non-detects)	A
11/6/09	2-Methyl-2-propanol	0.025 (≥0.05)	M-141B M-141BDL M-141009B M-141009BDL M-139B M-145B TB102609-GW1 M-144B M-146B TB102709-GW1 M-138B M-138009B TB102809-GW1 TB-102909-GW1 EB103009-GWA4 TB103009-GWA3 178301-MB	J (all detects) UJ (all non-detects)	A
11/7/09	2-Methyl-2-propanol	0.026 (≥0.05)	M-148B M-137B 178304-MB	J (all detects) UJ (all non-detects)	A

V. Blanks

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

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
178073-MB	11/5/09	Hexachlorobutadiene	0.28 ug/L	PB102309-A3 TB102309-GW1

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
178301-MB	11/6/09	Hexachlorobutadiene	0.32 ug/L	M-141B M-141BDL M-141009B M-141009BDL M-139B M-145B TB102609-GW1 M-144B M-146B TB102709-GW1 M-138B M-138009B TB102809-GW1 TB-102909-GW1 EB103009-GWA4 TB103009-GWA3

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

Samples TB102309-GW1, TB102609-GW1, TB102709-GW1, TB102809-GW1, TB-102909-GW1, and TB103009-GWA3 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
TB102309-GW1	10/23/09	Bromoform	0.29 ug/L	M-141B M-141BDL M-141009B M-141009BDL PB102309-A3
TB102609-GW1	10/26/09	Acetone Dichloromethane	13 ug/L 0.27 ug/L	M-139B M-145B
TB103009-GWA3	10/30/09	Bromoform Chloromethane	0.29 ug/L 0.25 ug/L	EB103009-GWA4

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
M-139B	Acetone	8.5 ug/L	8.5U ug/L
M-145B	Acetone	3.0 ug/L	3.0U ug/L

Sample	Compound	Reported Concentration	Modified Final Concentration
EB103009-GWA4	Chloromethane	0.22 ug/L	0.22U ug/L

Sample EB103009-GWA4 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
EB103009-GWA4	10/30/09	1,4-Dichlorobenzene Acetone Chloroform Chloromethane	0.43 ug/L 3.9 ug/L 0.22 ug/L 0.22 ug/L	No associated samples in this SDG

Sample FB080409-GW (from SDG R0904290) was identified as a field blank. No volatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB080409-GW	8/4/09	Acetone Chloromethane Dichloromethane Toluene	12 ug/L 0.31 ug/L 0.28 ug/L 0.78 ug/L	M-144B M-146B

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

Sample	Compound	Reported Concentration	Modified Final Concentration
M-144B	Acetone	12 ug/L	12U ug/L
M-146B	Acetone	4.7 ug/L	4.7U ug/L

Samples PB100209-A2 (from SDG R0905636) and PB102309-A3 were identified as pump blanks. No volatile contaminants were found in these blanks 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-141B M-141BDL M-141009B M-141009BDL M-139B M-145B M-148B
PB100209-A2	10/2/09	Acetone Dichloromethane Toluene	10 ug/L 0.42 ug/L 0.26 ug/L	M-144B M-146B

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	Compound	Reported Concentration	Modified Final Concentration
M-141B	Acetone	3.9 ug/L	3.9U ug/L
M-141009B	Acetone	9.7 ug/L	9.7U ug/L
M-139B	Acetone	8.5 ug/L	8.5U ug/L
M-148B	Acetone	3.7 ug/L	3.7U ug/L
M-144B	Acetone	12 ug/L	12U ug/L
M-146B	Acetone	4.7 ug/L	4.7U ug/L

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
178304LCS	Dichlorodifluoromethane	74 (75-125)	M-148B M-137B 178304-MB	J- (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

All target compound identifications were within validation criteria.

XII. Project Quantitation Limit

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

Sample	Compound	Finding	Criteria	Flag	A or P
M-141B M-141009B	Chloroform	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	A

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0906095	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 of Data

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

Sample	Compound	Flag	A or P
M-141B M-141009B	Chloroform	X	A
M-141BDL M-141009BDL	All TCL compounds except Chloroform	X	A

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

XVI. Field Duplicates

Samples M-141B and M-141009B, samples M-141BDL and M-141009BDL, and samples M-138B and M-138009B were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-141B	M-141009B				
Acetone	3.9	9.7	-	5.8 (≤20)	-	-
Bromodichloromethane	0.2	1.0U	-	0.8 (≤1.0)	-	-
Bromoform	0.82	1.7	-	0.88 (≤1.0)	-	-
Chloroform	790	820	4 (≤30)	-	-	-
Chloromethane	0.26	0.23	-	0.03 (≤2.0)	-	-
Tetrachloroethene	0.71	0.62	-	0.09 (≤1.0)	-	-
Trichloroethene	0.34	0.28	-	0.06 (≤1.0)	-	-

Compound	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-141BDL	M-141009BDL				
Acetone	17	21	-	4 (≤200)	-	-

Compound	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-141BDL	M-141009BDL				
Chloroform	880	810	8 (≤30)	-	-	-

Compound	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-138B	M-138009B				
1,1-Dichloroethane	1.5	1.4	-	0.1 (≤1.0)	-	-
1,1-Dichloroethene	0.55	0.62	-	0.07 (≤1.0)	-	-
Acetone	3.6	3.1	-	0.5 (≤20)	-	-
Chloroform	5.1	5.0	2 (≤30)	-	-	-
Tetrachloroethene	1.2	1.5	-	0.3 (≤1.0)	-	-
Trichloroethene	1.5	1.5	-	0 (≤1.0)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Data Qualification Summary - SDG R0906095

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906095	M-141B M-141BDL M-141009B M-141009BDL PB102309-A3 TB102309-GW1 M-139B M-145B TB102609-GW1 M-144B M-146B TB102709-GW1 M-138B M-138009B TB102809-GW1 M-148B M-137B TB-102909-GW1 EB103009-GWA4 TB103009-GWA3	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Initial calibration (RRF) (c)
R0906095	M-141B M-141BDL M-141009B M-141009BDL PB102309-A3 TB102309-GW1 M-139B M-145B TB102609-GW1 M-144B M-146B TB102709-GW1 M-138B M-138009B TB102809-GW1 M-148B M-137B TB-102909-GW1 EB103009-GWA4 TB103009-GWA3	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Continuing calibration (RRF) (c)
R0906095	M-148B M-137B	Dichlorodifluoromethane	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0906095	M-141B M-141009B	Chloroform	J (all detects)	A	Project Quantitation Limit (e)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906095	M-141B M-141BDL M-141009B M-141009BDL PB102309-A3 TB102309-GW1 M-139B M-145B TB102609-GW1 M-144B M-146B TB102709-GW1 M-138B M-138009B TB102809-GW1 M-148B M-137B TB-102909-GW1 EB103009-GWA4 TB103009-GWA3	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (PQL) (sp)
R0906095	M-141B M-141009B	Chloroform	X	A	Overall assessment of data (o)
R0906095	M-141BDL M-141009BDL	All TCL compounds except Chloroform	X	A	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Laboratory Blank Data Qualification Summary - SDG R0906095

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Trip Blank Data Qualification Summary - SDG R0906095

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0906095	M-139B	Acetone	8.5U ug/L	A	bt
R0906095	M-145B	Acetone	3.0U ug/L	A	bt
R0906095	EB103009-GWA4	Chloromethane	0.22U ug/L	A	bt

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Equipment Blank Data Qualification Summary - SDG R0906095

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Field Blank Data Qualification Summary - SDG R0906095

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0906095	M-144B	Acetone	12U ug/L	A	bf
R0906095	M-146B	Acetone	4.7U ug/L	A	bf

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Pump Blank Data Qualification Summary - SDG R0906095

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0906095	M-141B	Acetone	3.9U ug/L	A	bp
R0906095	M-141009B	Acetone	9.7U ug/L	A	bp
R0906095	M-139B	Acetone	8.5U ug/L	A	bp
R0906095	M-148B	Acetone	3.7U ug/L	A	bp
R0906095	M-144B	Acetone	12U ug/L	A	bp
R0906095	M-146B	Acetone	4.7U ug/L	A	bp

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 4

LDC #: 22234L1
SDG #: R0906095
Laboratory: Columbia Analytical Services

Date: 12/28/09
Page: 1 of 1
Reviewer: JVG
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: 10/23-30/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	SW	% RSD r ✓
IV.	Continuing calibration ~~ICV~~	SW	CCV ≤ 25 %
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	client spec
VIII.	Laboratory control samples	SW	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	A	
XII.	Compound quantitation/CRQLs	SW	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	A	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	SW	D_1 = 1,3 D_2 = 2,4 D_3 = 13,14
XVII.	Field blanks	SW	PB = 5 TB = 6, 9, 12, 15, 18, 20 EB = 19 ↓ = PB100209-A2 (R0905636) FB = FB080419-GW (R0904290)

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-141B D_1	11	M-146B	21	178073.mp	31	
2	M-141BDL D_2	12	TB102709-GW1	22	178301-	32	
3	M-141009B D_1	13	M-138B D_3	23	178304-	33	
4	M-141009BDL D_2	14	M-138009B D_3	24		34	
5	PB102309-A3	15	TB102809-GW1	25		35	
6	TB102309-GW1	16	M-148B	26		36	
7	M-139B	17	M-137B	27		37	
8	M-145B	18	TB-102909-GW1	28		38	
9	TB102609-GW1	19	EB103009-GWA4	29		39	
10	M-144B	20	TB103009-GWA3	30		40	

LDC #: 27234 L1
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Reviewer: JV6
2nd Reviewer: ✓

Method: Volatiles (EPA SW 846 Method 8260B)

Validation Area	Yes	No	NA	Findings/Comments
I. 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) ≤ 30% and relative response factors (RRF) ≥ 0.05?		✓		
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	✓			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	✓			
Were all percent differences (%D) < 25% and relative response factors (RRF) > 0.05?		✓		
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	✓	✓		
VI. Surrogate spikes				
Were all surrogate %R within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		✓		
Was a MS/MSD analyzed every 20 samples of each matrix?		✓		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?				✓
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			

LDC #: 22234 L1
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Reviewer: JG
2nd Reviewer: [illegible]

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

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

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

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

LDC #: 22234 41
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration

Reviewer: JVG
2nd Reviewer: [illegible]

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 Did the laboratory perform a 5 point calibration prior to sample analysis?
(Y) N N/A Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's?
(Y) N N/A Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation? $r^2 \geq 0.99$
(Y) N N/A Did the initial calibration meet the acceptance criteria?
Y (N) N/A Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %RSD (Limit: ≤30.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	10/31/07	ICAL	NNNN		0.028	All + Blks	J/UJ/A (c)

LDC #: 22234 L1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of
Reviewer: JM
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?
Y N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?
Y N N/A Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	11/05/09	C 2053	NNNN		0.028	5, 6, 178073-MB	J/NJ/A (c)
	11/06/09	C 2086	NNNN		0.025	1-4, 7-15, 18-20, 178301-MB	
	11/07/09	C 2111	NNNN		0.026	16, 17, 178304-MB	

CONCAL 1SB

LDC #: 22239L1
SDG #: Su Cmw

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: JVG
2nd Reviewer: [illegible]

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

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

Y N N/A Was a method blank associated with every sample in this SDG?
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.

Blank analysis date: 11/05/09
Conc. units: ug/L
Associated Samples: 5 6 (ND)

Compound	Blank ID	Sample Identification								
	178073-MB									
LLL	0.28									

Blank analysis date: 11/06/09
Conc. units: ug/L
Associated Samples: 1-4, 7-15, 18-20 (ND)

Compound	Blank ID	Sample Identification								
	178301-MB									
LLL	0.32									

LDC #: 22234 L1
SDG #: Lu Cmw

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JVG
2nd Reviewer: lw

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

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

(bp)

Blank units: ug/L **Associated sample units:** ug/L
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: PB Associated Samples: 1-4, 7, 8, 16

Compound	Blank ID	Blank ID	Sample Identification							
Sampling Date	10/22/09		5	1	3	7	16			
F	5.1	3.9/U	9.7/U	8.5/U	3.7/U					
K	0.28									
		(All others either ND or > PB)								
CRQL										

10.Y
0.56

Blank units: ug/L **Associated sample units:** ug/L
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: PB Associated Samples: 10, 11

(bp)

Compound	Blank ID PB100209-A2	Blank ID	Sample Identification							
Sampling Date	10/02/09		10	11						
F	10		12/U	4.7/U						
E	0.42									
CC	0.26									
			(All others either ND or > PB)							
CRQL										

LDC #: 22234 L1
SDG #: In Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

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

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

Blank units: ug/L **Associated sample units:** ~~ug/L~~ NA
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: EB Associated Samples: None

Compound	Blank ID 19	Blank ID	Sample Identification								
Sampling Date	10/30/09										
HHH	0.43										
F	3.9										
K	0.22										
A	0.22										
CRQL											

Blank units: ug/L **Associated sample units:** ug/L
Field blank type: (circle one) Field Blank / Rinsate / (Trip Blank) / Other: Associated Samples: 1-5

Compound	Blank ID 6	Blank ID	Sample Identification								
Sampling Date	10/23/09		1	3							
X	0.29		(0.82)	(1.7)							
CRQL											

LDC #: 22234 L1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JVB
2nd Reviewer:

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

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

Blank units: ug/L **Associated sample units:**
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: Associated Samples: 7, 8 (bt)

Compound	Blank ID 9	Blank ID	Sample Identification							
Sampling Date	10/26/09		7	8						
F	13		8.5/4	3.0/4						
E	0.27									
CRQL										

26
0.54

Blank units: ug/L **Associated sample units:** ug/L
Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: Associated Samples: 19 (bt)

Compound	Blank ID 20	Blank ID	Sample Identification							
Sampling Date	10/30/09		19							
X	0.29									
A	0.25		0.22/4							
CRQL										

LDC #: 22294L
SDG #: Sun Cove

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JVG
2nd Reviewer: L

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

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

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

Blank units: ug/L **Associated sample units:** ng/L

Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: Associated Samples: 10, 11 (6f)

Compound	Blank ID FB080409-GW	Blank ID	Sample Identification							
Sampling Date	8/04/09		10	11						
F	12		12/4	4.7/4						
A	0.31									
E	0.28									
CC	0.78									
CRQL										

Blank units: _____ **Associated sample units:** _____

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

Compound	Blank ID	Blank ID	Sample Identification							
Sampling Date										
CRQL										

LDC #: 22234 L
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: JVG
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?
Y [✓ N] N/A Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		178304 LCS	JJ	74 (75-125)	( )	( )	16, 17, 178304-MB	J-/UJ/P (L)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 22234
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and CRQLs

Reviewer: JVG
2nd Reviewer: [illegible]

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

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

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

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

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		1, 3	K > cal range		J dets/A (e)

Comments: See sample calculation verification worksheet for recalculations

LDC #: 223344
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: VV
2nd Reviewer: [illegible]

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

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

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

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

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		1, 3	K > cal range		X / A (O)
		2, 4	All except K dil		

Comments: _____

OVR.1SB

LDC#: 22234L1
SDG#:See cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

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

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

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

Compound Name	Conc (ug/L)		RPD (≤30%)	Diff	Diff Limits	Quals (Parent Only)
	1	3				
Acetone	3.9	9.7		5.8	≤20	
Bromodichloromethane	0.20	1.0U		0.8	≤1.0	
Bromoform	0.82	1.7		0.88	≤1.0	
Chloroform	790	820	4			
Chloromethane	0.26	0.23		0.03	≤2.0	
Tetrachloroethene	0.71	0.62		0.09	≤1.0	
Trichloroethene	0.34	0.28		0.06	≤1.0	

Compound Name	Conc (ug/L)		RPD (≤30%)	Diff	Diff Limits	Quals (Parent Only)
	2	4				
Acetone	17	21		4	≤200	
Chloroform	880	810	8			

Compound Name	Conc (ug/L)		RPD (≤30%)	Diff	Diff Limits	Quals (Parent Only)
	13	14				
1,1-Dichloroethane	1.5	1.4		0.1	≤1.0	
1,1-Dichloroethene	0.55	0.62		0.07	≤1.0	
Acetone	3.6	3.1		0.5	≤20	
Chloroform	5.1	5.0	2			
Tetrachloroethene	1.2	1.5		0.3	≤1.0	
Trichloroethene	1.5	1.5		0	≤1.0	

LDC #: 22234L1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVC
2nd Reviewer: [signature]

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

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

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

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

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

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported %RSD	Recalculated %RSD
1	1AL	10/21/09	C (1st internal standard)	0.576	0.576	0.540	0.540	8.2	8.2
			S (2nd internal standard)	0.287	0.287	0.281	0.281	9.9	9.9
			EE (3rd internal standard)	0.446	0.446	0.405	0.405	14.3	14.3
2			HHH (1st internal standard)	1.346	1.346	1.339	1.339	3.0	2.9
			(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)						

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 #: 22234 L1
SDG #: Cu Corr

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: JVG
2nd Reviewer: [illegible]

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
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	C2053	11/05/09	C (1st internal standard)	0.540	0.523	0.523	3.1	3.2
			S (2nd internal standard)	0.281	0.279	0.279	0.7	0.6
			EE (3rd internal standard)	0.405	0.428	0.428	5.7	5.7
			HHH (4th internal standard)	1.329	1.314	1.314	1.9	1.9
2	C2086	11/06/09	C (1st internal standard)		0.602	0.602	11.5	11.4
			S (2nd internal standard)		0.307	0.307	9.3	9.3
			EE (3rd internal standard)		0.472	0.472	16.5	16.5
			HHH (4th internal standard)		1.423	1.423	6.3	6.3
3	C2111	11/07/09	C (1st internal standard)		0.607	0.607	12.4	12.4
			S (2nd internal standard)		0.308	0.308	9.6	9.5
			EE (3rd internal standard)		0.448	0.448	10.6	10.6
			HHH (4th internal standard)		1.315	1.315	1.8	1.8
4			(1st internal standard)					
			(2nd internal standard)					
			(3rd internal standard)					
			(4th internal standard)					

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

LDC #: 22234 L1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

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

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

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

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: #1

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8	50	56.28	113	113	0
Bromofluorobenzene		54.65	109	109	
1,2-Dichloroethane-d4			P		
Dibromofluoromethane		55.90	112	112	

Sample ID:

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

Sample ID:

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

Sample ID:

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

Sample ID:

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

LDC #: 22234L1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Page: 1 of 1
Reviewer: JVG
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

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

LCS ID: 178301 - WS

Compound	Spike Added (ug/L)		Spiked Sample Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
1,1-Dichloroethene	20	NA	21.8	NA	109	109				
Trichloroethene			20.6		103	103				
Benzene			19.8		99	99				
Toluene			21.3		106	106				
Chlorobenzene			20.8		104	104				

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 #: 22234L1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: SR
2nd reviewer: V

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

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

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

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

RRF = Relative response factor of the calibration standard.

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

Df = Dilution factor.

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

Example:

Sample I.D. #2 , K :

Conc. = $\frac{(723270)(50)(10)}{(494376)(0.827)(\quad)(\quad)}$

= 884.5

≈ 880 ug/L

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: October 26 through October 27, 2009

LDC Report Date: January 15, 2010

Matrix: Soil/Water

Parameters: Volatiles

Validation Level: Stage 4

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906123

Sample Identification

SA34-0.5B
SA34-10B
SA34-20B
SA34-31B
SA34-34B
TB102609-SO1
EB102709-SO1A3
SA140-0.5B
SA140-10B
SA140009-10B
SA140-20B
SA140-30B
SA140-40B
RSAP7-0.5B
RSAP7-14B
RSAP7-25B
RSAP7-41B
RSAQ7-0.5B
RSAQ7-10B
RSAQ7-38B
TB102709-SO1
TB102709-SO3
RSAP7-0.5BMS
RSAP7-0.5BMSD
RSAQ7-38BMS
RSAQ7-38BMSD

Introduction

This data review covers 22 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.

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 water samples in SDG R0906123	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
11/8/09	Acetone 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	25.2 39.0 32.1 28.1 36.6	RSAQ7-38B RSAQ7-38BMS RSAQ7-38BMSD 178375-MB	J- (all detects) UJ (all non-detects)	A
11/9/09	Bromomethane 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	26.7 25.2 26.8 27.5 28.2	SA140-0.5B SA140-10B SA140009-10B SA140-20B SA140-30B SA140-40B RSAP7-0.5B RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-10B RSAP7-0.5BMS RSAP7-0.5BMSD 178637-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
11/5/09	2-Methyl-2-propanol	0.028 (≥0.05)	All water samples in SDG R0906123	J (all detects) UJ (all non-detects)	A

V. Blanks

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

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
178073-MB	11/5/09	Hexachlorobutadiene	0.28 ug/L	All water samples in SDG R0906123

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

Samples TB102609-SO1, TB102709-SO1, and TB102709-SO3 were identified as trip blanks. No volatile contaminants were found in these blanks.

Sample EB102709-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
EB102709-SO1A3	10/27/09	Acetone	2.8 ug/L	SA140-0.5B SA140-10B SA140009-10B SA140-20B SA140-30B SA140-40B RSAP7-0.5B RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-10B RSAQ7-38B

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

Sample	Compound	Reported Concentration	Modified Final Concentration
SA140-10B	Acetone	4.9 ug/Kg	4.9U ug/Kg
SA140-20B	Acetone	5.2 ug/Kg	5.2U ug/Kg

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 R0906123

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
SA34-20B	Toluene	0.37 ug/Kg	0.37U ug/Kg
SA140-10B	Acetone	4.9 ug/Kg	4.9U ug/Kg
SA140-20B	Acetone Toluene	5.2 ug/Kg 0.37 ug/Kg	5.2U ug/Kg 0.37U ug/Kg
SA140-30B	Toluene	0.47 ug/Kg	0.47U ug/Kg
SA140-40B	Toluene	0.51 ug/Kg	0.51U ug/Kg
RSAQ7-0.5B	Acetone	15 ug/Kg	15U 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
RSAQ7-38BMS/MSD (RSAQ7-38B)	Dichlorodifluoromethane	42 (70-130)	42 (70-130)	44 (≤30)	J (all detects) UJ (all non-detects)	A

VIII. Laboratory Control Samples (LCS)

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

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
178343-LCS	Bromoform Carbon tetrachloride 1,1,1,2-Tetrachloroethane Chloromethane Dichlorodifluoromethane Hexachlorobutadiene Naphthalene	74 (75-125) 67 (75-125) 72 (75-125) 68 (75-125) 67 (75-125) 67 (75-125) 73 (75-125)	SA34-0.5B SA34-10B SA34-20B SA34-31B SA34-34B 178343-MB	J- (all detects) UJ (all non-detects)	P
178375-LCS	Dichlorodifluoromethane	74 (75-125)	RSAQ7-38B 178375-MB	J- (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

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 R0906123	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 of Data

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

XVI. Field Duplicates

Samples SA140-10B and SA140009-10B were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA140-10B	SA140009-10B				
2-Butanone	2.7	1.2	-	1.5 (≤19)	-	-
Acetone	4.9	130	-	125.1 (≤38)	J (all detects)	A
Toluene	1.0	5.0U	-	4 (≤5.0)	-	-
Chloroform	9.5U	0.94	-	8.56 (≤9.5)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Data Qualification Summary - SDG R0906123

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906123	TB102609-SO1 EB102709-SO1A3 TB102709-SO1 TB102709-SO3	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Initial calibration (RRF) (c)
R0906123	RSAQ7-38B	Acetone 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J- (all detects) UJ (all non-detects)	A	Continuing calibration (%D) (c)
R0906123	SA140-0.5B SA140-10B SA140009-10B SA140-20B SA140-30B SA140-40B RSAP7-0.5B RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-10B	Bromomethane 1,2,4-Trichlorobenzene Hexachlorobutadiene Naphthalene 1,2,3-Trichlorobenzene	J- (all detects) UJ (all non-detects)	A	Continuing calibration (%D) (c)
R0906123	TB102609-SO1 EB102709-SO1A3 TB102709-SO1 TB102709-SO3	2-Methyl-2-propanol	J (all detects) UJ (all non-detects)	A	Continuing calibration (RRF) (c)
R0906123	RSAQ7-38B	Dichlorodifluoromethane	J (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R)(RPD) (m,ld)
R0906123	SA34-0.5B SA34-10B SA34-20B SA34-31B SA34-34B	Bromoform Carbon tetrachloride 1,1,1,2-Tetrachloroethane Chloromethane Dichlorodifluoromethane Hexachlorobutadiene Naphthalene	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0906123	RSAQ7-38B	Dichlorodifluoromethane	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906123	SA34-0.5B SA34-10B SA34-20B SA34-31B SA34-34B TB102609-SO1 EB102709-SO1A3 SA140-0.5B SA140-10B SA140009-10B SA140-20B SA140-30B SA140-40B RSAP7-0.5B RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-10B RSAQ7-38B TB102709-SO1 TB102709-SO3	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (PQL) (sp)
R0906123	SA140-10B SA140009-10B	Acetone	J (all detects)	A	Field duplicates (Difference) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Laboratory Blank Data Qualification Summary - SDG R0906123

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Trip Blank Data Qualification Summary - SDG R0906123

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Equipment Blank Data Qualification Summary - SDG R0906123

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0906123	SA140-10B	Acetone	4.9U ug/Kg	A	be
R0906123	SA140-20B	Acetone	5.2U ug/Kg	A	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Volatiles - Field Blank Data Qualification Summary - SDG R0906123

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0906123	SA34-20B	Toluene	0.37U ug/Kg	A	bf
R0906123	SA140-10B	Acetone	4.9U ug/Kg	A	bf
R0906123	SA140-20B	Acetone Toluene	5.2U ug/Kg 0.37U ug/Kg	A	bf
R0906123	SA140-30B	Toluene	0.47U ug/Kg	A	bf
R0906123	SA140-40B	Toluene	0.51U ug/Kg	A	bf
R0906123	RSAQ7-0.5B	Acetone	15U ug/Kg	A	bf

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 4

LDC #: 22234M1
SDG #: R0906123
Laboratory: Columbia Analytical Services

Date: 1/13/10
Page: 1 of 1
Reviewer: JM
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: 10/26 - 27/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	SW	2 RSD
IV.	Continuing calibration/ICV	SW	CCV ≤ 25%
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	A	
XII.	Compound quantitation/CRQLs	A	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	A	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D = 9, 10
XVII.	Field blanks	SW	*TB = 6, 21, 22 EB = 7 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: Soil + Water

1	1	SA34-0.5B	S	11	3	SA140-20B	S	21	7	TB102709-SO1	W	31	1	178343 - MB
2	1	SA34-10B		12	3	SA140-30B		22	7	TB102709-SO3		32	7	178073 -
3	1	SA34-20B		13	3	SA140-40B		23	3	RSAP7-0.5BMS	S	33	3	178637 -
4	1	SA34-31B		14	3	RSAP7-0.5B		24	3	RSAP7-0.5BMSD		34	4	178375 -
5	1	SA34-34B		15	3	RSAP7-14B		25	4	RSAQ7-38BMS		35		
6	7	TB102609-SO1	W	16	3	RSAP7-25B		26	4	RSAQ7-38BMSD		36		
7	7	EB102709-SO1A3		17	3	RSAP7-41B		27				37		
8	3	SA140-0.5B	S	18	3	RSAQ7-0.5B		28				38		
9	3	SA140-10B	D	19	3	RSAQ7-10B		29				39		
10	3	SA140009-10B	D	20	4	RSAQ7-38B		30				40		

LDC #: 22234 M1
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Reviewer: JG
2nd Reviewer: W

Method: Volatiles (EPA SW 846 Method 8260B)

Validation Area	Yes	No	NA	Findings/Comments
I. 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 $\geq$ 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) $\leq$ 25% and relative response factors (RRF) > 0.05?		✓		
V. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was a method blank analyzed at least once every 12 hours for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	✓			
VI. Surrogate spikes				
Were all surrogate %R within QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		✓		
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			

LDC #: 22234 M1
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Reviewer: JV
2nd Reviewer: W

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

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

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

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

LDC #: 222-34M1

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration

Reviewer: [signature]

2nd Reviewer: [signature]

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 Did the laboratory perform a 5 point calibration prior to sample analysis?
- (Y) N N/A Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's?
- (Y) N N/A Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation? $r^2 \geq 0.99$
- (Y) N N/A Did the initial calibration meet the acceptance criteria?
- Y (N) N/A Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %RSD (Limit: <30.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	10/31/09	ICAL	NNNN		0.628	All water + 178073-MB	J/UJ/A (c)

INICAL.1SB

LDC #: 22234M1
SDG #: Fw Cmw

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: NV
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?
Y N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?
Y N N/A Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	11/05/09	C2053	NNN		0.028	All water + 178073-MB	J/UJ/A (c)
	11/08/09	H2338	F (-)	25.2		20, 25, 26, 178375-MB	J-/UJ/A
			KKK (-)	39.0			
			LLL (-)	32.1			
			MMM (-)	28.1			
			NNN (-)	36.6			
	11/09/09	H2387	B (-)	26.7		8-19, 23, 24, 178637-MB	J-/UJ/A
			KKK (-)	25.2			
			LLL (-)	26.8			
			MMM (-)	27.5			
			NNN (-)	28.2			

LDC #: 22239 M1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: JVG
2nd Reviewer: [signature]

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

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

(Y) N N/A Was a method blank associated with every sample in this SDG?
(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.

Blank analysis date: 11/05/09
Conc. units: ug/L
Associated Samples: All water (ND)

Compound	Blank ID	Sample Identification								
	178073-MB									
LLL	0.28									

Blank analysis date:
Conc. units:
Associated Samples:

Compound	Blank ID	Sample Identification								

LDC #: 22234M1
SDG #: La Cava

VALIDATION FINDINGS WORKSHEET
Field Blanks

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

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

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

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

Field blank type: (circle one) Field Blank / Rinsate / Trip Blank / Other: EB Associated Samples: 8 - 20 (6e)

Compound	Blank ID 7	Blank ID	Sample Identification							
Sampling Date	10/27/09		9	11						
5.6 F	2.8		4.9/U	5.2/U						
		(All others either ND or < EB)								

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

Field blank type: (circle one) ~~Field Blank~~ / Rinsate / Trip Blank / Other: Associated Samples: All soils (6f)

Compound	FB082809-SO Blank ID	Blank ID	Sample Identification							
Sampling Date	8/28/09		3	9	11	12	13	18		
18.4 F	9.2			4.9/U	5.2/U			15/U		
0.88 CC	0.44		0.37/U		0.37/U	0.47/U	0.51/U			
		(All others either ND or > FB)								

LDC #: 22234 M1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

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

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

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

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

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

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

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		23/24	Several	compounds outside limits		( )	14	No qual
			(See attached Summary		)	( )		(LCS in)
				( )	( )	( )		
				( )	( )	( )		
		25/26		( )	( )	( )	20	No qual (LCS in)
			JJ	92 (70-130)	92 (70-130)	44 (30)		J/UJ/A (m, ld)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
H.	1,1-Dichloroethene	59-172%	≤ 22%	61-145%	≤ 14%
S.	Trichloroethene	62-137%	≤ 24%	71-120%	≤ 14%
V.	Benzene	66-142%	≤ 21%	76-127%	≤ 11%
CC.	Toluene	59-139%	≤ 21%	76-125%	≤ 13%
DD.	Chlorobenzene	60-133%	≤ 21%	75-130%	≤ 13%

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Northgate Environmental
Project: Tronox LLC Henderson/2027.001
Sample Matrix: Soil

Service Request: R0906123
Date Collected: 10/27/09
Date Received: 10/28/09
Date Analyzed: 11/10/09

Matrix Spike Summary
Volatile Organic Compounds by GC/MS

Sample Name: RSAP7-0.5B
Lab Code: R0906123-017

Units: µg/Kg
Basis: Dry

Analytical Method: 8260B

Analyte Name	Sample Result	Matrix Spike RQ0911207-03 Result	Amount	% Rec		Duplicate Matrix Spike RQ0911207-04 Result	Amount	% Rec		% Rec Limits	RPD	RPD Limit
1,1,1,2-Tetrachloroethane	ND	34.1	52.7	65	*	34.3	56.5	61	*	70 - 130	1	30
1,1,1-Trichloroethane (TCA)	ND	41.7	52.7	79		45.8	56.5	81		70 - 130	9	30
1,1,2,2-Tetrachloroethane	ND	32.4	52.7	62	*	31.5	56.5	56	*	70 - 130	3	30
1,1,2-Trichloroethane	ND	35.6	52.7	68	*	36.2	56.5	64	*	70 - 130	2	30
1,1-Dichloroethane (1,1-DCA)	ND	38.1	52.7	72		41.8	56.5	74		70 - 130	9	30
1,1-Dichloroethene (1,1-DCE)	ND	31.3	52.7	59	*	32.5	56.5	58	*	70 - 130	4	30
1,1-Dichloropropene	ND	32.1	52.7	61	*	34.8	56.5	62	*	70 - 130	8	30
1,2,3-Trichlorobenzene	ND	24.1	52.7	46	*	22.0	56.5	39	*	70 - 130	9	30
1,2,3-Trichloropropane	ND	35.8	52.7	68	*	37.5	56.5	66	*	70 - 130	5	30
1,2,4-Trichlorobenzene	ND	22.7	52.7	43	*	20.8	56.5	37	*	70 - 130	9	30
1,2,4-Trimethylbenzene	ND	27.7	52.7	53	*	23.9	56.5	42	*	70 - 130	15	30
1,2-Dibromo-3-chloropropane (DBC	ND	35.0	52.7	66		35.6	56.5	63		50 - 150	2	30
1,2-Dibromoethane	ND	34.4	52.7	65	*	35.7	56.5	63	*	70 - 130	4	30
1,2-Dichlorobenzene	ND	28.1	52.7	53	*	27.1	56.5	48	*	70 - 130	4	30
1,2-Dichloroethane	ND	38.7	52.7	73		41.0	56.5	73		70 - 130	6	30
1,2-Dichloropropane	ND	36.3	52.7	69	*	37.8	56.5	67	*	70 - 130	4	30
1,3,5-Trimethylbenzene	ND	27.9	52.7	53	*	24.6	56.5	43	*	70 - 130	13	30
1,3-Dichlorobenzene	ND	28.6	52.7	54	*	25.4	56.5	45	*	70 - 130	12	30
1,3-Dichloropropane	ND	35.8	52.7	68	*	37.2	56.5	66	*	70 - 130	4	30
1,4-Dichlorobenzene	ND	27.7	52.7	53	*	25.9	56.5	46	*	70 - 130	7	30
2,2-Dichloropropane	ND	39.3	52.7	75		41.8	56.5	74		70 - 130	6	30
2-Butanone (MEK)	1.6	41.8	52.7	76		47.1	56.5	81		50 - 150	12	30
2-Chlorotoluene	ND	30.1	52.7	57	*	27.4	56.5	49	*	70 - 130	9	30
2-Hexanone	ND	37.1	52.7	70		40.7	56.5	72		70 - 130	9	30
2-Methyl-2-propanol	ND	803	1050	76		891	1130	79		50 - 150	10	30
4-Chlorotoluene	ND	30.4	52.7	58	*	27.5	56.5	49	*	70 - 130	10	30
4-Isopropyltoluene	ND	26.1	52.7	50	*	21.6	56.5	38	*	70 - 130	19	30
4-Methyl-2-pentanone	ND	38.0	52.7	72		41.8	56.5	74		70 - 130	10	30
Acetone	23	71.1	52.7	91		68.4	56.5	80		50 - 150	4	30
Benzene	ND	32.7	52.7	62	*	33.3	56.5	59	*	70 - 130	2	30
Bromobenzene	ND	29.6	52.7	56	*	28.2	56.5	50	*	70 - 130	5	30
Bromochloromethane	ND	33.1	52.7	63	*	36.1	56.5	64	*	70 - 130	9	30
Bromodichloromethane	ND	39.8	52.7	75		40.2	56.5	71		70 - 130	1	30

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Northgate Environmental
Project: Tronox LLC Henderson/2027.001
Sample Matrix: Soil

Service Request: R0906123
Date Collected: 10/27/09
Date Received: 10/28/09
Date Analyzed: 11/10/09

Matrix Spike Summary
Volatile Organic Compounds by GC/MS

Sample Name: RSAP7-0.5B
Lab Code: R0906123-017

Units: µg/Kg
Basis: Dry

Analytical Method: 8260B

Analyte Name	Sample Result	Matrix Spike RQ0911207-03 Result	Amount	% Rec		Duplicate Matrix Spike RQ0911207-04 Result	Amount	% Rec		% Rec Limits	RPD	RPD Limit
Bromoform	ND	36.1	52.7	68	*	37.5	56.5	66	*	70 - 130	4	30
Bromomethane	ND	19.5	52.7	37	*	21.4	56.5	38	*	50 - 150	9	30
Carbon Tetrachloride	ND	38.8	52.7	74		40.8	56.5	72		70 - 130	5	30
Chlorobenzene	ND	30.2	52.7	57	*	30.3	56.5	54	*	70 - 130	0	30
Chloroethane	ND	28.2	52.7	53	*	32.4	56.5	57	*	70 - 130	14	30
Chloroform	ND	41.4	52.7	78		42.6	56.5	75		70 - 130	3	30
Chloromethane	ND	28.4	52.7	54	*	32.0	56.5	57	*	70 - 130	12	30
Dibromochloromethane	ND	36.8	52.7	70		38.0	56.5	67	*	70 - 130	3	30
Dibromomethane	ND	34.0	52.7	65	*	35.5	56.5	63	*	70 - 130	4	30
Dichlorodifluoromethane (CFC 12)	ND	18.9	52.7	36	*	23.2	56.5	41	*	70 - 130	20	30
Dichloromethane	ND	33.4	52.7	63	*	36.1	56.5	64	*	70 - 130	8	30
Diisopropyl Ether	ND	39.4	52.7	75		42.5	56.5	75		70 - 130	8	30
Ethyl tert-Butyl Ether	ND	41.1	52.7	78		44.8	56.5	79		70 - 130	9	30
Ethylbenzene	ND	33.3	52.7	63	*	30.9	56.5	55	*	70 - 130	7	30
Hexachlorobutadiene	ND	18.2	52.7	35	*	13.8	56.5	24	*	70 - 130	27	30
Isopropylbenzene (Cumene)	ND	34.3	52.7	65	*	31.0	56.5	55	*	70 - 130	10	30
Methyl tert-Butyl Ether	ND	36.4	52.7	69	*	42.1	56.5	75		70 - 130	15	30
Naphthalene	ND	28.8	52.7	55		28.8	56.5	51		50 - 150	0	30
Styrene	ND	34.1	52.7	65	*	31.8	56.5	56	*	70 - 130	7	30
Tetrachloroethene (PCE)	ND	29.5	52.7	56	*	29.0	56.5	51	*	70 - 130	2	30
Toluene	ND	31.9	52.7	61	*	31.9	56.5	56	*	70 - 130	0	30
Trichloroethene (TCE)	ND	35.9	52.7	68	*	39.1	56.5	69	*	70 - 130	9	30
Trichlorofluoromethane (CFC 11)	ND	36.5	52.7	69	*	38.5	56.5	68	*	70 - 130	5	30
Vinyl Chloride	ND	27.3	52.7	52	*	31.1	56.5	55	*	70 - 130	13	30
cis-1,2-Dichloroethene	ND	34.4	52.7	65	*	36.5	56.5	65	*	70 - 130	6	30
cis-1,3-Dichloropropene	ND	36.3	52.7	69	*	36.9	56.5	65	*	70 - 130	2	30
m,p-Xylenes	ND	62.1	105	59	*	56.3	113	50	*	70 - 130	10	30
n-Butylbenzene	ND	24.3	52.7	46	*	19.1	56.5	34	*	70 - 130	24	30
n-Propylbenzene	ND	30.4	52.7	58	*	25.8	56.5	46	*	70 - 130	16	30
o-Xylene	ND	31.9	52.7	61	*	29.8	56.5	53	*	70 - 130	7	30
sec-Butylbenzene	ND	29.3	52.7	56	*	24.2	56.5	43	*	70 - 130	19	30
tert-Amyl Methyl Ether	ND	38.6	52.7	73		42.0	56.5	74		70 - 130	8	30
tert-Butylbenzene	ND	29.5	52.7	56	*	26.3	56.5	47	*	70 - 130	11	30
trans-1,2-Dichloroethene	ND	28.3	52.7	54	*	31.4	56.5	56	*	70 - 130	10	30

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Northgate Environmental	**Service Request:**	R0906123
Project:	Tronox LLC Henderson/2027.001	**Date Collected:**	10/27/09
Sample Matrix:	Soil	**Date Received:**	10/28/09
		Date Analyzed:	11/10/09

Matrix Spike Summary
Volatile Organic Compounds by GC/MS

Sample Name:	RSAP7-0.5B	**Units:**	µg/Kg
Lab Code:	R0906123-017	**Basis:**	Dry

Analytical Method: 8260B

		Matrix Spike RQ0911207-03				Duplicate Matrix Spike RQ0911207-04						
Analyte Name	**Sample Result**	**Result**	**Amount**	**% Rec**		**Result**	**Amount**	**% Rec**		**% Rec Limits**	**RPD**	**RPD Limit**
trans-1,3-Dichloropropene	ND	35.9	52.7	68	*	36.8	56.5	65	*	70 - 130	3	30

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Northgate Environmental
Project: Tronox LLC Henderson/2027.001
Sample Matrix: Soil

Service Request: R0906123
Date Collected: 10/27/09
Date Received: 10/28/09
Date Analyzed: 11/ 8/09

Matrix Spike Summary
Volatile Organic Compounds by GC/MS

Sample Name: RSAQ7-38B
Lab Code: R0906123-024

Units: µg/Kg
Basis: Dry

Analytical Method: 8260B

Analyte Name	Sample Result	Matrix Spike RQ0911111-03 Result	Amount	% Rec		Duplicate Matrix Spike RQ0911111-04 Result	Amount	% Rec		% Rec Limits	RPD		RPD Limit
1,1,1,2-Tetrachloroethane	ND	66.6	90.6	73		42.9	58.0	74		70 - 130	43	*	30
1,1,1-Trichloroethane (TCA)	ND	76.1	90.6	84		49.4	58.0	85		70 - 130	42	*	30
1,1,2,2-Tetrachloroethane	ND	70.6	90.6	78		46.3	58.0	80		70 - 130	42	*	30
1,1,2-Trichloroethane	ND	67.4	90.6	74		42.9	58.0	74		70 - 130	45	*	30
1,1-Dichloroethane (1,1-DCA)	ND	70.4	90.6	78		46.8	58.0	81		70 - 130	40	*	30
1,1-Dichloroethene (1,1-DCE)	ND	59.6	90.6	66	*	39.6	58.0	68	*	70 - 130	40	*	30
1,1-Dichloropropene	ND	66.8	90.6	74		43.4	58.0	75		70 - 130	42	*	30
1,2,3-Trichlorobenzene	ND	64.8	90.6	72		43.1	58.0	74		70 - 130	40	*	30
1,2,3-Trichloropropane	ND	65.0	90.6	72		41.2	58.0	71		70 - 130	45	*	30
1,2,4-Trichlorobenzene	ND	68.2	90.6	75		46.3	58.0	80		70 - 130	38	*	30
1,2,4-Trimethylbenzene	ND	70.8	90.6	78		48.0	58.0	83		70 - 130	39	*	30
1,2-Dibromo-3-chloropropane (DBC	ND	62.9	90.6	69		41.4	58.0	72		50 - 150	41	*	30
1,2-Dibromoethane	ND	65.6	90.6	72		42.4	58.0	73		70 - 130	43	*	30
1,2-Dichlorobenzene	ND	69.7	90.6	77		47.3	58.0	82		70 - 130	38	*	30
1,2-Dichloroethane	ND	71.5	90.6	79		47.8	58.0	83		70 - 130	40	*	30
1,2-Dichloropropane	ND	71.9	90.6	79		45.8	58.0	79		70 - 130	44	*	30
1,3,5-Trimethylbenzene	ND	72.0	90.6	79		48.1	58.0	83		70 - 130	40	*	30
1,3-Dichlorobenzene	ND	73.2	90.6	81		49.7	58.0	86		70 - 130	38	*	30
1,3-Dichloropropane	ND	67.2	90.6	74		41.8	58.0	72		70 - 130	47	*	30
1,4-Dichlorobenzene	ND	75.9	90.6	84		50.2	58.0	87		70 - 130	41	*	30
2,2-Dichloropropane	ND	78.4	90.6	86		51.0	58.0	88		70 - 130	42	*	30
2-Butanone (MEK)	2.6	75.9	90.6	81		46.8	58.0	76		50 - 150	47	*	30
2-Chlorotoluene	ND	71.5	90.6	79		49.1	58.0	85		70 - 130	37	*	30
2-Hexanone	ND	66.4	90.6	73		40.3	58.0	70		70 - 130	49	*	30
2-Methyl-2-propanol	ND	1420	1810	78		928	1160	80		50 - 150	42	*	30
4-Chlorotoluene	ND	77.4	90.6	85		52.6	58.0	91		70 - 130	38	*	30
4-Isopropyltoluene	ND	75.3	90.6	83		51.9	58.0	89		70 - 130	37	*	30
4-Methyl-2-pentanone	ND	69.1	90.6	76		43.2	58.0	75		70 - 130	46	*	30
Acetone	31	136	90.6	116		53.1	58.0	38	*	50 - 150	88	*	30
Benzene	ND	62.8	90.6	69	*	41.8	58.0	72		70 - 130	40	*	30
Bromobenzene	ND	67.4	90.6	74		44.7	58.0	77		70 - 130	40	*	30
Bromochloromethane	ND	ND	90.6	0	*	40.5	58.0	70		70 - 130	200	*	30
Bromodichloromethane	ND	73.5	90.6	81		46.3	58.0	80		70 - 130	45	*	30
Bromoform	ND	68.4	90.6	75		44.2	58.0	76		70 - 130	43	*	30

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Northgate Environmental
Project: Tronox LLC Henderson/2027.001
Sample Matrix: Soil

Service Request: R0906123
Date Collected: 10/27/09
Date Received: 10/28/09
Date Analyzed: 11/ 8/09

Matrix Spike Summary
Volatile Organic Compounds by GC/MS

Sample Name: RSAQ7-38B
Lab Code: R0906123-024

Units: µg/Kg
Basis: Dry

Analytical Method: 8260B

Analyte Name	Sample Result	Matrix Spike RQ0911111-03 Result	Amount	% Rec		Duplicate Matrix Spike RQ0911111-04 Result	Amount	% Rec		% Rec Limits		RPD		RPD Limit
Bromomethane	ND	43.6	90.6	48	*	28.5	58.0	49	*	50 - 150		42	*	30
Carbon Tetrachloride	ND	74.4	90.6	82		48.8	58.0	84		70 - 130		42	*	30
Chlorobenzene	ND	67.2	90.6	74		43.2	58.0	74		70 - 130		44	*	30
Chloroethane	ND	54.7	90.6	60	*	34.4	58.0	59	*	70 - 130		46	*	30
Chloroform	13	80.1	90.6	74		61.2	58.0	84		70 - 130		27		30
Chloromethane	ND	49.8	90.6	55	*	29.8	58.0	51	*	70 - 130		50	*	30
Dibromochloromethane	ND	70.4	90.6	78		43.8	58.0	76		70 - 130		47	*	30
Dibromomethane	ND	64.8	90.6	71		42.0	58.0	72		70 - 130		43	*	30
Dichlorodifluoromethane (CFC 12)	ND	38.2	90.6	42	*	24.3	58.0	42	*	70 - 130		44	*	30
Dichloromethane	ND	62.3	90.6	69	*	43.7	58.0	75		70 - 130		35	*	30
Diisopropyl Ether	ND	71.4	90.6	79		46.9	58.0	81		70 - 130		41	*	30
Ethyl tert-Butyl Ether	ND	75.8	90.6	84		48.5	58.0	84		70 - 130		44	*	30
Ethylbenzene	ND	74.2	90.6	82		48.9	58.0	84		70 - 130		41	*	30
Hexachlorobutadiene	ND	69.8	90.6	77		48.8	58.0	84		70 - 130		35	*	30
Isopropylbenzene (Cumene)	ND	79.2	90.6	87		52.4	58.0	90		70 - 130		41	*	30
Methyl tert-Butyl Ether	ND	72.4	90.6	80		45.9	58.0	79		70 - 130		45	*	30
Naphthalene	ND	61.5	90.6	68		43.4	58.0	75		50 - 150		35	*	30
Styrene	ND	76.2	90.6	84		51.1	58.0	88		70 - 130		40	*	30
Tetrachloroethene (PCE)	ND	65.8	90.6	73		42.6	58.0	74		70 - 130		43	*	30
Toluene	ND	68.8	90.6	76		44.4	58.0	77		70 - 130		43	*	30
Trichloroethene (TCE)	ND	67.2	90.6	74		41.3	58.0	71		70 - 130		48	*	30
Trichlorofluoromethane (CFC 11)	ND	68.8	90.6	76		44.3	58.0	76		70 - 130		43	*	30
Vinyl Chloride	ND	53.4	90.6	59	*	36.6	58.0	63	*	70 - 130		37	*	30
cis-1,2-Dichloroethene	ND	65.6	90.6	72		43.1	58.0	74		70 - 130		41	*	30
cis-1,3-Dichloropropene	ND	72.7	90.6	80		47.4	58.0	82		70 - 130		42	*	30
m,p-Xylenes	ND	142	181	78		96.1	116	83		70 - 130		38	*	30
n-Butylbenzene	ND	81.0	90.6	89		55.0	58.0	95		70 - 130		38	*	30
n-Propylbenzene	ND	76.5	90.6	84		53.1	58.0	92		70 - 130		36	*	30
o-Xylene	ND	71.9	90.6	79		45.4	58.0	78		70 - 130		45	*	30
sec-Butylbenzene	ND	79.1	90.6	87		53.4	58.0	92		70 - 130		39	*	30
tert-Amyl Methyl Ether	ND	69.0	90.6	76		46.0	58.0	79		70 - 130		40	*	30
tert-Butylbenzene	ND	72.2	90.6	80		48.1	58.0	83		70 - 130		40	*	30
trans-1,2-Dichloroethene	ND	59.8	90.6	66	*	39.8	58.0	69	*	70 - 130		40	*	30
trans-1,3-Dichloropropene	ND	73.6	90.6	81		46.5	58.0	80		70 - 130		45	*	30

Comments:

LDC #: 22234 M1
SDG #: Sw Cmw

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: MB
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?
Y N N/A Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		178343-LCS	X	74 (75-125)	( )	( )	1-5, 178343-MB	J-/UJ/P (L)
			O	67 ( )	( )	( )		
			UU	72 ( )	( )	( )		
			A	68 ( )	( )	( )		
			JJ	67 ( )	( )	( )		
			LLL	67 ( )	( )	( )		
			MMM	73 ( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		178375-LCS	NNN	73 ( )	( )	( )	20, 178375-MB	No qual (MS/MSDim)
			KKK	71 ( )	( )	( )		
			F	130 ( )	( )	( )		
			JJ	74 ( )	( )	( )		J-/UJ/P (L)
			LLL	70 ( )	( )	( )		No qual (MS/MSDim)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 22239 M1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

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

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

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

Compound	Concentration (ug/kg) 9	Concentration (ug/kg) 10	RPD (Parent only)
M	2.7	1.2	1.5 (≤19 D) –
F	4.9	130	125.1 (≤38 D) J dets/A (fd)
CC	1.0	5.0U	4.0 (≤5.0 D) –
K	9.5U	0.94	8.56 (≤9.5 D) –

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

LDC #: 22234 M1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

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

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

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

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

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

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

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported %RSD	Recalculated %RSD
1	ICAL MS 7	9/13/09	C (1st internal standard)	0.422	0.422	0.414	0.414	11.9	11.9
			S (2nd internal standard)	0.327	0.327	0.319	0.319	11.7	11.7
			EE (3rd internal standard)	1.576	1.576	1.497	1.497	9.2	9.2
2			BB (1st internal standard)	1.159	1.159	1.143	1.143	10.8	10.8
			(2nd internal standard)						
			(3rd internal standard)						
3	ICAL MS4	10/31/09	C (1st internal standard)	0.546	0.546	0.540	0.540	8.2	8.1
			S (2nd internal standard)	0.282	0.282	0.281	0.281	9.9	9.9
			EE (3rd internal standard)	0.446	0.446	0.405	0.405	14.3	14.3
4			BB (1st internal standard)	0.525	0.525	0.515	0.515	2.2	2.1
			(2nd internal standard)						
			(3rd internal standard)						

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

LDC #: 22234M1
SDG #: Su Group

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: VZ
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
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	C 2053	11/05/09	C (1st internal standard)	0.540	0.523	0.523	3.1	3.2
			S (2nd internal standard)	0.281	0.279	0.279	0.7	0.6
			EE (3rd internal standard)	0.405	0.428	0.428	5.7	5.7
			BB (4th internal standard)	0.515	0.495	0.495	3.9	3.8
2	H 2316	11/07/09	C (1st internal standard)	0.414	0.362	0.362	12.6	12.6
			S (2nd internal standard)	0.319	0.297	0.297	6.9	6.9
			EE (3rd internal standard)	1.497	1.527	1.527	2.0	2.0
			BB (4th internal standard)	1.143	1.060	1.060	7.3	7.3
3	H 2328	11/08/09	C (1st internal standard)		0.371	0.371	10.4	10.5
			S (2nd internal standard)		0.286	0.286	10.3	10.3
			EE (3rd internal standard)		1.319	1.319	11.9	11.9
			BB (4th internal standard)		0.970	0.970	15.1	15.1
4	H 2387	11/09/09	C (1st internal standard)		0.366	0.366	11.6	11.6
			S (2nd internal standard)		0.241	0.241	24.5	24.4
			EE (3rd internal standard)		1.302	1.302	13.0	13.0
			BB (4th internal standard)	↓	0.943	0.943	17.5	17.5

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 #: 22234 M)
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

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

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

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

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: #1

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8	50	50.87	102	102	0
Bromofluorobenzene	↓	50.90	102	102	↓
1,2-Dichloroethane-d4	↓				↓
Dibromofluoromethane	↓	49.35	99	99	↓

Sample ID:

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

Sample ID:

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

Sample ID:

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

Sample ID:

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

LDC #: 22234 M1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: JV6
2nd Reviewer: W

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

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

% Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked sample concentration; SA = Spike added; SC = Sample concentration

RPD = I MSC - MSDC I * 2/(MSC + MSDC) MSC = Matrix spike percent recovery MSDC = Matrix spike duplicate percent recovery

MS/MSD sample: 23/24

Compound	Spike Added (ug/kg)		Sample Concentration (ug/kg)	Spiked Sample Concentration ( )		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	-----	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
1,1-Dichloroethene	52.7	56.5	0	31.3	32.5	59	59	58	58	4	4
Trichloroethene				35.9	39.1	68	68	69	69	9	9
Benzene				32.7	33.3	62	62	59	59	2	2
Toluene				31.9	31.9	61	61	56	56	0	0
Chlorobenzene				30.2	30.3	57	57	54	54	0	0

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

LDC #: 22234 M1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample Results Verification

Page: 1 of 1
Reviewer: JM
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

RPD = I LCS - LCSD I * 2/(LCS + LCSD) LCS = Laboraotry control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS ID: 178073 LCS

Compound	Spike Added (ug/L)		Spiked Sample Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
1,1-Dichloroethene	20.0	NA	21.1	NA	105	105				
Trichloroethene			20.5		103	103				
Benzene			19.3		97	97				
Toluene			20.6		103	103				
Chlorobenzene	↓	↓	20.9	↓	104	104				

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 #: 22234M1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: SM
2nd reviewer: [signature]

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

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

Concentration = $\frac{(A_x)(I_s)(DF)}{(A_{is})(RRF)(V_o)(\%S)}$

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

RRF = Relative response factor of the calibration standard.

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

Df = Dilution factor.

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

Example:

Sample I.D. 2 , K :

Conc. = $\frac{(4849)(50)(\quad)}{(442265)(0.982)(0.921)(\quad)}$

= 0.63 ug/kg

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Data Validation Reports
LDC #22234

Semivolatiles

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: August 4 through August 5, 2009

LDC Report Date: January 5, 2010

Matrix: Soil

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0904329

Sample Identification

SA146-0.5B
SA146-10B
SA146-25B
SA146009-25B
SA146-40B
SA146-55B
SA147-0.5B
SA147-10B
SA147-25B
SA147009-25B
SA147-40B
SA147-56B
RSAU5-0.5B
RSAU5-10B
RSAU5-25B
RSAU5-40B
RSAU5-50B
RSAU5-55B
SA146-10BMS
SA146-10BMSD

Introduction

This data review covers 20 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

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

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

B The analytical result may be a false positive totally attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JB The analytical result may be biased high and partially attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JK The analytical result is an estimated maximum possible concentration (EMPC).

X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.

J-TDS The analytical result is estimated based on failure of the Total Dissolved Solids (TDS) correctness check performed in accordance with the Standard Method 1030E.

J-CAB The analytical result is estimated based on failure of the cation-anion balance correctness check performed in accordance with Standard Method 1030E.

J-TDS & CAB The analytical result is unreliable based on the failure of the cation-anion balance and TDS correctness check performed in accordance with standard Method 1030E.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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
8/18/09	1,4-Dioxane	27.2	RSAU5-0.5B RSAU5-10B RSAU5-25B RSAU5-40B RSAU5-50B RSAU5-55B 93638-MB	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
92971-MB	8/6/09	Di-n-butylphthalate	37 ug/Kg	SA146-25B SA146009-25B SA146-40B SA146-55B SA147-0.5B SA147-10B SA147-25B SA147009-25B SA147-40B SA147-56B
93638-MB	8/14/09	Butylbenzylphthalate Di-n-butylphthalate	5.7 ug/Kg 110 ug/Kg	RSAU5-0.5B RSAU5-10B RSAU5-25B RSAU5-40B RSAU5-50B RSAU5-55B

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
SA146-25B	Di-n-butylphthalate	68 ug/Kg	68U ug/Kg
SA146009-25B	Di-n-butylphthalate	45 ug/Kg	45U ug/Kg

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
SA146-55B	Di-n-butylphthalate	87 ug/Kg	87U ug/Kg
SA147-0.5B	Di-n-butylphthalate	44 ug/Kg	44U ug/Kg
SA147-10B	Di-n-butylphthalate	43 ug/Kg	43U ug/Kg
RSAU5-10B	Di-n-butylphthalate	41 ug/Kg	41U ug/Kg
RSAU5-25B	Di-n-butylphthalate	62 ug/Kg	62U ug/Kg
RSAU5-40B	Di-n-butylphthalate	84 ug/Kg	84U ug/Kg
RSAU5-50B	Di-n-butylphthalate	100 ug/Kg	100U ug/Kg
RSAU5-55B	Di-n-butylphthalate	88 ug/Kg	88U ug/Kg

Sample FB080309-SO (from SDG R0904279) 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
FB080309-SO	8/3/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Diethylphthalate	2.0 ug/L 0.14 ug/L 0.36 ug/L	All soil samples in SDG R0904329

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 MSD percent recovery (%R) was 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 with the following exceptions:

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
93638-LCS/D (RSAU5-0.5B RSAU5-10B RSAU5-25B RSAU5-40B RSAU5-50B RSAU5-55B 93638-MB)	Bis(2-ethylhexyl)phthalate Di-n-butylphthalate	138 (50-120) 139 (50-120)	130 (50-120) 131 (50-120)	- -	J+ (all detects) J+ (all detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0904329	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 SA146-25B and SA146009-25B and samples SA147-25B and SA147009-25B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA146-25B	SA146009-25B				
Di-n-butylphthalate	68	45	-	23 (≤180)	-	-

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA147-25B	SA147009-25B				
Bis(2-ethylhexyl)phthalate	180U	220	-	40 (≤180)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles - Data Qualification Summary - SDG R0904329

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0904329	RSAU5-0.5B RSAU5-10B RSAU5-25B RSAU5-40B RSAU5-50B RSAU5-55B	1,4-Dioxane	J+ (all detects)	A	Continuing calibration (%D) (c)
R0904329	RSAU5-0.5B RSAU5-10B RSAU5-25B RSAU5-40B RSAU5-50B RSAU5-55B	Bis(2-ethylhexyl)phthalate Di-n-butylphthalate	J+ (all detects) J+ (all detects)	P	Laboratory control samples (%R) (l)
R0904329	SA146-0.5B SA146-10B SA146-25B SA146009-25B SA146-40B SA146-55B SA147-0.5B SA147-10B SA147-25B SA147009-25B SA147-40B SA147-56B RSAU5-0.5B RSAU5-10B RSAU5-25B RSAU5-40B RSAU5-50B RSAU5-55B	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 R0904329

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0904329	SA146-25B	Di-n-butylphthalate	68U ug/Kg	A	bl
R0904329	SA146009-25B	Di-n-butylphthalate	45U ug/Kg	A	bl
R0904329	SA146-55B	Di-n-butylphthalate	87U ug/Kg	A	bl
R0904329	SA147-0.5B	Di-n-butylphthalate	44U ug/Kg	A	bl
R0904329	SA147-10B	Di-n-butylphthalate	43U ug/Kg	A	bl

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0904329	RSAU5-10B	Di-n-butylphthalate	41U ug/Kg	A	bl
R0904329	RSAU5-25B	Di-n-butylphthalate	62U ug/Kg	A	bl
R0904329	RSAU5-40B	Di-n-butylphthalate	84U ug/Kg	A	bl
R0904329	RSAU5-50B	Di-n-butylphthalate	100U ug/Kg	A	bl
R0904329	RSAU5-55B	Di-n-butylphthalate	88U ug/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles- Field Blank Data Qualification Summary - SDG R0904329

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234A2a
SDG #: R0904329
Laboratory: Columbia Analytical Services

Date: 12/26/09
Page: 1 of 1
Reviewer: SW
2nd Reviewer: V

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 8/04-05/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	2 RSD ≤
IV.	Continuing calibration/ICV	SW	CCV/ICV ≤25 %
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	LCS/D
IX.	Regional Quality Assurance and Quality Control	N	
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 = 3, 4 D_2 = 9, 10
XVII.	Field blanks	SW	FB = FB080309-50 (R0904279)

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

Validated Samples: Soil

1	SA146-0.5B		11	SA147-40B		21	92928-MB	31	
2	SA146-10B		12	SA147-56B		22	92971-	32	
3	SA146-25B	D_1	13	RSAU5-0.5B		23	93638-	33	
4	SA146009-25B	D_1	14	RSAU5-10B		24		34	
5	SA146-40B		15	RSAU5-25B		25		35	
6	SA146-55B		16	RSAU5-40B		26		36	
7	SA147-0.5B		17	RSAU5-50B		27		37	
8	SA147-10B		18	RSAU5-55B		28		38	
9	SA147-25B	D_1	19	SA146-10BMS		29		39	
10	SA147009-25B	D_1	20	SA146-10BMSD		30		40	

VALIDATION FINDINGS WORKSHEET

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

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

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

LDC #: 22734A29

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

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

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

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

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

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

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

#	Date	Standard ID	Compound	Finding %D (Limit: ≤25.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	8/18/09	AU 688	TTT (+)	27.2		13-18, 93638-MB	J+ dets/A (c)

CONCAL.2S

LDC #: 22234A29
SDG #: Sa Cruz

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: JVG
2nd Reviewer:

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

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

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

Blank extraction date: 8/06/09 **Blank analysis date:** 8/12/09
Conc. units: ug/Kg Associated Samples: 3-12 (bl)

Compound	Blank ID	Sample Identification								
	92971-MB	3	4	6	7	8				
XX	37	68 /U	45 /U	87 /U	44 /U	43 /U				

Blank extraction date: 8/14/09 **Blank analysis date:** 8/18/09
Conc. units: ug/Kg Associated Samples: 13-18 (bl)

Compound	Blank ID	Sample Identification								
	93638-MB	14	15	16	17	18				
AAA	5.7									
XX	110	41 /U	62 /U	84 /U	100 /U	88 /U				

5x Phthalates
2x all others

LDC #: 22234 A2G
SDG #: Sa Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JVG
2nd Reviewer:

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

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

Blank units: ug/L **Associated sample units:** ug/Kg
Sampling date: 8/03/05
Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: All soils

Compound	Blank ID	Sample Identification								
	FB080309-SO									
EEE	2.0		All results either ND or > FB)							
AAA	0.14									
LL	0.36									
CRQL										

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

Compound	Blank ID	Sample Identification								
CRQL										

5x Phthalates
2x all others

LDC #: 22734A26
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: JVC
2nd Reviewer: [signature]

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

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

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

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

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		19/20	EFE	( )	165 (50-150)	( )	2	No qual (MS in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

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

LDC #: 22234A29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: OVL
2nd Reviewer: [signature]

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

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

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

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		92928-LCS/D	EEE	130 (50-120)	( )	40 (30)	1, 2, 92928-MB	No spike (LCSD in)
				( )	( )	( )		
				( )	( )	( )		
		92971-LCS/D	EEE	126 ( )	( )	( )	3-12, 92971-MB	(LCSD in)
			XX	( )	124 (50-120)	( )		(LCS in)
				( )	( )	( )		
				( )	( )	( )		
		93638-LCS/D	EEE	138 ( )	130 ( )	( )	13-18, 93638-MB	J+ dets/P (L)
			XX	139 ( )	131 ( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 22294 A2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

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

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

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

Compound	Concentration (ug/kg)		RPD
	3	4	Parent only
XX	68	45	23 (≤ 180 D) -

Compound	Concentration (ug/kg)		RPD
	9	10	
EFE	180 U	220	40 (≤ 180 D) -

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: September 24 through September 25, 2009

LDC Report Date: December 29, 2009

Matrix: Water

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905462

Sample Identification

M-89B
M-2AB
M-2009AB
M-89BMS
M-89BMSD

Introduction

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

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

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

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

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
96998-MB	9/28/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Di-n-butylphthalate Diethylphthalate	0.30 ug/L 0.48 ug/L 3.6 ug/L 0.27 ug/L	M-89B

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

Sample FB080409-GW (from SDG R0904290) 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
FB080409-GW	8/4/09	Diethylphthalate	0.22 ug/L	All samples in SDG R0905462

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

Sample PB100209-A2 (from SDG R0905636) 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
PB100209-A2	10/2/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate	0.37 ug/L 0.22 ug/L	All samples in SDG R0905462

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

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

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
M-89BMS/MSD (M-89B)	Pyridine	0 (50-150)	0 (50-150)	-	J- (all detects) R (all non-detects)	A

VIII. Laboratory Control Samples (LCS)

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

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
96998-LCS/D (M-89B 96998-MB)	Pyridine	38 (50-120)	33 (50-120)	-	J- (all detects) UJ (all non-detects)	P
97225-LCS/D (M-2AB M-2009AB 97225-MB)	Pyridine	24 (50-120)	41 (50-120)	53 (≤30)	J (all detects) UJ (all non-detects)	P
97225-LCS/D (M-2AB M-2009AB 97225-MB)	1,4-Dioxane	45 (50-120)	45 (50-120)	-	J- (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

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 R0905462	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 M-2AB and M-2009AB were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-2AB	M-2009AB				
1,4-Dioxane	0.28	1.9U	-	1.62 (≤1.9)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles - Data Qualification Summary - SDG R0905462

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905462	M-89B	Pyridine	J- (all detects) R (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R) (m)
R0905462	M-89B	Pyridine	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0905462	M-2AB M-2009AB	Pyridine	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)(RPD) (l,ld)
R0905462	M-2AB M-2009AB	1,4-Dioxane	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0905462	M-89B M-2AB M-2009AB	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 R0905462

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles - Field Blank Data Qualification Summary - SDG R0905462

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles - Pump Blank Data Qualification Summary - SDG R0905462

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234B2a
SDG #: R0905462
Laboratory: Columbia Analytical Services

Date: 12/23/09
Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 9/24-25/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	%RSD ≤ 15%
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 25%
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	LCS/D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	SW	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D = 2, 3
XVII.	Field blanks	SW	FB = FB080409-GW (R0904290) PB = PB100209-A2 (R0905636)

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-89B	11	96998-MB	21		31	
2	M-2AB	12	97225-	22		32	
3	M-2009AB	13		23		33	
4	M-89BMS	14		24		34	
5	M-89BMSD	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
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TTT. 1,4- Dioxane
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	UUU Octachlorostyrene
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	VVV.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	WWW.

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

LDC #: 22234 B29
SDG #: Sy Conv

VALIDATION FINDINGS WORKSHEET
Blanks

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

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

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

Blank extraction date: 9/28/09 **Blank analysis date:** 1/30/09
Conc. units: ug/L Associated Samples: 1 (ND)

Compound	Blank ID	Sample Identification								
	96998-MB									
EEE	0.30									
AAA	0.48									
XX	3.6									
LL	0.27									

Blank extraction date: _____ **Blank analysis date:** _____
Conc. units: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								

5x Phthalates
2x all others

LDC #: 22234 B2a
SDG #: Sw cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JV6
2nd Reviewer:

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

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

Blank units: ug/L **Associated sample units:** ug/L
Sampling date: 8/04/09
Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: All (ND)

Compound	Blank ID	Sample Identification								
	FB080409-GW									
LL	0.22									
CRQL										

Blank units: ug/L **Associated sample units:** ug/L
Sampling date: 10/02/09
Field blank type: (circle one) Field Blank / Rinsate / Other: PB Associated Samples: All (ND)

Compound	Blank ID	Sample Identification								
	PB100209-AW									
EEE	0.37									
AAA	0.22									
CRQL										

LDC #: 22234 B2a
SDG #: Eu Crv

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: MC
2nd Reviewer: [signature]

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

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

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

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

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

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		4/5	Several	compounds	not side limits	( )	1	No qual (either MS, MSD or LCS in)
				( )	( )	( )	↓	
			RRR	0 (50-150)	0 (50-150)	( )	✓	J-/R/A (m)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

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

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Northgate Environmental
Project: Tronox LLC Henderson/2027.001
Sample Matrix: Water

Service Request: R0905462
Date Collected: 9/24/09
Date Received: 9/25/09
Date Analyzed: 9/30/09

Matrix Spike Summary
Low Level Semivolatile Organic Compounds by GC/MS

Sample Name: M-89B
Lab Code: R0905462-001

Units: µg/L
Basis: NA

Analytical Method: 8270C
Prep Method: EPA 3510C

Analyte Name	Sample Result	Matrix Spike RQ0909173-04 Result	Amount	% Rec		Duplicate Matrix Spike RQ0909173-05 Result	Amount	% Rec		% Rec Limits		RPD		RPD Limit
2-Methylnaphthalene	ND	2.33	3.77	62		2.20	3.77	58		51 - 108		6		30
Acenaphthene	ND	0.387	3.77	10	*	0.264	3.77	7	*	20 - 154		38	*	30
Acenaphthylene	ND	0.151	3.77	4	*	0.179	3.77	5	*	27 - 143		17		30
Anthracene	ND	3.33	3.77	88		3.05	3.77	81		10 - 161		9		30
Benz(a)anthracene	ND	0.396	3.77	10	*	0.358	3.77	9	*	53 - 121		10		30
Benzo(a)pyrene	ND	ND	3.77	0	*	ND	3.77	0	*	24 - 113		0		30
Benzo(b)fluoranthene	ND	11.0	3.77	291	*	6.40	3.77	169	*	19 - 164		53	*	30
Benzo(g,h,i)perylene	ND	7.13	3.77	189	*	4.31	3.77	114		24 - 159		49	*	30
Benzo(k)fluoranthene	ND	5.86	3.77	155		3.41	3.77	90		27 - 156		53	*	30
Bis(2-ethylhexyl) Phthalate	ND	3.93	3.77	104		4.54	3.77	120		55 - 130		14		30
Butyl Benzyl Phthalate	ND	3.56	3.77	94		3.71	3.77	98		50 - 150		4		30
Chrysene	ND	3.14	3.77	83		3.11	3.77	82		57 - 120		1		30
Di-n-butyl Phthalate	ND	3.42	3.77	91		3.21	3.77	85		50 - 150		7		30
Di-n-octyl Phthalate	ND	10.3	3.77	273	*	6.38	3.77	169	*	50 - 150		47	*	30
Dibenz(a,h)anthracene	ND	8.04	3.77	213	*	4.91	3.77	130		10 - 179		48	*	30
Diethyl Phthalate	ND	3.83	3.77	101		3.70	3.77	98		50 - 150		4		30
Dimethyl Phthalate	ND	3.61	3.77	96		3.51	3.77	93		50 - 150		3		30
Fluoranthene	ND	3.11	3.77	82		2.88	3.77	76		40 - 156		8		30
Fluorene	ND	4.24	3.77	112		4.19	3.77	111		26 - 153		1		30
Hexachlorobenzene	ND	3.12	3.77	83		2.81	3.77	74		47 - 108		10		30
Indeno(1,2,3-cd)pyrene	ND	9.08	3.77	241	*	5.40	3.77	143		16 - 167		51	*	30
Naphthalene	ND	3.22	3.77	85		3.33	3.77	88		55 - 116		3		30
Nitrobenzene	ND	4.40	3.77	116		4.39	3.77	116		50 - 150		0		30
Phenanthrene	ND	3.11	3.77	82		2.86	3.77	76		36 - 144		9		30
Pyrene	ND	0.604	3.77	16	*	0.453	3.77	12	*	38 - 146		29		30
Pyridine	ND	ND	3.77	0	*	ND	3.77	0	*	50 - 150		0		30
1,4-Dioxane	ND	2.39	4.72	51		2.36	4.72	50		10 - 106		1		30
Octachlorostyrene	ND	2.80	3.77	74		3.04	3.77	80		50 - 150		8		30

Comments:

LDC #: 22234B29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: OVC
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 Was a LCS required?

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

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		96998-LCS/D	XX	137 (50-120)	129 (50-120)	( )	1, 96998-MB	No qual (MS/MSD in)
			RRR	38 ( )	33 ( )	( )		J-/UJ/P (l)
			TTT	48 ( )	47 ( )	( )	↓	No qual (MS/MSD in)
				( )	( )	( )		
				( )	( )	( )		
		97225-LCS/D	RRR	24 ( )	41 ( )	53 (30)	2, 3, 97225-MB	J/UJ/P (l, ld)
			TTT	45 (↓)	45 (↓)	( )	↓	J-/UJ/P (l)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		

LDC #: 22239B2a
SDG #: See Cover

Reviewer: JVG
2nd Reviewer: [illegible]

VALIDATION FINDINGS WORKSHEET
Internal Standards

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

#	Date	Sample ID	Internal Standard	Area (Limits)	RT (Limits)	Qualifications
		4	PRY	114717 (173464 - 693856)		No qual (QC)

* QC limits are advisory
IS1 (DCB) = 1,4-Dichlorobenzene-d4
IS2 (NPT) = Naphthalene-d8
IS3 (ANT) = Acenaphthene-d10
IS4 (PHN) = Phenanthrene-d10
IS5 (CRY) = Chrysene-d12
IS6 (PRY) = Perylene-d12

LDC #: 22234 B2a
SDG #: Sw Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: NV
2nd reviewer: [signature]

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

(Y) N N/A Were field duplicate pairs identified in this SDG?
(Y) N N/A Were target compounds identified in the field duplicate pairs?

Compound	Concentration (ug/L)		RPD (Parent only)
	2	3	
TIT	0.28	1.9 U	1.62 (≤1.9 D) —

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: October 2 through October 7, 2009

LDC Report Date: December 29, 2009

Matrix: Water

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905636

Sample Identification

PB100209-A2
M-76B
M-76009B
MC-94B

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 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
10/6/09	Di-n-octylphthalate	25.9	PB100209-A2 M-76B 97551-MB	J+ (all detects)	A
10/13/09	Di-n-octylphthalate	29.4	MC-94B	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
97551-MB	10/5/09	Bis(2-ethylhexyl)phthalate	0.25 ug/L	PB100209-A2 M-76B M-76009B
97951-MB	10/9/09	Bis(2-ethylhexyl)phthalate	1.4 ug/L	MC-94B

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
PB100209-A2	Bis(2-ethylhexyl)phthalate	0.37 ug/L	0.37U ug/L
M-76B	Bis(2-ethylhexyl)phthalate	0.45 ug/L	0.45U ug/L

Sample FB080409-GW (from SDG R0904290) 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
FB080409-GW	8/4/09	Diethylphthalate	0.22 ug/L	M-76B M-76009B

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

Sample	Compound	Reported Concentration	Modified Final Concentration
M-76009B	Diethylphthalate	0.27 ug/L	0.27U ug/L

Sample PB100209-A2 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
PB100209-A2	10/2/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate	0.37 ug/L 0.22 ug/L	M-76B M-76009B

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

Sample	Compound	Reported Concentration	Modified Final Concentration
M-76B	Bis(2-ethylhexyl)phthalate	0.45 ug/L	0.45U ug/L
M-76009B	Butylbenzylphthalate	0.19 ug/L	0.19U ug/L

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) 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
97551-LCS/D (PB100209-A2 M-76B M-76009B 97551-MB)	Pyridine	21 (50-120)	24 (50-120)	-	J- (all detects) UJ (all non-detects)	P
	1,4-Dioxane	33 (50-120)	33 (50-120)	-	J- (all detects) UJ (all non-detects)	
97951-LCS/D (MC-94B 97951-MB)	Pyridine	18 (50-120)	16 (50-120)	-	J- (all detects) UJ (all non-detects)	P
	1,4-Dioxane	37 (50-120)	36 (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 R0905636	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 M-76B and M-76009B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-76B	M-76009B				
Bis(2-ethylhexyl)phthalate	0.45	4.7U	-	4.25 (≤4.7)	-	-
Butylbenzylphthalate	4.7U	0.19	-	4.51 (≤4.7)	-	-
Di-n-butylphthalate	4.7U	1.2	-	3.50 (≤4.7)	-	-
Diethylphthalate	4.7U	0.27	-	4.43 (≤4.7)	-	-
1,4-Dioxane	1.9U	0.24	-	1.66 (≤1.9)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles - Data Qualification Summary - SDG R0905636

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905636	PB100209-A2 M-76B MC-94B	Di-n-octylphthalate	J+ (all detects)	A	Continuing calibration (%D) (c)
R0905636	PB100209-A2 M-76B M-76009B MC-94B	Pyridine 1,4-Dioxane	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0905636	PB100209-A2 M-76B M-76009B MC-94B	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 R0905636

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905636	PB100209-A2	Bis(2-ethylhexyl)phthalate	0.37U ug/L	A	bl
R0905636	M-76B	Bis(2-ethylhexyl)phthalate	0.45U ug/L	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles- Field Blank Data Qualification Summary - SDG R0905636

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905636	M-76009B	Diethylphthalate	0.27U ug/L	A	bf

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles- Pump Blank Data Qualification Summary - SDG R0905636

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0905636	M-76B	Bis(2-ethylhexyl)phthalate	0.45U ug/L	A	bp
R0905636	M-76009B	Butylbenzylphthalate	0.19U ug/L	A	bp

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234C2a
SDG #: R0905636
Laboratory: Columbia Analytical Services

Date: 12/23/09
Page: 1 of 1
Reviewer: JV
2nd Reviewer: ~

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 10/02 - 07/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	% RSD r ✓
IV.	Continuing calibration/ICV	SW	CCV/ICV ≤25 %
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	client spec
VIII.	Laboratory control samples	SW	LCS/D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D = 2, 3
XVII.	Field blanks	SW	PB = 1 FB = FB080409GW (R0904290)

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: water

1	PB100209-A2	11	97551-MB	21		31	
2	M-76B	12	97951-	22		32	
3	M-76009B	13		23		33	
4	MC-94B	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-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP. Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TTT. 1,4-Dioxane
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	UUU octachlorostyrene
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	VVV.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	WWW.

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

LDC #: 22234C29
SDG #: San Cove

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: JYG
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 Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis for each instrument?
Y (N) N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?
Y (N) N/A Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	10/06/09	DB855	FFF (F)	25.9		1,2, 97551-MB	J+ detects/A (c)
	10/13/09	DC023	FFF (F)	39.4		4	J+ detects/A

CONCAL.2S

LDC #: 22234C2a
SDG #: Ca Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: MG
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 Was a method blank analyzed for each matrix?
Y N N/A Was a method blank analyzed for each concentration preparation level?
Y N N/A Was a method blank associated with every sample?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 10/05/09 **Blank analysis date:** 10/06/09
Conc. units: ug/L Associated Samples: ~~ALL~~ 1-3 (6 l)

Compound	Blank ID	Sample Identification								
	97951-MB	1	2							
EEE	0.25	0.37/U	0.45/U							

Blank extraction date: 10/09/09 **Blank analysis date:** 10/13/09
Conc. units: ug/L Associated Samples: 4 (ND)

Compound	Blank ID	Sample Identification								
	97951-MB									
EEE	1.4									

5x Phthalates
2x all others

LDC #: 22234C29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JV
2nd Reviewer: LA

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

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

Blank units: ug/L **Associated sample units:** ug/L
Sampling date: 10/02/09
Field blank type: (circle one) Field Blank / Rinsate / Other: PB Associated Samples: 2, 3 (bp)

Compound	Blank ID	Sample Identification								
	1	2	3							
EEE	0.37	0.45 U								
AAA	0.22		0.19 U							
CRQL										

Blank units: ug/L **Associated sample units:** ug/L
Sampling date: 8/04/09
Field blank type: (circle one) Field Blank / Rinsate / Other: Associated Samples: 2, 3 (bf)

Compound	Blank ID	Sample Identification								
	FB080409-GW	3								
LL	0.22		0.27 U							
CRQL										

LDC #: 22234C2a
SDG #: Su Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: NG
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 Was a LCS required?

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

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		97551 LCS/D	RRR	21 (50-120)	24 (50-120)	( )	1-3, 97551-MB	J-/UJ/P (l)
			TTT	33 ( )	33 ( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		97951 LCS/D	RRR	18 ( )	16 ( )	( )	4, 97951-MB	
			TTT	37 ( )	36 ( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 22234C2S
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: JVK
2nd reviewer: [signature]

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

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

Compound	Concentration (ug/L) 2	3	RPD (Parent only)
EEE	0.45	4.7U	4.25 (≤4.7D)
AAA	4.7U	0.19	4.51
XX	↓	1.2	3.50
LL	↓	0.27	4.43
TTT	1.9U	0.24	1.66 (≤1.9D)

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: October 6, 2009

LDC Report Date: January 20, 2010

Matrix: Soil/Water

Parameters: Semivolatiles

Validation Level: Stage 4

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905693

Sample Identification

EB100609-SO1A4	RSAR5-40BMS
SA138-0.5B	RSAR5-40BMSD
SA138-10B	
SA138009-10B	
SA138-30B	
SA138-45B	
SA103-0.5B	
SA103-10B	
SA103009-10B	
SA103-25B	
SA103-35B	
RSAR5-0.5B	
RSAR5-10B	
RSAR5-25B	
RSAR5-40B	
RSAS5-0.5B	
RSAS5-10B	
RSAS5-25B	
RSAS5-36B	
RSAS5009-36B	

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.

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
10/13/09	Di-n-octylphthalate	29.4	EB100609-SO1A4	J+ (all detects)	A
10/16/09	Fluoranthene	25.1	SA103-35B RSAR5-40B RSAS5009-36B RSAR5-40BMS RSAR5-40BMSD 98304-MB	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
97951-MB	10/9/09	Bis(2-ethylhexyl)phthalate	1.4 ug/L	All water samples in SDG R0905693
98173-MB	10/13/09	Di-n-butylphthalate	39 ug/Kg	SA138-0.5B SA138-10B SA138009-10B SA138-30B SA138-45B SA103-0.5B SA103-10B SA103009-10B SA103-25B RSAR5-25B RSAS5-0.5B RSAS5-10B RSAS5-25B RSAS5-36B
98304-MB	10/14/09	Di-n-butylphthalate	50 ug/Kg	SA103-35B RSAR5-0.5B RSAR5-10B RSAR5-40B RSAS5009-36B

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
SA138-0.5B	Di-n-butylphthalate	110 ug/Kg	110U ug/Kg
SA138009-10B	Di-n-butylphthalate	70 ug/Kg	70U ug/Kg
SA138-30B	Di-n-butylphthalate	180 ug/Kg	180U ug/Kg
SA138-45B	Di-n-butylphthalate	120 ug/Kg	120U ug/Kg
SA103-10B	Di-n-butylphthalate	49 ug/Kg	49U ug/Kg
SA103009-10B	Di-n-butylphthalate	52 ug/Kg	52U ug/Kg
RSAR5-25B	Di-n-butylphthalate	46 ug/Kg	46U ug/Kg
RSAS5-36B	Di-n-butylphthalate	81 ug/Kg	81U ug/Kg
SA103-35B	Di-n-butylphthalate	91 ug/Kg	91U ug/Kg
RSAR5-0.5B	Di-n-butylphthalate	77 ug/Kg	77U ug/Kg
RSAR5-10B	Di-n-butylphthalate	55 ug/Kg	55U ug/Kg
RSAS5009-36B	Di-n-butylphthalate	190 ug/Kg	190U ug/Kg

Sample SA103-35B 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
SA103-35B	10/6/09	Butylbenzylphthalate	0.13 ug/L	All soil samples in SDG R0905693

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

Sample FB080309-SO (from SDG R0904279) 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
FB080309-SO	8/3/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Diethylphthalate	2.0 ug/L 0.14 ug/L 0.36 ug/L	All soil samples in SDG R0905693

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

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
97951-LCS/D (All water samples in SDG R0905693)	Pyridine	18 (50-120)	16 (50-120)	-	J- (all detects) UJ (all non-detects)	P
	1,4-Dioxane	37 (50-120)	36 (50-120)	-	J- (all detects) UJ (all non-detects)	
98173-LCS/D (SA138-0.5B SA138-10B SA138009-10B SA138-30B SA138-45B SA103-0.5B SA103-10B SA103009-10B SA103-25B RSAR5-25B RSAS5-0.5B RSAS5-10B RSAS5-25B RSAS5-36B 98173-MB)	1,4-Dioxane	45 (50-120)	49 (50-120)	-	J- (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

All target compound identifications were within validation criteria.

XII. Project Quantitation Limit

All project quantitation limits were within validation criteria

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0905693	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

Samples SA138-10B and SA138009-10B, samples SA103-10B and SA103009-10B, and RSAS5-36B and RSAS5009-36B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA138-10B	SA138009-10B				
Di-n-butylphthalate	1800U	70	-	1730 (≤1800)	-	-

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA138-10B	SA138009-10B				
Fluoranthene	18	7.1U	-	10.9 (≤7.1)	J (all detects) UJ (all non-detects)	A
Pyrene	14	7.1U	-	6.9 (≤7.1)	-	-

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA103-10B	SA103009-10B				
Di-n-butylphthalate	49	52	-	3 (≤180)	-	-

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAS5-36B	RSAS5009-36B				
Di-n-butylphthalate	81	190	-	109 (≤250)	-	-
Butylbenzylphthalate	250U	5.8	-	244.2 (≤250)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles - Data Qualification Summary - SDG R0905693

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905693	EB100609-SO1A4	Di-n-octylphthalate	J+ (all detects)	A	Continuing calibration (%D) (c)
R0905693	SA103-35B RSAR5-40B RSAS5009-36B	Fluoranthene	J+ (all detects)	A	Continuing calibration (%D) (c)
R0905693	EB100609-SO1A4	Pyridine 1,4-Dioxane	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0905693	SA138-0.5B SA138-10B SA138009-10B SA138-30B SA138-45B SA103-0.5B SA103-10B SA103009-10B SA103-25B RSAR5-25B RSAS5-0.5B RSAS5-10B RSAS5-25B RSAS5-36B	1,4-Dioxane	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0905693	EB100609-SO1A4 SA138-0.5B SA138-10B SA138009-10B SA138-30B SA138-45B SA103-0.5B SA103-10B SA103009-10B SA103-25B SA103-35B RSAR5-0.5B RSAR5-10B RSAR5-25B RSAR5-40B RSAS5-0.5B RSAS5-10B RSAS5-25B RSAS5-36B RSAS5009-36B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0905693	SA138-10B SA138009-10B	Fluoranthene	J (all detects) UJ (all non-detects)	A	Field duplicates (Difference) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0905693

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905693	SA138-0.5B	Di-n-butylphthalate	110U ug/Kg	A	bl
R0905693	SA138009-10B	Di-n-butylphthalate	70U ug/Kg	A	bl
R0905693	SA138-30B	Di-n-butylphthalate	180U ug/Kg	A	bl
R0905693	SA138-45B	Di-n-butylphthalate	120U ug/Kg	A	bl
R0905693	SA103-10B	Di-n-butylphthalate	49U ug/Kg	A	bl
R0905693	SA103009-10B	Di-n-butylphthalate	52U ug/Kg	A	bl
R0905693	RSAR5-25B	Di-n-butylphthalate	46U ug/Kg	A	bl
R0905693	RSAS5-36B	Di-n-butylphthalate	81U ug/Kg	A	bl
R0905693	SA103-35B	Di-n-butylphthalate	91U ug/Kg	A	bl
R0905693	RSAR5-0.5B	Di-n-butylphthalate	77U ug/Kg	A	bl
R0905693	RSAR5-10B	Di-n-butylphthalate	55U ug/Kg	A	bl
R0905693	RSAS5009-36B	Di-n-butylphthalate	190U ug/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles- Equipment Blank Data Qualification Summary - SDG R0905693

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles- Field Blank Data Qualification Summary - SDG R0905693

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 4

LDC #: 22234D2a
SDG #: R0905693
Laboratory: Columbia Analytical Services

Date: 12/28/09
Page: 1 of 1
Reviewer: JM
2nd Reviewer: [signature]

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 10/06/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	%RSD ≤ 25%
IV.	Continuing calibration/ICV	SW	CCV/ICV ≤ 25%
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	LCS/D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	A	
XII.	Compound quantitation/CRQLs	A	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	A	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D_1 = 3, 4 D_2 = 8, 9 D_3 = 19, 20
XVII.	Field blanks	SW	EB = 1 FB = FB080309-SO (R0904279)

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

1	1	EB100609-SO1A4	W	11	3	SA103-35B	S	21	3	RSAR5-40BMS	S	31	1	97951-MB
2	2	SA138-0.5B	S	12	3	RSAR5-0.5B		22	3	RSAR5-40BMSD		32	2	98173-
3	2	SA138-10B	D_1	13	3	RSAR5-10B		23				33	3	98304-
4	2	SA138009-10B	D_1	14	2	RSAR5-25B		24				34		
5	2	SA138-30B		15	3	RSAR5-40B		25				35		
6	2	SA138-45B		16	2	RSAS5-0.5B		26				36		
7	2	SA103-0.5B		17	2	RSAS5-10B		27				37		
8	2	SA103-10B	D_2	18	2	RSAS5-25B		28				38		
9	2	SA103009-10B	D_2	19	2	RSAS5-36B	D_3	29				39		
10	2	SA103-25B		20	3	RSAS5009-36B	D_3	30				40		

LDC #: 22234 D29
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Reviewer: JVL
2nd Reviewer: V

Method: Semivolatiles (EPA SW 846 Method 8270C)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
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) ≤ 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 for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Surrogate spikes				
Were all surrogate %R within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		✓		
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			

LDC #: 22234 D2A
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Reviewer: JM
2nd Reviewer: ✓

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?			✓	
X. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds from the associated calibration standard?	✓			
XI. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?		✓		
XII. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?		✓		
XIII. Tentatively identified compounds (TICs)				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?			✓	
Were relative intensities of the major ions within ± 20% between the sample and the reference spectra?			✓	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?		✓		
XIV. System performance				
System performance was found to be acceptable.	✓			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XVI. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target compounds were detected in the field duplicates.	✓			
XVII. Field blanks				
Field blanks were identified in this SDG.	✓			
Target compounds were detected in the field blanks.	✓			

VALIDATION FINDINGS WORKSHEET

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

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

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

LDC #: 22234 D24
SDG #: Su Env

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: JVL
2nd Reviewer: [illegible]

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

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

(Y) N N/A Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis for each instrument?

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

Y (N) N/A Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	10/13/09	DC023	FFF (+)	29.4		1	J+ dets/A (c)
	10/16/09	AV614	YY (+)	25.1		11, 15, 20-22, 98304-MB	J+ dets/A

CONCAL.2S

LDC #: 22234 D2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 2
Reviewer: JVC
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 Was a method blank analyzed for each matrix?
Y N N/A Was a method blank analyzed for each concentration preparation level?
Y N N/A Was a method blank associated with every sample?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 10/09/09 **Blank analysis date:** 10/13/09
Conc. units: ug/L Associated Samples: 1 (ND)

Compound	Blank ID	Sample Identification								
	97951-MB									
EEE	1.4									

Blank extraction date: 10/13/09 **Blank analysis date:** 10/15/09
Conc. units: ug/Kg Associated Samples: 2-10, 14, 16-19 (6 l)

Compound	Blank ID	Sample Identification								
	98173-MB	2	4	5	6	8	9	14	19	
195 XX	39	110/U	70/U	180/U	120/U	49/U	52/U	46/U	81/U	

5x Phthalates
2x all others

LDC #: 22234D2A
SDG #: Eu Conv

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 2 of 4
Reviewer: JG
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 Was a method blank analyzed for each matrix?
Y N N/A Was a method blank analyzed for each concentration preparation level?
Y N N/A Was a method blank associated with every sample?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 10/14/09 **Blank analysis date:** 10/16/09
Conc. units: ug/Kg Associated Samples: 11-13, 15, 20 (bl)

Compound	Blank ID	Sample Identification								
	98304-MB	11	12	13	20					
XX	50	91/4	77/4	55/4	190/4					

x50

Blank extraction date: _____ **Blank analysis date:** _____
Conc. units: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								

5x Phthalates
2x all others

LDC #: 22234D2A
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JV
2nd Reviewer:

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

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

Blank units: ug/L **Associated sample units:** ug/Kg
Sampling date: 10/06/09
Field blank type: (circle one) Field Blank / Rinsate / Other: EB Associated Samples: All soils (ND)

Compound	Blank ID	Sample Identification								
	1									
AAA	0.13									
CRQL										

Blank units: ug/L **Associated sample units:** ug/Kg
Sampling date: 8/03/09
Field blank type: (circle one) Field Blank / Rinsate / Other: Associated Samples: All soils (ND)

Compound	Blank ID	Sample Identification								
	FB080309-SO									
EEE	2.0									
AAA	0.14									
LL	0.36									
CRQL										

LDC #: 22234D2a
SDG #: Su Creek

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

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

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

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

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

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

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

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		21/22	W	146 (35-108)	113 (35-108)	( )	15	No qual (LCS/p in)
			RRR	24 (50-150)	40 (50-150)	51 (30)	↓	↓
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

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

LDC #: 22234D2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: NG
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 Was a LCS required?
Y (N) N/A Were the LCS/LCSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		97951-LCS/D	RRR	18 (50-120)	16 (50-120)	( )	1, 97951-MB	J-/UJ/P (l)
			TTT	37 ( )	36 ( )	( )	↓	↓ ↓
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		98173-LCS/D	XX	132 ( )	( )	( )	2-10 14 16-19,	No qual (LCSD im)
			TTT	45 ( )	49 (✓)	( )	98173-MB	J-/UJ/P (l)
			UUU	( )	( )	31 (30)	↓	No qual (LCSD im)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		98304 LCS/D	XX	127 (↓)	( )	( )	11-13, 15, 20, 98304-MB	No qual (LCSD im)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 27734 D2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: JVC
2nd reviewer: [signature]

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

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

Compound	Concentration (ug/kg) 3	4	RPD (Parent only)	
XX	1800 U	70	1730 (≤ 1800 D)	–
YY	18	7.1 U	10.9 (≤ 7.1 D)	J/UJ/A (fd)
ZZ	14	↓	6.9	–

Compound	Concentration (ug/kg) 8	9	RPD	
XX	49	52	3 (≤ 180 D)	–

Compound	Concentration (ug/kg) 19	20	RPD	
XX	81	190	109 (≤ 250 D)	–
AAA	250 U	5.8	244.2 ↓	–

Compound	Concentration ( )		RPD

LDC #: 72234 D2A
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: JVL
2nd 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 = $(A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

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

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported RRF (10.0 std)	Recalculated RRF (10.0 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1		9/28/09	~~Phenol~~ RRR (1st internal standard)	NR	1.389	1.325	1.325	9.25	9.24
	ICAL		Naphthalene (2nd internal standard)		0.943	1.049	1.049	5.03	5.02
			Fluorene (3rd internal standard)		1.192	1.192	1.192	11.04	11.04
			~~Pentachlorophenol~~ NA (4th internal standard)		0.940	1.161	1.161	8.15	8.15
			Bis(2-ethylhexyl)phthalate (5th internal standard)		0.690	0.840	0.840	9.03	9.05
			Benzo(a)pyrene (6th internal standard)		1.387	1.274	1.274	10.74	10.74
2	ICAL	10/13/09	~~Phenol~~ RRR (1st internal standard)		2.771	2.458	2.458	8.99	8.98
			Naphthalene (2nd internal standard)		1.174	1.075	1.075	8.48	8.48
			Fluorene (3rd internal standard)		1.326	1.132	1.132	11.44	11.44
			~~Pentachlorophenol~~ NA (4th internal standard)		1.262	1.153	1.153	7.73	7.72
			Bis(2-ethylhexyl)phthalate (5th internal standard)		1.116	1.002	1.002	13.97	13.96
			Benzo(a)pyrene (6th internal standard)		1.443	1.301	1.302	8.18	8.18
3			Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Pentachlorophenol (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						

9/28/09 | 10/13/09

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 results.

	4.0	5.0	10.0	4.0	5.0	10.0
Pyridine	1.333	1.427	1.389	2.572	2.507	2.771
Naphthalene	1.063	1.018	0.943	1.126	1.134	1.174
Fluorene	1.364	1.355	1.192	1.220	1.228	1.326
Phenanthrene	1.198	1.127	0.940	1.226	1.235	1.262
Bis(2-eh)phthalate	1.725/2=0.863	1.737/2=0.869	1.380/2=0.690	1.093	1.118	1.116
Benzo(a)pyrene	1.338	1.402	1.387	1.347	1.420	1.443

LDC #: 22734D29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: JVG
2nd Reviewer: [illegible]

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
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	DB987	10/12/09	~~Phenol~~ (1st internal standard)	1.325	1.267	1.267	4.4	4.4
			Naphthalene (2nd internal standard)	1.049	1.107	1.107	5.1	5.1
			Fluorene (3rd internal standard)	1.197	1.316	1.316	14.7	14.7
			~~Pentachlorophenol~~ (4th internal standard)	1.161	1.163	1.163	0.2	0.2
			Bis(2-ethylhexyl)phthalate (5th internal standard)	0.840	0.973	0.973	15.8	15.8
			Benzo(a)pyrene (6th internal standard)	1.274	1.410	1.410	10.7	10.7
2	DC023	10/17/09	~~Phenol~~ (1st internal standard)		1.075	1.075	18.9	18.9
			Naphthalene (2nd internal standard)		1.120	1.120	6.8	6.8
			Fluorene (3rd internal standard)		1.285	1.285	7.8	7.8
			~~Pentachlorophenol~~ (4th internal standard)		1.200	1.200	3.4	3.4
			Bis(2-ethylhexyl)phthalate (5th internal standard)		1.030	1.030	22.6	22.6
			Benzo(a)pyrene (6th internal standard)		1.364	1.364	9.4	9.4
3	AV595	10/15/09	~~Phenol~~ (1st internal standard)	2.458	2.587	2.587	5.0	5.0
			Naphthalene (2nd internal standard)	1.075	1.133	1.133	5.4	5.4
			Fluorene (3rd internal standard)	1.137	1.254	1.254	10.8	10.8
			~~Pentachlorophenol~~ (4th internal standard)	1.153	1.160	1.160	0.6	0.6
			Bis(2-ethylhexyl)phthalate (5th internal standard)	1.007	1.056	1.056	5.4	5.4
			Benzo(a)pyrene (6th internal standard)	1.301	1.338	1.338	2.8	2.8

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 #: 22234D2g
SDG #: Qa Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: JVG
2nd Reviewer: W

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
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	AV614	10/16/09	~~Phenol~~ RRR (1st internal standard)	2.458	2.446	2.446	0.5	0.5
			Naphthalene (2nd internal standard)	1.075	1.132	1.132	5.3	5.3
			Fluorene (3rd internal standard)	1.132	1.298	1.298	14.7	14.7
			~~Pentachlorophenol~~ UU (4th internal standard)	1.153	1.219	1.219	5.7	5.7
			Bis(2-ethylhexyl)phthalate (5th internal standard)	1.007	0.965	0.965	3.7	3.7
			Benzo(a)pyrene (6th internal standard)	1.301	1.367	1.367	5.1	5.1
2	AV645	10/19/09	~~Phenol~~ RRR (1st internal standard)		2.796	2.796	13.8	13.8
			Naphthalene (2nd internal standard)		1.143	1.143	6.3	6.3
			Fluorene (3rd internal standard)		1.299	1.299	14.8	14.7
			~~Pentachlorophenol~~ UU (4th internal standard)		1.188	1.188	3.0	3.0
			Bis(2-ethylhexyl)phthalate (5th internal standard)		0.988	0.988	1.4	1.4
			~~Benzo(a)pyrene~~ (6th internal standard)		1.300	1.300	0.1	0.1
3			Phenol (1st internal standard)					
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					

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

LDC #: 22236J79
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: JVG
2nd reviewer: W

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

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

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: # 2

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	2.10	1.53	77	77	0
2-Fluorobiphenyl	↓	1.50	75	75	↓
Terphenyl-d14	↓	1.95	98	98	↓
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID:

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

Sample ID:

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

LDC #: 22734 D2A
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Page: 1 of 1
Reviewer: JVB
2nd Reviewer: [illegible]

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

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

% Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked sample concentration; SA = Spike added; SC = Sample concentation

RPD = | MS - MSD | * 2/(MS + MSD) MS = Matrix spike percent recovery MSD = Matrix spike duplicate percent recovery

MS/MSD samples: 21/22

Compound	Spike Added (ug/kg)		Sample Concentration (ug/kg)	Spiked Sample Concentration (ug/kg)		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	------	MS	MSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol											
N-Nitroso-di-n-propylamine											
4-Chloro-3-methylphenol											
Acenaphthene	22	22	0	196	240	88	85	108	108	20	20
Pentachlorophenol											
Pyrene	22	22	0	216	241	97	97	109	109	11	11

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

LDC #: 22234 D29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Reviewer: JVG
2nd Reviewer: MV

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

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

% Recovery = 100 * (SC/SA Where: SSC = Spike concentration; SA = Spike added

RPD = I LCSC - LCSDC I * 2/(LCSC + LCSDC) LCSC = Laboraotry control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS/LCSD samples: 97951 - LCS/D

Compound	Spike Added (ug/~~Kg~~ L)		Spike Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene	4.00	4.00	3.48	3.47	87	87	87	87	0	0
Pentachlorophenol										
Pyrene	4.00	4.00	3.58	3.66	90	90	92	92	2	2

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 #: R23402a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: JVG
2nd reviewer: ✓

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

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

$$\text{Concentration} = \frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$$

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

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

V_i = Volume of extract injected in microliters (ul)

V_t = Volume of the concentrated extract in microliters (ul)

Df = Dilution Factor.

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

2.0 = Factor of 2 to account for GPC cleanup

Example:

Sample I.D. #7, XX:

Conc. = $\frac{(1102267)(1.00)(1ml)(1000)(\quad)}{(237969)(1.499)(30.0g)(0.944)(\quad)}$

= 109.1

≈ 110 ug/kg

#	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 7 through October 8, 2009

LDC Report Date: January 1, 2010

Matrix: Soil/Water

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905744

Sample Identification

RSAP5-0.5B
RSAP5-10B
RSAP5009-10B
RSAP5-25B
RSAP5-39B
SA192-0.5B
SA192-10B
SA192-25B
SA192-39B
EB100809-SO1A3
SA130-0.5B
SA130-10B
SA130-25B
SA130-43B
RSAP6-0.5B
RSAP6-10B
RSAP6-25B
RSAP6-44B
SA192-10BMS
SA192-10BMSD
SA130-0.5BMS
SA130-0.5BMSD

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 with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
10/16/09	Fluoranthene	25.1	RSAP5-0.5B RSAP5-25B RSAP5-39B SA192-0.5B 98304-MB	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
98304-MB	10/14/09	Di-n-butylphthalate	50 ug/Kg	RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-25B RSAP5-39B SA192-0.5B SA192-10B

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

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
RSAP5-0.5B	Di-n-butylphthalate	86 ug/Kg	86U ug/Kg
RSAP5009-10B	Di-n-butylphthalate	47 ug/Kg	47U ug/Kg
RSAP5-39B	Di-n-butylphthalate	120 ug/Kg	120U ug/Kg
SA192-0.5B	Di-n-butylphthalate	74 ug/Kg	74U ug/Kg
SA192-10B	Di-n-butylphthalate	75 ug/Kg	75U ug/Kg

Sample EB100809-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
EB100809-SO1A3	10/8/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate	0.29 ug/L 0.12 ug/L	SA130-0.5B SA130-10B SA130-25B SA130-43B RSAP6-0.5B RSAP6-10B RSAP6-25B RSAP6-44B

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

Samples FB080309-SO (from SDG R0904279) and sample FB082809-SO (from SDG R0904894) were identified as field blanks. No semivolatile contaminants were found in these blanks with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB080309-SO	8/3/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Diethylphthalate	2.0 ug/L 0.14 ug/L 0.36 ug/L	RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-25B RSAP5-39B SA192-0.5B SA192-10B SA192-25B SA192-39B
FB082809-SO	8/28/09	Diethylphthalate 1,4-Dioxane	0.37 ug/L 0.16 ug/L	SA130-0.5B SA130-10B SA130-25B SA130-43B RSAP6-0.5B RSAP6-10B RSAP6-25B RSAP6-44B

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0905744	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 RSAP5-10B and RSAP5009-10B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAP5-10B	RSAP5009-10B				
Chrysene	5.0	7.2U	-	2.2 (≤7.2)	-	-
Phenanthrene	5.0	7.2U	-	2.2 (≤7.2)	-	-
Di-n-butylphthalate	370U	47	-	323 (≤370)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles - Data Qualification Summary - SDG R0905744

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905744	RSAP5-0.5B RSAP5-25B RSAP5-39B SA192-0.5B	Fluoranthene	J+ (all detects)	A	Continuing calibration (%D) (c)
R0905744	RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-25B RSAP5-39B SA192-0.5B SA192-10B SA192-25B SA192-39B EB100809-SO1A3 SA130-0.5B SA130-10B SA130-25B SA130-43B RSAP6-0.5B RSAP6-10B RSAP6-25B RSAP6-44B	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 R0905744

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905744	RSAP5-0.5B	Di-n-butylphthalate	86U ug/Kg	A	bl
R0905744	RSAP5009-10B	Di-n-butylphthalate	47U ug/Kg	A	bl
R0905744	RSAP5-39B	Di-n-butylphthalate	120U ug/Kg	A	bl
R0905744	SA192-0.5B	Di-n-butylphthalate	74U ug/Kg	A	bl
R0905744	SA192-10B	Di-n-butylphthalate	75U ug/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles- Equipment Blank Data Qualification Summary - SDG R0905744

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles- Field Blank Data Qualification Summary - SDG R0905744

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234E2a
SDG #: R0905744
Laboratory: Columbia Analytical Services

Date: 12/24/09
Page: 1 of 1
Reviewer: JV
2nd Reviewer: V

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 10/07 - 08/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	2 RSD rr
IV.	Continuing calibration/ICV	SW	CW/ICW ≤ 25%
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	SW	LCS/D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D = 2, 3
XVII.	Field blanks	SW	EB = 10 FB = FB080309-SO (R0904279) ↓ = FB082809-SO (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: Soil + Water

1	1	RSAP5-0.5B	S	11	3	SA130-0.5B	S	21	3	SA130-0.5BMS	S	31	1	98304 - MB
2	1	RSAP5-10B	D	12	3	SA130-10B		22	3	SA130-0.5BMSD	↓	32	7	98360 -
3	1	RSAP5009-10B	D	13	3	SA130-25B		23				33	3	98483 -
4	1	RSAP5-25B		14	3	SA130-43B		24				34		
5	1	RSAP5-39B		15	3	RSAP6-0.5B		25				35		
6	1	SA192-0.5B		16	3	RSAP6-10B		26				36		
7	1	SA192-10B		17	3	RSAP6-25B		27				37		
8	3	SA192-25B		18	3	RSAP6-44B		28				38		
9	3	SA192-39B	↓	19	1	SA192-10BMS		29				39		
10	7	EB100809-SO1A3	W	20	1	SA192-10BMSD	↓	30				40		

99720
99455
99630

LDC #: 22234E29

SDG #: Su Cover

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

VALIDATION FINDINGS WORKSHEET

Continuing Calibration

Reviewer: DVG

2nd Reviewer: [illegible]

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 of sample analysis for each instrument?

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

Y (N) N/A Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤25.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	10/16/09	AV614	YY (+)	25.1		1, 4, 5, 6, 98304-MB	J+ dets/A (C)

CONCAL.2S

VALIDATION FINDINGS WORKSHEET

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

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

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

LDC #: 22234 E2a
SDG #: Sv Cover

VALIDATION FINDINGS WORKSHEET
Blanks

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

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

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

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

Blank extraction date: 10/14/09 **Blank analysis date:** 10/16/09

Conc. units: ug/kg Associated Samples: 1-7 (6l)

Compound	Blank ID	Sample Identification								
	98304-MB	1	3	5	6	7				
250 XX	50	86/U	47/U	120/U	74/U	75/U				

Blank extraction date: _____ **Blank analysis date:** _____

Conc. units: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								

5x Phthalates
2x all others

LDC #: 22234 E2G
SDG #: Sq Com

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JVG
2nd Reviewer:

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

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

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 10/08/09
Field blank type: (circle one) Field Blank / Rinsate / Other: EB Associated Samples: 11 - 18 (ND)

Compound	Blank ID	Sample Identification								
	10									
EEE	0.29									
AAA	0.12									
CRQL										

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 8/03/09
Field blank type: (circle one) Field Blank / Rinsate / Other: Associated Samples: 1 - 9 (ND)

Compound	Blank ID	Sample Identification								
	FB080304-SO									
EEE	2.0									
AAA	0.14									
LL	0.36									
CRQL										

LDC #: 22234 E2a
SDG #: Sa Cruz

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JVG
2nd Reviewer: [signature]

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

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

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 8/28/09
Field blank type: (circle one) Field Blank / Rinsate / Other: Associated Samples: 11-18 (ND)

Compound	Blank ID	Sample Identification								
	FB082809-SO									
LL	0.37									
TTT	0.16									
CRQL										

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

Compound	Blank ID	Sample Identification								
CRQL										

LDC #: 22234 E2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

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

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

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

[✓ Y] N N/A Was a LCS required?

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

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		98304 LCS/D	XX	127 (50-120)	( )	( )	1-7, 98304-MB	No qual (LCSD in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 22234 E2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: JV6
2nd reviewer: [illegible]

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

(Y) N N/A Were field duplicate pairs identified in this SDG?
(Y) N N/A Were target compounds identified in the field duplicate pairs?

Compound	Concentration (ug/kg)		RPD (Parent only)
	2	3	
DDD	5.0	7.2 U	2.2 (≤7.2 D) -
UU	5.0	↓	2.2 ↓ -
XX	370 U	47	323 (≤370 D) -

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: October 9 through October 12, 2009

LDC Report Date: January 1, 2010

Matrix: Soil/Water

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905829

Sample Identification

SA137-0.5B
SA137-0.5BDL
SA137-15B
SA137-31B
EB101209-SO1A3
RSAR7-0.5B
RSAR7-9B
RSAR7009-9B
RSAR7-20B
RSAR7-34B
RSAO7-9B
RSAO7-19B
RSAO7-29B
RSAO7-47B
RSAO7-19BMS
RSAO7-19BMSD

Introduction

This data review covers 15 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
98879-MB	10/22/09	Di-n-butylphthalate	54 ug/Kg	RSAO7-19B RSAO7-29B RSAO7-47B

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
RSAO7-19B	Di-n-butylphthalate	88 ug/Kg	88U ug/Kg
RSAO7-47B	Di-n-butylphthalate	74 ug/Kg	74U ug/Kg

Sample EB101209-SO1A3 was identified as an equipment blank. No semivolatile contaminants were found in this blank.

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 R0905829

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

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for SA137-0.5BDL. Since the sample was diluted out, no data were qualified.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Although the MS/MSD percent recoveries (%R) were not within QC limits for some compounds, the MS, 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
98360-LCS/D (All water samples in SDG R0905829)	Pyridine	24 (50-120)	0 (50-120)	200 (≤30)	J (all detects) R (all non-detects)	P
98360-LCS/D (All water samples in SDG R0905829)	1,4-Dioxane	33 (50-120)	41 (50-120)	-	J- (all detects) UJ (all non-detects)	P
98483-LCS/D (SA137-0.5B SA137-0.5BDL SA137-15B SA137-31B RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B 98483-MB)	Di-n-butylphthalate	150 (50-120)	148 (50-120)	-	J+ (all detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

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

Sample	Compound	Finding	Criteria	Flag	A or P
SA137-0.5B	Hexachlorobenzene Octachlorostyrene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects)	A

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0905829	All compounds reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

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

Sample	Compound	Flag	A or P
SA137-0.5B	Hexachlorobenzene Octachlorostyrene	X X	A
SA137-0.5BDL	All TCL compounds except Hexachlorobenzene Octachlorostyrene	X	A

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

XVI. Field Duplicates

Samples RSAR7-9B and RSAR7009-9B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAR7-9B	RSAR7009-9B				
Acenaphthene	22U	5.4	-	16.6 (≤22)	-	-
Anthracene	11	16	-	5 (≤22)	-	-
Benzo(a)anthracene	52	99	-	47 (≤22)	J (all detects)	A
Benzo(a)pyrene	26	51	-	25 (≤22)	J (all detects)	A
Benzo(b)fluoranthene	36	67	-	31 (≤22)	J (all detects)	A
Benzo(g,h,i)perylene	15	30	-	15 (≤22)	-	-
Benzo(k)fluoranthene	24	52	-	28 (≤22)	J (all detects)	A
Chrysene	53	92	-	39 (≤22)	J (all detects)	A
Dibenzo(a,h)anthracene	22U	11	-	11 (≤22)	-	-
Fluoranthene	140	250	56 (≤50)	-	J (all detects)	A
Indeno(1,2,3-cd)-pyrene	14	27	-	13 (≤22)	-	-
Phenanthrene	57	83	-	26 (≤22)	J (all detects)	A
Pyrene	110	210	63 (≤50)	-	J (all detects)	A

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles - Data Qualification Summary - SDG R0905829

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905829	EB101209-SO1A3	Pyridine	J (all detects) R (all non-detects)	P	Laboratory control samples (%R)(RPD) (l,ld)
R0905829	EB101209-SO1A3	1,4-Dioxane	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0905829	SA137-0.5B SA137-0.5BDL SA137-15B SA137-31B RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B	Di-n-butylphthalate	J+ (all detects)	P	Laboratory control samples (%R) (l)
R0905829	SA137-0.5B	Hexachlorobenzene Octachlorostyrene	J (all detects) J (all detects)	A	Project Quantitation Limit (e)
R0905829	SA137-0.5B SA137-0.5BDL SA137-15B SA137-31B EB101209-SO1A3 RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0905829	SA137-0.5B	Hexachlorobenzene Octachlorostyrene	X X	A	Overall assessment of data (o)
R0905829	SA137-0.5BDL	All TCL compounds except Hexachlorobenzene Octachlorostyrene	X	A	Overall assessment of data (o)
R0905829	RSAR7-9B RSAR7009-9B	Fluoranthene Pyrene	J (all detects) J (all detects)	A	Field duplicates (RPD) (fd)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905829	RSAR7-9B RSAR7009-9B	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Chrysene Phenanthrene	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Field duplicates (Difference) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0905829

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905829	RSAO7-19B	Di-n-butylphthalate	88U ug/Kg	A	bl
R0905829	RSAO7-47B	Di-n-butylphthalate	74U ug/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles- Equipment Blank Data Qualification Summary - SDG R0905829

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles- Field Blank Data Qualification Summary - SDG R0905829

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234F2a
SDG #: R0905829
Laboratory: Columbia Analytical Services

Date: 12/21/09
Page: 1 of 1
Reviewer: JW
2nd Reviewer: [signature]

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 10/09 - 12/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	2 RSD r²
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 25 2
V.	Blanks	SW	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	LCS/D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	SW	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	
XVI.	Field duplicates	SW	D = 7, 8
XVII.	Field blanks	SW	*EB = 5 FB = FB082809-SO (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: Soil + Water

1	SA137-0.5B	S	11	RSAO7-9B	S	21	98483-MB	31	
2	SA137-0.5BDL		12	RSAO7-19B		22	98360-MB	32	
3	SA137-15B		13	RSAO7-29B		23	98879-MB	33	
4	SA137-31B		14	RSAO7-47B		24		34	
5	EB101209-SO1A3	W	15	RSAO7-19BMS		25		35	
6	RSAR7-0.5B	S	16	RSAO7-19BMSD		26		36	
7	RSAR7-9B	D	17			27		37	
8	RSAR7009-9B	D	18			28		38	
9	RSAR7-20B		19			29		39	
10	RSAR7-34B		20			30		40	

VALIDATION FINDINGS WORKSHEET

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

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

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

LDC #: 22234 F2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: JVG
2nd Reviewer: [illegible]

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

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

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

Blank extraction date: 10/22/09 **Blank analysis date:** 10/26/09
Conc. units: ug/kg Associated Samples: 12-14 (b1)

Compound	Blank ID	Sample Identification								
	98879-MB	12	14							
XX	54	88/4	74/4							

Blank extraction date: _____ **Blank analysis date:** _____
Conc. units: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								

5x Phthalates
2x all others

LDC #: 22234 FA
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

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

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

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

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

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

Sampling date: 8/28/09

Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: All Soils (ND)

Compound	Blank ID	Sample Identification								
	FB082809-SO									
LL	0.37									
TTT	0.16									
CRQL										

Blank units: _____ **Associated sample units:** _____

Sampling date: _____

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

Compound	Blank ID	Sample Identification								
CRQL										

LDC #: 22234F2G
SDG #: Su Cover
METHOD: GC/MS BNA (EPA SW 846 Method 8270C)

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

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

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

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

#	Date	Sample ID	Surrogate	%R (Limits)	Qualifications
		2 (20x)	All	DO (45-135)	No qual
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

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

LDC #: 22234 F2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

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

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

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

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

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

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		15/16	XX	( )	33 (50-150)	( )	12	No qual (MS in LCS/D in)
			RRR	46 (50-150)	34 ( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

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

LDC #: 22234 F2a
SDG #: Ea Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: JVG
2nd Reviewer: [signature]

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

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

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

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		98360 LCS/D	RKR	24 (50-120)	0 (50-120)	200 (30)	5, 98360-MB	J /R /P (l, ld)
			TTT	33 ( )	41 ( )	( )		J- /NJ /P (l)
				( )	( )	( )		
				( )	( )	( )		
		98483 LCS/D	XX	150 ( )	148 ( )	( )	1-4, 6-11, 98483-MB	J+ Acts /P (l)
				( )	( )	( )		
				( )	( )	( )		
		98879 LCS/D	XX	125 ( )	121 ( )	( )	12-14, 98879-MB	No qual (MS in)
			TTT	45 (✓)	48 (✓)	( )	↓	(MS/MSD in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 22234 F2a
SDG #: Su Cver

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Reviewer: JVG
2nd Reviewer: L

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

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

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

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

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

Comments: See sample calculation verification worksheet for recalculations

LDC #: 22234 F2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Reviewer: JVL
2nd Reviewer:

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

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

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

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

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		1	SS, UUU > cal range		X/A (O)
		2	All except SS, UUU dil		

Comments: _____

LDC#: 22234F2a
SDG#:See cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

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

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

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

Compound Name	Conc (ug/Kg)		RPD (≤50%)	Diff	Diff Limits	Quals (Parent Only)
	7	8				
Acenaphthene	22U	5.4		16.6	≤22	-
Anthracene	11	16		5	≤22	-
Benzo(a)anthracene	52	99		47	≤22	J dets /A
Benzo(a)pyrene	26	51		25	≤22	↓
Benzo(b)fluoranthene	36	67		31	≤22	↓
Benzo(g,h,i)perylene	15	30		15	≤22	-
Benzo(k)fluoranthene	24	52		28	≤22	J dets /A
Chrysene	53	92		39	≤22	↓
Dibenzo(a,h)anthracene	22U	11		11	≤22	-
Fluoranthene	140	250	56			J dets /A
Indeno(1,2,3-cd)-pyrene	14	27		13	≤22	-
Phenanthrene	57	83		26	≤22	J dets /A
Pyrene	110	210	63			↓

(fd) ↓

V:\FIELD DUPLICATES\22234F2a.wpd

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: October 13 through October 15, 2009

LDC Report Date: January 1, 2010

Matrix: Soil/Water

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905882

Sample Identification

RSAN8-0.5B
RSAN8-10B
RSAN8-20B
RSAN8-28B
EB101409-SO1A3
SA178-0.5B
SA178-10B
SA178-17B
SA178-25B
SA178-43B
SA141-14B
SA141009-14B
SA141-24B
SA141-30B

Introduction

This data review covers 13 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
98567-MB	10/19/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate	0.42 ug/L 0.16 ug/L	All water samples in SDG R0905882
98879-MB	10/22/09	Di-n-butylphthalate	55 ug/Kg	All soil samples in SDG R0905882

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
EB101409-SO1A3	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate	0.24 ug/L 0.11 ug/L	0.24U ug/L 0.11U ug/L
RSAN8-10B	Di-n-butylphthalate	80 ug/Kg	80U ug/Kg
RSAN8-20B	Di-n-butylphthalate	95 ug/Kg	95U ug/Kg
RSAN8-28B	Di-n-butylphthalate	63 ug/Kg	63U ug/Kg
SA178-0.5B	Di-n-butylphthalate	62 ug/Kg	62U ug/Kg
SA178-25B	Di-n-butylphthalate	55 ug/Kg	55U ug/Kg
SA178-43B	Di-n-butylphthalate	68 ug/Kg	68U ug/Kg
SA141-24B	Di-n-butylphthalate	49 ug/Kg	49U ug/Kg

Sample EB101409-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
EB101409-SO1A3	10/14/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate	0.24 ug/L 0.11 ug/L	SA178-0.5B SA178-10B SA178-17B SA178-25B SA178-43B

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 R0905882

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
98567-LCS/D (All water samples in SDG R0905963)	Pyridine	21 (50-120)	18 (50-120)	-	J- (all detects) UJ (all non-detects)	P
	1,4-Dioxane	38 (50-120)	35 (50-120)	-	J- (all detects) UJ (all non-detects)	

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
98879-LCS/D (All soil samples in SDG R0905882)	Di-n-butylphthalate	125 (50-120)	121 (50-120)	-	J+ (all detects)	P
98879-LCS/D (All soil samples in SDG R0905882)	1,4-Dioxane	45 (50-120)	48 (50-120)	-	J- (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

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 R0905882	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 SA141-14B and SA141009-14B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA141-14B	SA141009-14B				
Butylbenzylphthalate	3.9	180U	-	176.1 (≤180)	-	-
Hexachlorobenzene	7.1U	11	-	3.9 (≤7.1)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles - Data Qualification Summary - SDG R0905882

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905882	EB101409-SO1A3	Pyridine 1,4-Dioxane	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0905882	RSAN8-0.5B RSAN8-10B RSAN8-20B RSAN8-28B SA178-0.5B SA178-10B SA178-17B SA178-25B SA178-43B SA141-14B SA141009-14B SA141-24B SA141-30B	Di-n-butylphthalate	J+ (all detects)	P	Laboratory control samples (%R) (l)
R0905882	RSAN8-0.5B RSAN8-10B RSAN8-20B RSAN8-28B SA178-0.5B SA178-10B SA178-17B SA178-25B SA178-43B SA141-14B SA141009-14B SA141-24B SA141-30B	1,4-Dioxane	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0905882	RSAN8-0.5B RSAN8-10B RSAN8-20B RSAN8-28B EB101409-SO1A3 SA178-0.5B SA178-10B SA178-17B SA178-25B SA178-43B SA141-14B SA141009-14B SA141-24B SA141-30B	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 R0905882

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905882	EB101409-SO1A3	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate	0.24U ug/L 0.11U ug/L	A	bl
R0905882	RSAN8-10B	Di-n-butylphthalate	80U ug/Kg	A	bl
R0905882	RSAN8-20B	Di-n-butylphthalate	95U ug/Kg	A	bl
R0905882	RSAN8-28B	Di-n-butylphthalate	63U ug/Kg	A	bl
R0905882	SA178-0.5B	Di-n-butylphthalate	62U ug/Kg	A	bl
R0905882	SA178-25B	Di-n-butylphthalate	55U ug/Kg	A	bl
R0905882	SA178-43B	Di-n-butylphthalate	68U ug/Kg	A	bl
R0905882	SA141-24B	Di-n-butylphthalate	49U ug/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles - Equipment Blank Data Qualification Summary - SDG R0905882

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles - Field Blank Data Qualification Summary - SDG R0905882

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234G2a
SDG #: R0905882
Laboratory: Columbia Analytical Services

Date: 12/24/09
Page: 1 of 1
Reviewer: JM
2nd Reviewer:

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 10/13 - 15/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	% RSD ≤ 20
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 20 %
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	Client spec
VIII.	Laboratory control samples	SW	LCS/D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D = 11, 12
XVII.	Field blanks	SW	EB = 5 FB = FB082809-SO (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: Soil + Water

1	RSAN8-0.5B	S	11	SA141-14B	D	S	+ 21	98879-MB	31		
2	RSAN8-10B		12	SA141009-14B	D		+ 22	98547-	32		
3	RSAN8-20B		13	SA141-24B			23		33		
4	RSAN8-28B		14	SA141-30B			24		34		
5	EB101409-SO1A3	W	15	~~RSAN8-0.5BMS~~			25		35		
6	SA178-0.5B	S	16	~~RSAN8-0.5BMSD~~			26		36		
7	SA178-10B		17				27		37		
8	SA178-17B		18				28		38		
9	SA178-25B		19				29		39		
10	SA178-43B		20				30		40		

VALIDATION FINDINGS WORKSHEET

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

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

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

LDC #: 22234G29
SDG #: Sy Cmpy

VALIDATION FINDINGS WORKSHEET
Blanks

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

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

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

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

Blank extraction date: 10/19/09 **Blank analysis date:** 10/22/09
Conc. units: ug/L Associated Samples: 5 (bl)

Compound	Blank ID	Sample Identification								
	98547-MB	5								
EEE	0.47	0.24 /U								
AAA	0.16	0.11 /U								

Blank extraction date: 10/22/09 **Blank analysis date:** 10/27/09
Conc. units: ug/Kg Associated Samples: All soils (bl)

Compound	Blank ID	Sample Identification								
	98879-MB	2	3	4	6	9	10	13		
XX	55	80/U	95/U	63/U	62/U	55/U	68/U	49/U		

5x Phthalates
2x all others

LDC #: 22234 6 24
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 1 of 1
Reviewer: JV6
2nd Reviewer: [signature]

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

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

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 10/14/09
Field blank type: (circle one) Field Blank / Rinsate / Other: EB Associated Samples: 6-10

Compound	Blank ID	Sample Identification								
	5									
EEE	0.24		(All results either ND or > EB)							
AAA	0.11									
CRQL										

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 8/28/09
Field blank type: (circle one) Field Blank / Rinsate / Other: Associated Samples: All soils (ND)

Compound	Blank ID	Sample Identification								
	FB082809-SO									
LL	0.37									
TTT	0.16									
CRQL										

LDC #: 22234 G29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

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

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

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

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

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		98567 LCS/D	RRR	21 (50-120)	18 (50-120)	( )	5, 98567-MB	J-/UJ/P (L)
			TTT	38 ( )	35 ( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		98879 LCS/D	XX	125 ( )	121 ( )	( )	All soils, 98879-MB	J+dets/P
			TTT	45 ( )	48 ( )	( )		J-/UJ/P
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		

LDC #: 22234 G29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: JV6
2nd reviewer:

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

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

Compound	Concentration (ug/kg)		RPD (Parent only)
	11	12	
AAA	3.9	180 U	176.1 (≤ 180 D) —
SS	7.1 U	11	3.9 (≤ 7.1 D) —

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: October 13, 2009

LDC Report Date: January 1, 2010

Matrix: Soil

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905885

Sample Identification

RSAN8-10BSPLP2
RSAN8-10BSPLP3

Samples in this SDG underwent SPLP extraction

Introduction

This data review covers 2 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.

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
SPLP2-BLK	10/21/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Di-n-butylphthalate	1.3 ug/L 0.13 ug/L 1.3 ug/L	RSAN8-10BSPLP2
SPLP3-BLK	10/21/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Di-n-butylphthalate	1.4 ug/L 0.15 ug/L 0.88 ug/L	RSAN8-10BSPLP3

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	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
RSAN8-10BSPLP2	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Di-n-butylphthalate	1.3 ug/L 0.16 ug/L 1.9 ug/L	1.3U ug/L 0.16U ug/L 1.9U ug/L
RSAN8-10BSPLP3	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Di-n-butylphthalate	1.3 ug/L 0.14 ug/L 2.4 ug/L	1.3U ug/L 0.14U ug/L 2.4U 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
99699LCS/D (All samples in SDG R0905885)	Pyridine	35 (50-120)	24 (50-120)	38 (≤30)	J (all detects) UJ (all non-detects)	P
99699LCS/D (All samples in SDG R0905885)	1,4-Dioxane	30 (50-120)	30 (50-120)	-	J- (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

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 R0905885	All compounds reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

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

XVI. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles - Data Qualification Summary - SDG R0905885

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905885	RSAN8-10BSPLP2 RSAN8-10BSPLP3	Pyridine	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)(RPD) (l,ld)
R0905885	RSAN8-10BSPLP2 RSAN8-10BSPLP3	1,4-Dioxane	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0905885	RSAN8-10BSPLP2 RSAN8-10BSPLP3	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 R0905885

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905885	RSAN8-10BSPLP2	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Di-n-butylphthalate	1.3U ug/L 0.16U ug/L 1.9U ug/L	A	bl
R0905885	RSAN8-10BSPLP3	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Di-n-butylphthalate	1.3U ug/L 0.14U ug/L 2.4U ug/L	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles- Field Blank Data Qualification Summary - SDG R0905885

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234H2a
SDG #: R0905885
Laboratory: Columbia Analytical Services

Date: 12/23/09
Page: 1 of 1
Reviewer: JG
2nd Reviewer:

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 10/13/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	%RSD r²
IV.	Continuing calibration/ICV	A	CCV/ICV < 25%
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	Client Spec.
VIII.	Laboratory control samples	SW	LCS/D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

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

Validated Samples: RSA Soil

1	RAN8-10BSPLP2	11	99699-MB	21		31	
2	RAN8-10BSPLP3	12	SPLP2-Blk	22		32	
3		13	SPLP3-Blk	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-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP. Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TTT.
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	UUU
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	VVV.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	WWW.

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

LDC #: 22234 H29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

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

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

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

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

SPLP **Blank extraction date:** 10/21/09 **Blank analysis date:** 10/28/09 (b1)
Conc. units: ug/L Associated Samples: 1

Compound	Blank ID	Sample Identification								
	SPLP2-Blk	1								
EEE	1.3	1.3/U								
AAA	0.13	0.16/U								
XX	1.3	1.9/U								

SPLP **Blank extraction date:** 10/21/09 **Blank analysis date:** 10/28/09 (b1)
Conc. units: ug/L Associated Samples: 2

Compound	Blank ID	Sample Identification								
	SPLP3-Blk	2								
EEE	1.4	1.3/U								
AAA	0.15	0.14/U								
XX	0.88	2.4/U								

5x Phthalates
2x all others

LDC #: 22234 H2K
SDG #: See Cover

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

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

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

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

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

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		99699 LCS/D	RRR	35 (50-120)	24 (50-120)	38 (30)	All + Blks	J/UJ/P (l,ld)
			TTT	30 (↓)	30 (↓)	( )	↓	J-/UJ/P (l)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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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: October 16 through October 19, 2009

LDC Report Date: January 1, 2010

Matrix: Soil/Water

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905693

Sample Identification

SA142-20.5B
SA142009-20.5B
SA142-30.5B
SA142-51B
EB101909-SO1A3
SA157-10B
SA157-25B
SA157-44B
SA171-5B
SA171-15B
SA171-30B
SA171-41B
SA157-25BMS
SA157-25BMSD

Introduction

This data review covers 13 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
98879-MB	10/22/09	Di-n-butylphthalate	54 ug/Kg	SA142-20.5B SA142009-20.5B SA142-30.5B

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

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
SA142-20.5B	Di-n-butylphthalate	70 ug/Kg	70U ug/Kg
SA142009-20.5B	Di-n-butylphthalate	44 ug/Kg	44U ug/Kg
SA142-30.5B	Di-n-butylphthalate	70 ug/Kg	70U ug/Kg

Sample EB101909-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
EB101909-SO1A3	10/19/09	Bis(2-ethylhexyl)phthalate	0.38 ug/L	SA157-10B SA157-25B SA157-44B SA171-5B SA171-15B SA171-30B SA171-41B

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 R0905963

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. 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
98879-LCS/D (SA142-20.5B SA142009-20.5B SA142-30.5B 98879-MB)	Di-n-butylphthalate	125 (50-120)	121 (50-120)	-	J+ (all detects)	P
98879-LCS/D (SA142-20.5B SA142009-20.5B SA142-30.5B 98879-MB)	1,4-Dioxane	45 (50-120)	48 (50-120)	-	J- (all detects) UJ (all non-detects)	P
98870-LCS/D (All water samples in SDG R0905963)	Pyridine 1,4-Dioxane	27 (50-120) 28 (50-120)	22 (50-120) 32 (50-120)	- -	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

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 R0905693	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 SA142-20.5B and SA142009-20.5B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA142-20.5B	SA142009-20.5B				
Chrysene	2.2	7.1U	-	4.9 (≤7.1)	-	-
Di-n-butyl phthalate	70	44	-	26 (≤180)	-	-

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA142-20.5B	SA142009-20.5B				
Fluoranthene	2.2	1.8	-	0.4 (≤7.1)	-	-
Hexachlorobenzene	36	29	-	7 (≤7.1)	-	-
Phenanthrene	2.9	2.1	-	0.8 (≤7.1)	-	-
Pyrene	1.8	1.8	-	0 (≤7.1)	-	-
Octachlorostyrene	7.5	7.1U	-	0.4 (≤7.1)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles - Data Qualification Summary - SDG R0905693

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905693	SA142-20.5B SA142009-20.5B SA142-30.5B	Di-n-butylphthalate	J+ (all detects)	P	Laboratory control samples (%R) (l)
R0905693	SA142-20.5B SA142009-20.5B SA142-30.5B	1,4-Dioxane	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0905693	EB101909-SO1A3	Pyridine 1,4-Dioxane	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0905693	SA142-20.5B SA142009-20.5B SA142-30.5B SA142-51B EB101909-SO1A3 SA157-10B SA157-25B SA157-44B SA171-5B SA171-15B SA171-30B SA171-41B	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 R0905693

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905693	SA142-20.5B	Di-n-butylphthalate	70U ug/Kg	A	bl
R0905693	SA142009-20.5B	Di-n-butylphthalate	44U ug/Kg	A	bl
R0905693	SA142-30.5B	Di-n-butylphthalate	70U ug/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles- Equipment Blank Data Qualification Summary - SDG R0905693

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles- Field Blank Data Qualification Summary - SDG R0905693

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234I2a
SDG #: R0905963
Laboratory: Columbia Analytical Services

Date: 12/23/09
Page: 1 of 1
Reviewer: JG
2nd Reviewer:

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 10/16 - 19/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	%RSD r
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 25 %
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	LCS/D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D = 1, 2
XVII.	Field blanks	SW	EB = 5 FB = FB082809-SO (CR090484)

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

Validated Samples: Soil + Water

+ 1	SA142-20.5B	D S	- 11	SA171-30B	S	+ 21	1	98879 - MB	31		
+ 2	SA142009-20.5B	D	- 12	SA171-41B		- 22		98946 -	32		
3	1 SA142-30.5B		13	SA157-25BMS		- 23	3	98870 -	33		
4	2 SA142-51B		14	SA157-25BMSD		24			34		
+ 5	3 EB101909-SO1A3	W	15			25			35		
- 6	7 SA157-10B	S	16			26			36		
- 7	SA157-25B		17			27			37		
+ 8	SA157-44B		18			28			38		
+ 9	SA171-5B		19			29			39		
+ 10	SA171-15B		20			30			40		

VALIDATION FINDINGS WORKSHEET

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

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

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

LDC #: 22234 I 2A
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: JV6
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 Was a method blank analyzed for each matrix?
Y N N/A Was a method blank analyzed for each concentration preparation level?
Y N N/A Was a method blank associated with every sample?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 10/22/09 **Blank analysis date:** 10/26/09
Conc. units: ng/kg Associated Samples: 1-3 (6 l)

Compound	Blank ID	Sample Identification								
	98879-MB	1	2	3						
XX	54	70/4	44/4	70/4						

Blank extraction date: _____ **Blank analysis date:** _____
Conc. units: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								

5x Phthalates
2x all others

LDC #: 22234 I 24
SDG #: Sa Cruz

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JM
2nd Reviewer: [illegible]

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

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

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 10/19/07
Field blank type: (circle one) Field Blank / Rinsate / Other: EB Associated Samples: 6 - 12 (ND)

Compound	Blank ID	Sample Identification								
	5									
EEE	0.30									
CRQL										

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 8/28/07
Field blank type: (circle one) Field Blank / Rinsate / Other: Associated Samples: All Soils (ND)

Compound	Blank ID	Sample Identification								
	FB082807-SD									
LL	0.37									
TTT	0.16									
CRQL										

LDC #: 22234 I2A
SDG #: Su Cmar

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: SVC
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.

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

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

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		13/14	RRR	38 (50-150)	47 (50-150)	( )	7	No qual (LCS/D in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

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

LDC #: 22234 I2x
SDG #: Sw Cmw

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

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

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

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

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

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		98879 LCS/D	XX	125 (50-120)	121 (50-120)	( )	1-3, 98879-MB	J+ dets/P (d)
			TTT	45 ( )	48 ( )	( )	↓	J-/UJ/P
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		98870 LCS/D	RRR	27 ( )	22 ( )	( )	5, 98870-MB	J-/UJ/P
			TTT	28 (↓)	32 ( )	( )	↓	↓
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		98946 LCS/D	TTT	( )	49 (↓)	( )	4, 6-12, 98946-MB	Nonal (LCSm)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC#: 22234I2a
SDG#:See cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: QV
2nd Reviewer:

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

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

Compound Name	Conc (ug/Kg)		RPD (≤ 50%)	Diff	Diff Limits	Quals (Parent Only)
	1	2				
Chrysene	2.2	7.1U		4.9	≤7.1	
Di-n-butyl phthalate	70	44		26	≤180	
Fluoranthene	2.2	1.8		0.4	≤7.1	
Hexachlorobenzene	36	29		7	≤7.1	
Phenanthrene	2.9	2.1		0.8	≤7.1	
Pyrene	1.8	1.8		0	≤7.1	
Octachlorostyrene	7.5	7.1U		0.4	≤7.1	

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: October 20, 2009

LDC Report Date: January 1, 2010

Matrix: Soil

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906024

Sample Identification

SA156-0.5B
SA156-10B
SA156-30B
SA156-35B
SA156-45B
SA157-0.5B
SA157009-0.5B

Introduction

This data review covers 7 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.

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

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

V. Blanks

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

Samples FB080309-SO (from SDG R0904279) and sample FB082809-SO (from SDG R0904894) were identified as field blanks. No semivolatile contaminants were found in these blanks with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB080309-SO	8/3/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Diethylphthalate	2.0 ug/L 0.14 ug/L 0.36 ug/L	SA156-0.5B SA156-10B SA156-30B SA156-35B SA156-45B
FB082809-SO	8/28/09	Diethylphthalate 1,4-Dioxane	0.37 ug/L 0.16 ug/L	SA157-0.5B SA157009-0.5B

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

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for SA156-0.5B. Since the sample was diluted out, no data were qualified.

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Although the LCSD percent 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 R0906024	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 SA157-0.5B and SA157009-0.5B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA157-0.5B	SA157009-0.5B				
Chrysene	14U	1.5	-	12.5 (≤14)	-	-
Di-n-butylphthalate	370U	53	-	317 (≤370)	-	-
Hexachlorobenzene	12	14	-	2 (≤14)	-	-
Pyrene	14U	1.5	-	12.5 (≤14)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles - Data Qualification Summary - SDG R0906024

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906024	SA156-0.5B SA156-10B SA156-30B SA156-35B SA156-45B SA157-0.5B SA157009-0.5B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0906024

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles- Field Blank Data Qualification Summary - SDG R0906024

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234J2a
SDG #: R0906024
Laboratory: Columbia Analytical Services

Date: 12/23/09
Page: 1 of 1
Reviewer: JVL
2nd Reviewer: ~~

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 10/20/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	%RSD ✓
IV.	Continuing calibration/ICV	A	CW/ICV ≤ 25%
V.	Blanks	A	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	N	Client Spec
VIII.	Laboratory control samples	SW	LCS/D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	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 = 6,7
XVII.	Field blanks	SW	FB = FB082809-SO (R0904894) FB080309-SO (R0904279)

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

Validated Samples: Soil

1	SA156-0.5B	11	98946-MB	21		31	
2	SA156-10B	12		22		32	
3	SA156-30B	13		23		33	
4	SA156-35B	14		24		34	
5	SA156-45B	15		25		35	
6	SA157-0.5B D	16		26		36	
7	SA157009-0.5B D	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
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TTT. 1,4-Dioxane
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	UUU Octachlorostyrene
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	VVV.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	WWW.

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

COMPNDL

LDC #: 22234 J29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: SVG
2nd Reviewer: [signature]

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

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

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 8/03/09
Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: 1-5

Compound	Blank ID	Sample Identification								
	FB080309-SO									
EEE	2.0	(All results either ND or > FB)								
AAA	0.14									
LL	0.36									
CRQL										

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 8/28/09
Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: 6, 7 (ND)

Compound	Blank ID	Sample Identification								
	FB 082809-SO									
~~EE~~ LL	0.37	~~All~~								
TTT	0.16									
CRQL										

LDC #: 22234J2a
SDG #: See Cover
METHOD: GC/MS BNA (EPA SW 846 Method 8270C)

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

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

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

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

#	Date	Sample ID	Surrogate	%R (Limits)	Qualifications
		1 (20x)	All	DO (45-135)	No qual
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

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

LDC #: 22234 J2a
SDG #: Su Cover

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

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

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

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

[✓ Y] N N/A Was a LCS required?

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

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		98946-LCS/D	TTT	( )	49 (50-120)	( )	All + Blk	No qual (LCS in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 22224 J2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: SVL
2nd reviewer: [signature]

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

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

Compound	Concentration (ug/kg)		RPD
	6	7	
DDD	14 U	1.5	12.5 (≤ 14 D)
XX	370 U	53	317 (≤ 370 D)
SS	12	14	2 (≤ 14 D)
ZZ	14 U	1.5	12.5 ✓

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: October 23 through October 30, 2009

LDC Report Date: December 28, 2009

Matrix: Water

Parameters: Semivolatiles

Validation Level: Stage 4

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906095

Sample Identification

M-141B
M-141009B
PB102309-A3
M-139B
M-145B
M-144B
M-146B
M-138B
M-138009B
M-148B
M-137B
EB103009-GWA4

Introduction

This data review covers 12 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

The following are definitions of the data qualifiers:

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

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

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

B The analytical result may be a false positive totally attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JB The analytical result may be biased high and partially attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JK The analytical result is an estimated maximum possible concentration (EMPC).

X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.

J-TDS The analytical result is estimated based on failure of the Total Dissolved Solids (TDS) correctness check performed in accordance with the Standard Method 1030E.

J-CAB The analytical result is estimated based on failure of the cation-anion balance correctness check performed in accordance with Standard Method 1030E.

J-TDS & CAB The analytical result is unreliable based on the failure of the cation-anion balance and TDS correctness check performed in accordance with standard Method 1030E.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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
99616-MB	11/2/09	Butylbenzylphthalate Di-n-butylphthalate Phenanthrene Fluoranthene	0.18 ug/L 0.82 ug/L 0.15 ug/L 0.050 ug/L	M-144B M-146B M-138B M-138009B M-148B M-137B EB103009-GWA4

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
M-146B	Phenanthrene Fluoranthene	0.25 ug/L 0.057 ug/L	0.25U ug/L 0.057U ug/L
M-138B	Phenanthrene	0.16 ug/L	0.16U ug/L
M-148B	Butylbenzylphthalate Phenanthrene Fluoranthene	0.12 ug/L 0.12 ug/L 0.048 ug/L	0.12U ug/L 0.12U ug/L 0.048U ug/L
M-137B	Butylbenzylphthalate Di-n-butylphthalate	0.21 ug/L 0.97 ug/L	0.21U ug/L 0.97U ug/L
EB103009-GWA4	Butylbenzylphthalate	0.11 ug/L	0.11U ug/L

Sample EB103009-GWA4 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
EB103009-GWA4	10/30/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate	0.25 ug/L 0.11 ug/L	No associated samples in this SDG

Sample FB080409-GW (from SDG R0904290) 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
FB080409-GW	8/4/09	Diethylphthalate	0.22 ug/L	M-144B M-146B

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

Samples PB100209-A2 (from SDG R0905636) and PB102309-A3 were identified as pump blanks. No semivolatile contaminants were found in these blanks 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	M-141B M-141009B M-139B M-145B M-148B
PB100209-A2	10/2/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate	0.37 ug/L 0.22 ug/L	M-144B M-146B

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	Compound	Reported Concentration	Modified Final Concentration
M-141B	Bis(2-ethylhexyl)phthalate	1.4 ug/L	1.4U ug/L
M-141009B	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate	1.5 ug/L 0.11 ug/L	1.5U ug/L 0.11U ug/L
M-139B	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate	1.8 ug/L 0.14 ug/L	1.8U ug/L 0.14U ug/L
M-145B	Bis(2-ethylhexyl)phthalate	1.8 ug/L	1.8U ug/L
M-148B	Butylbenzylphthalate	0.12 ug/L	0.12U ug/L
M-144B	Bis(2-ethylhexyl)phthalate	0.24 ug/L	0.24U ug/L
M-146B	Bis(2-ethylhexyl)phthalate	0.25 ug/L	0.25U ug/L

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) 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
99320-LCS/D (M-141B M-141009B PB102309-A3 M-139B M-145B 99320-MB)	Pyridine	35 (50-120)	24 (50-120)	38 (≤30)	J (all detects) UJ (all non-detects)	P
99320-LCS/D (M-141B M-141009B PB102309-A3 M-139B M-145B 99320-MB)	1,4-Dioxane	30 (50-120)	30 (50-120)	-	J- (all detects) UJ (all non-detects)	P
99616-LCS/D (M-144B M-146B M-138B M-138009B M-148B M-137B EB103009-GWA4 99616-MB)	Pyridine	34 (50-120)	22 (50-120)	40 (≤30)	J (all detects) UJ (all non-detects)	P

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
99616-LCS/D (M-144B M-146B M-138B M-138009B M-148B M-137B EB103009-GWA4 99616-MB)	1,4-Dioxane	41 (50-120)	38 (50-120)	-	J- (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

All target compound identifications were within validation criteria.

XII. Project Quantitation Limit

All project quantitation limits were within validation criteria

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0906095	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

Samples M-141B and M-141009B and samples M-138B and M-138009B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-141B	M-141009B				
Bis(2-ethylhexyl)phthalate	1.4	1.5	-	0.1 (≤4.7)	-	-
1,4-Dioxane	0.36	0.43	-	0.07 (≤1.9)	-	-
Butylbenzylphthalate	4.7U	0.11	-	4.59 (≤4.7)	-	-

Compound	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-138B	M-138009B				
Bis(2-ethylhexyl)phthalate	0.36	0.30	-	0.06 (≤4.9)	-	-
Phenanthrene	0.16	0.19U	-	0.03 (≤0.19)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles - Data Qualification Summary - SDG R0906095

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906095	M-141B M-141009B PB102309-A3 M-139B M-145B M-144B M-146B M-138B M-138009B M-148B M-137B EB103009-GWA4	Pyridine	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)(RPD) (l,ld)
R0906095	M-141B M-141009B PB102309-A3 M-139B M-145B M-144B M-146B M-138B M-138009B M-148B M-137B EB103009-GWA4	1,4-Dioxane	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0906095	M-141B M-141009B PB102309-A3 M-139B M-145B M-144B M-146B M-138B M-138009B M-148B M-137B EB103009-GWA4	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 R0906095

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0906095	M-146B	Phenanthrene Fluoranthene	0.25U ug/L 0.057U ug/L	A	bl
R0906095	M-138B	Phenanthrene	0.16U ug/L	A	bl

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0906095	M-148B	Butylbenzylphthalate Phenanthrene Fluoranthene	0.12U ug/L 0.12U ug/L 0.048U ug/L	A	bl
R0906095	M-137B	Butylbenzylphthalate Di-n-butylphthalate	0.21U ug/L 0.97U ug/L	A	bl
R0906095	EB103009-GWA4	Butylbenzylphthalate	0.11U ug/L	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Equipment Blank Data Qualification Summary - SDG R0906095

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0906095

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Pump Blank Data Qualification Summary - SDG R0906095

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0906095	M-141B	Bis(2-ethylhexyl)phthalate	1.4U ug/L	A	bp
R0906095	M-141009B	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate	1.5U ug/L 0.11U ug/L	A	bp
R0906095	M-139B	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate	1.8U ug/L 0.14U ug/L	A	bp
R0906095	M-145B	Bis(2-ethylhexyl)phthalate	1.8U ug/L	A	bp
R0906095	M-148B	Butylbenzylphthalate	0.12U ug/L	A	bp
R0906095	M-144B	Bis(2-ethylhexyl)phthalate	0.24U ug/L	A	bp
R0906095	M-146B	Bis(2-ethylhexyl)phthalate	0.25U ug/L	A	bp

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 4

LDC #: 22234L2a
SDG #: R0906095
Laboratory: Columbia Analytical Services

Date: 12/28/09
Page: 1 of 1
Reviewer: NG
2nd Reviewer:

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 10/23-30/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	2 RSD rr
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 25 %
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	client spec
VIII.	Laboratory control samples	SW	LCS/D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	A	
XII.	Compound quantitation/CRQLs	A	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	A	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D_1 = 1, r D_2 = 8, 9
XVII.	Field blanks	SW	PB = 3 EB = 1r FB = FB080409-GW (R0904290) PB = PB100209-A2 (from R0905636)

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	M-141B	D1	11	2 M-137B	21	1	99320-MB	31 (522)
2	+ 1	M-141009B	D1	12	+ 2 EB103009-GWA4	22	+ 2	99616-1	32 (717)
3	+ 1	PB102309-A3		13		23			33
4	1	M-139B		14		24			34
5	1	M-145B		15		25			35
6	2	M-144B		16		26			36
7	2	M-146B		17		27			37
8	2	M-138B	D1	18		28			38
9	2	M-138009B	D1	19		29			39
10	2	M-148B		20		30			40

LDC #: I22341 L 2a
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Reviewer: JVG
2nd Reviewer: [signature]

Method: Semivolatiles (EPA SW 846 Method 8270C)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
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 $\geq$ 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) $\leq$ 25% and relative response factors (RRF) $\geq$ 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				
Were all surrogate %R within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?				
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		✓		
Was a MS/MSD analyzed every 20 samples of each matrix?		✓		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			✓	
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			

LDC #: 22234 L2a
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Reviewer: JVL
2nd Reviewer: [signature]

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?			✓	
X. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds from the associated calibration standard?	✓			
XI. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
XII. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Tentatively identified compounds (TICs)				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?			✓	
Were relative intensities of the major ions within ± 20% between the sample and the reference spectra?			✓	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?		✓		
XIV. System performance				
System performance was found to be acceptable.	✓			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XVI. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target compounds were detected in the field duplicates.	✓			
XVII. Field blanks				
Field blanks were identified in this SDG.	✓			
Target compounds were detected in the field blanks.	✓			

VALIDATION FINDINGS WORKSHEET

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

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

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

COMPNDL

LDC #: 22234 L2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

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

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

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

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

Blank extraction date: 11/02/09 **Blank analysis date:** 11/10/09
Conc. units: ug/L Associated Samples: 6 - 12 (bl)

Compound	Blank ID	Sample Identification								
	99616-MB	7	8	10	11	12				
AAA	0.18			0.12/U	0.21/U	0.11/U				
XX	0.82				0.97/U					
UU	0.15	0.25/U	0.16/U	0.12/U						
YY	0.050	0.057/U		0.048/U						

Blank extraction date: _____ **Blank analysis date:** _____
Conc. units: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								

5x Phthalates
2x all others

LDC #: 22234L2a
SDG #: Eu Cor

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JNG
2nd Reviewer: [illegible]

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

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

Blank units: ug/L **Associated sample units:** ug/KG
Sampling date: 10/30/09
Field blank type: (circle one) Field Blank / Rinsate / Other: EB Associated Samples: none

Compound	Blank ID	Sample Identification								
	1Y									
EEE	0.25									
AAA	0.11									
CRQL										

Blank units: ug/L **Associated sample units:** ug/L
Sampling date: 10/23/09
Field blank type: (circle one) Field Blank / Rinsate / Other: PB Associated Samples: 1, 2, 4, 5, 10 (6p)

Compound	Blank ID	Sample Identification								
	3	1	2	4	5	10				
EEE	1.5	1.4/U	1.5/U	1.8/U	1.8/U					
AAA	0.11		0.11/U	0.14/U		0.12/U				
CRQL										

5x Phthalates
2x all others

LDC #: 22234L2c
SDG #: Sediment

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JVG
2nd Reviewer: [illegible]

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

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

Blank units: ug/L **Associated sample units:** ug/L
Sampling date: 10/02/09
Field blank type: (circle one) Field Blank / Rinsate / Other: PB Associated Samples: 6, 7 (bp)

Compound	Blank ID	Sample Identification								
	PB100209-AX	6	7							
EE	0.37	0.24 J	0.25 J							
AA	0.22									
CRQL										

Blank units: ug/L **Associated sample units:** ug/L
Sampling date: 8/04/09
Field blank type: (circle one) Field Blank / Rinsate / Other: Associated Samples: 6, 7 (ND)

Compound	Blank ID	Sample Identification								
	FB080409-GW									
LL	0.22									
CRQL										

5x Phthalates
2x all others

LDC #: 22234 L29
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

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

METHOD: GC/MS BNA (EPA SW 846 Method 8270C)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Was a LCS required?

Y [✓ N] N/A Were the LCS/LCSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		99320-LCS/D	RRR	35 (50-120)	24 (50-120)	38 (30)	1-5, 99320-MB	J/UJ/P (1, ld)
			TTT	30 ( )	30 ( )	( )		J-/UJ/P (1)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		99616-LCS/D	RRR	34 ( )	22 ( )	40 (30)	6-12, 99616-MB	J/UJ/P (1, ld)
			TTT	41 ( )	38 ( )	( )		J-/UJ/P (1)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 22234 L2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: VB
2nd reviewer:

METHOD: GC/MS BNA (EPA SW 846 Method 8270C)

Y N N/A Were field duplicate pairs identified in this SDG?
Y N N/A Were target compounds identified in the field duplicate pairs?

Compound	Concentration (ug/L) 1	2	RPD	Parent only
EEE	1.4	1.5	0.1 (≤ 4.7 D)	-
TTT	0.36	0.43	0.07 (≤ 1.9 D)	-
AAA	4.7U	0.11	4.59 (≤ 4.7 D)	-

Compound	Concentration (ug/L) 8	9	RPD	Parent only
EEE	0.36	0.30	0.06 (≤ 4.9 D)	-
UU	0.16	0.19 U	0.03 (≤ 0.19 D)	-

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

LDC #: 22734L2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JV
2nd Reviewer: [illegible]

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 = $(A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound,
C_x = Concentration of compound,
S = Standard deviation of the RRFs,

A_{is} = Area of associated internal standard
C_{is} = Concentration of internal standard
X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported RRF (10.0 std)	Recalculated RRF (10.0 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL	10/27/09	~~Phenol~~ RRR (1st internal standard)	NR	1.740	1.608	1.608	6.82	6.81
			Naphthalene (2nd internal standard)		1.005	1.096	1.096	5.73	5.73
			Fluorene (3rd internal standard)		1.160	1.137	1.137	4.97	4.97
			~~Pentachlorophenol~~ UU (4th internal standard)		1.119	1.167	1.167	3.71	3.69
			Bis(2-ethylhexyl)phthalate (5th internal standard)		0.943	0.944	0.944	12.68	12.60
			Benzo(a)pyrene (6th internal standard)		1.449	1.282	1.282	10.51	10.51
2	ICAL	10/16/09	~~Phenol~~ RRR (1st internal standard)		1.246	1.151	1.151	14.68	14.59
			Naphthalene (2nd internal standard)		1.036	1.044	1.044	3.38	3.36
			Fluorene (3rd internal standard)		1.297	1.286	1.286	5.32	5.31
			~~Pentachlorophenol~~ UU (4th internal standard)		1.051	1.165	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 (6th internal standard)		1.348	1.243	1.243	7.28	7.28
3			Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Pentachlorophenol (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						

10/27/09 10/16/09

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 results.

	4.0	5.0	10.0	4.0	5.0	10.0
Pyridine	1.659	1.614	1.740	1.147	1.229	1.246
Naptha	1.121	1.078	1.005	1.022	1.063	1.036
Fluorene	1.212	1.156	1.160	1.256	1.348	1.297
Phenan	1.186	1.161	1.119	1.106	1.094	1.051
bis(2-eh)ph	1.044	1.032	0.943	0.829	0.901	0.753
Benzo(a)py	1.361	1.370	1.449	1.290	1.290	1.348

LDC #: 22234 L29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: JVB
2nd Reviewer: [signature]

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
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	AV 869	11/03/09	~~Phenol~~ RRR (1st internal standard)	1.608	1.685	1.685	4.8	4.8
			Naphthalene (2nd internal standard)	1.096	1.132	1.132	3.3	3.2
			Fluorene (3rd internal standard)	1.137	1.160	1.160	2.0	2.0
			~~Pentachlorophenol~~ MM (4th internal standard)	1.167	1.160	1.160	0.6	0.6
			Bis(2-ethylhexyl)phthalate (5th internal standard)	0.944	1.031	1.031	9.2	9.2
			Benzo(a)pyrene (6th internal standard)	1.287	1.290	1.290	0.6	0.6
2	AV 901	11/04/09	~~Phenol~~ CRR (1st internal standard)		1.776	1.776	10.4	10.4
			Naphthalene (2nd internal standard)		1.143	1.143	4.3	4.3
			Fluorene (3rd internal standard)		1.162	1.162	2.2	2.2
			~~Pentachlorophenol~~ MM (4th internal standard)		1.116	1.116	4.4	4.4
			Bis(2-ethylhexyl)phthalate (5th internal standard)		1.021	1.021	8.2	8.2
			Benzo(a)pyrene (6th internal standard)		1.294	1.294	0.9	0.9
3	AV 929	11/05/09	~~Phenol~~ RRR (1st internal standard)		1.833	1.833	14.0	14.0
			Naphthalene (2nd internal standard)		1.154	1.154	5.3	5.3
			Fluorene (3rd internal standard)		1.150	1.150	1.1	1.1
			~~Pentachlorophenol~~ MM (4th internal standard)		1.124	1.124	3.7	3.7
			Bis(2-ethylhexyl)phthalate (5th internal standard)		1.031	1.031	9.2	9.2
			Benzo(a)pyrene (6th internal standard)	✓	1.303	1.303	1.6	1.6

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 #:_____
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: JVG
2nd Reviewer: [illegible]

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
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	DC 296	11/10/09	~~Phenol~~ RRR (1st internal standard)	1.151	1.162	1.162	1.0	1.0
			Naphthalene (2nd internal standard)	1.044	1.104	1.104	5.7	5.6
			Fluorene (3rd internal standard)	1.286	1.337	1.337	4.0	4.0
			~~Pentachlorophenol~~ NN (4th internal standard)	1.105	1.133	1.133	2.5	2.5
			Bis(2-ethylhexyl)phthalate (5th internal standard)	0.787	0.772	0.772	1.9	1.9
			Benzo(a)pyrene (6th internal standard)	1.293	1.298	1.298	4.4	4.4
2	DC 325	11/11/09	~~Phenol~~ RRR (1st internal standard)		1.137	1.137	1.2	1.2
			Naphthalene (2nd internal standard)		1.050	1.050	0.6	0.6
			Fluorene (3rd internal standard)		1.297	1.297	0.9	0.9
			~~Pentachlorophenol~~ NN (4th internal standard)		1.107	1.107	0.2	0.2
			Bis(2-ethylhexyl)phthalate (5th internal standard)		0.795	0.795	1.0	1.0
			Benzo(a)pyrene (6th internal standard)		1.319	1.319	6.1	6.1
3			Phenol (1st internal standard)					
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22794L2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Page: 1 of 1
Reviewer: JVB
2nd reviewer:

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270C)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: # 1

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	2.00	1.80	90	90	0
2-Fluorobiphenyl	↓	1.48	74	74	↓
Terphenyl-d14	↓	1.74	87	87	↓
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

LDC #: 22234 L2g
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Reviewer: JV6
2nd Reviewer:

METHOD: GC/MS BNA (EPA SW 846 Method 8270C)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SC/SA Where: SSC = Spike concentration
SA = Spike added

RPD = | LCSC - LCSDC | * 2/(LCSC + LCSDC) LCSC = Laboratory control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS/LCSD samples: 99320 LCS

Compound	Spike Added (ug/L)		Spike Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene	4.0	4.0	3.06	2.97	77	77	74	74	3	3
Pentachlorophenol										
Pyrene	4.0	4.0	4.35	4.14	109	109	104	104	5	5

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 #: 22234L2a
SDG #: Sa Lmar

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: SVG
2nd reviewer:

METHOD: GC/MS BNA (EPA SW 846 Method 8270C)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$

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_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

V_i = Volume of extract injected in microliters (ul)

V_t = Volume of the concentrated extract in microliters (ul)

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

2.0 = Factor of 2 to account for GPC cleanup

Example:

Sample I.D. #1 . EEE

Conc. = $\frac{(568079)(1.00)(1.0\ ml)(\quad)(\quad)(\quad)}{(402697)(0.944)(1060)(\quad)(\quad)(\quad)}$

= 1.4 ug/L

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 26 through October 27, 2009

LDC Report Date: January 15, 2010

Matrix: Soil/Water

Parameters: Semivolatiles

Validation Level: Stage 4

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906123

Sample Identification

SA34-0.5B
SA34-10B
SA34-20B
SA34-31B
SA34-34B
EB102709-SO1A3
RSAP7-0.5B
RSAP7-14B
RSAP7-25B
RSAP7-41B
RSAQ7-0.5B
RSAQ7-10B
RSAQ7-38B
RSAP7-0.5BMS
RSAP7-0.5BMSD
RSAQ7-38BMS
RSAQ7-38BMSD

Introduction

This data review covers 16 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.

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
11/9/09	Di-n-octylphthalate	25.6	RSAP7-0.5B RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-38B RSAP7-0.5BMS RSAP7-0.5BMSD RSAQ7-38BMS RSAQ7-38BMSD	J+ (all detects)	A
11/11/09	1,4-Dioxane	27.6	RSAQ7-10B 99725-MB	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
99309-MB	10/28/09	Butylbenzylphthalate	6.7 ug/Kg	SA34-0.5B SA34-10B SA34-20B SA34-31B SA34-34B
99616-MB	11/2/09	Butylbenzylphthalate Di-n-butylphthalate Fluoranthene Phenanthrene	0.18 ug/L 0.82 ug/L 0.50 ug/L 0.15 ug/L	All water samples in SDG R0906123
99725-MB	11/3/09	Butylbenzylphthalate Di-n-octylphthalate	3.0 ug/Kg 15 ug/Kg	RSAP7-0.5B RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-10B RSAQ7-38B

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
SA34-10B	Butylbenzylphthalate	3.3 ug/Kg	3.3U ug/Kg
SA34-20B	Butylbenzylphthalate	12 ug/Kg	12U ug/Kg
SA34-31B	Butylbenzylphthalate	5.2 ug/Kg	5.2U ug/Kg
EB102709-SO1A3	Butylbenzylphthalate	0.16 ug/L	0.16U ug/L
RSAP7-0.5B	Butylbenzylphthalate	3.3 ug/Kg	3.3U ug/Kg
RSAP7-14B	Butylbenzylphthalate	3.7 ug/Kg	3.7U ug/Kg
RSAP7-25B	Butylbenzylphthalate	3.2 ug/Kg	3.2U ug/Kg
RSAP7-41B	Butylbenzylphthalate	4.7 ug/Kg	4.7U ug/Kg
RSAQ7-0.5B	Butylbenzylphthalate	3.6 ug/Kg	3.6U ug/Kg

Sample EB102709-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
EB102709-SO1A3	10/27/09	Butylbenzylphthalate	0.16 ug/L	RSAP7-0.5B RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-10B RSAQ7-38B

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 R0906123

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 MSD percent recovery (%R) and MS/MSD relative percent difference (RPD) were not within QC limits for some compounds, the MS or 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
99309-LCS/D (SA34-0.5B SA34-10B SA34-20B SA34-31B SA34-34B 99309-MB)	1,4-Dioxane	39 (50-120)	42 (50-120)	-	J- (all detects) UJ (all non-detects)	P
99616-LCS/D (All water samples in SDG R0906123)	Pyridine	34 (50-120)	22 (50-120)	40 (≤30)	J (all detects) UJ (all non-detects)	P
99616-LCS/D (All water samples in SDG R0906123)	1,4-Dioxane	41 (50-120)	38 (50-120)	-	J- (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

All internal standard areas and retention times were within QC limits.

XI. Target Compound Identifications

All target compound identifications were within validation criteria.

XII. Project Quantitation Limit

All project quantitation limits were within validation criteria.

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0906123	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 R0906123

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906123	RSAP7-0.5B RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-38B	Di-n-octylphthalate	J+ (all detects)	A	Continuing calibration (%D) (c)
R0906123	RSAQ7-10B	1,4-Dioxane	J+ (all detects)	A	Continuing calibration (%D) (c)
R0906123	SA34-0.5B SA34-10B SA34-20B SA34-31B SA34-34B EB102709-SO1A3	1,4-Dioxane	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0906123	EB102709-SO1A3	Pyridine	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)(RPD) (l,ld)
R0906123	SA34-0.5B SA34-10B SA34-20B SA34-31B SA34-34B EB102709-SO1A3 RSAP7-0.5B RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-10B RSAQ7-38B	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 R0906123

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0906123	SA34-10B	Butylbenzylphthalate	3.3U ug/Kg	A	bl
R0906123	SA34-20B	Butylbenzylphthalate	12U ug/Kg	A	bl
R0906123	SA34-31B	Butylbenzylphthalate	5.2U ug/Kg	A	bl
R0906123	EB102709-SO1A3	Butylbenzylphthalate	0.16U ug/L	A	bl

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0906123	RSAP7-0.5B	Butylbenzylphthalate	3.3U ug/Kg	A	bl
R0906123	RSAP7-14B	Butylbenzylphthalate	3.7U ug/Kg	A	bl
R0906123	RSAP7-25B	Butylbenzylphthalate	3.2U ug/Kg	A	bl
R0906123	RSAP7-41B	Butylbenzylphthalate	4.7U ug/Kg	A	bl
R0906123	RSAQ7-0.5B	Butylbenzylphthalate	3.6U ug/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles- Equipment Blank Data Qualification Summary - SDG R0906123

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Semivolatiles- Field Blank Data Qualification Summary - SDG R0906123

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 4

LDC #: 22234M2a
SDG #: R0906123
Laboratory: Columbia Analytical Services

Date: 1/13/10
Page: 1 of 1
Reviewer: JVC
2nd Reviewer: [signature]

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270C)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 10/26 - 27/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	% RSD rr
IV.	Continuing calibration/ICV	SW	CCV/ICV ≤ 25%
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	LCS/D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	A	
XII.	Compound quantitation/CRQLs	A	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	A	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	SW	EB = 6 FB = FB082809-SO (R0904899)

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Soil + Water

1	1	SA34-0.5B	S	11	3	RSAQ7-0.5B	S	21	1	99309-MB	31	
2	1	SA34-10B		12	3	RSAQ7-10B		22	1	99616 -	32	
3	1	SA34-20B		13	3	RSAQ7-38B		23	3	99725 -	33	
4	1	SA34-31B		14	3	RSAP7-0.5BMS		24			34	
5	1	SA34-34B		15	3	RSAP7-0.5BMSD		25			35	
6	1	EB102709-SO1A3	W	16	3	RSAQ7-38BMS		26			36	
7	3	RSAP7-0.5B	S	17	3	RSAQ7-38BMSD		27			37	
8	3	RSAP7-14B		18				28			38	
9	3	RSAP7-25B		19				29			39	
10	3	RSAP7-41B		20				30			40	

LDC #: 22234 M 29
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: JVb
2nd Reviewer: [illegible]

Method: Semivolatiles (EPA SW 846 Method 8270C)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	✓			
Were all samples analyzed within the 12 hour clock criteria?	✓			
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) ≤ 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 for each matrix and concentration?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	✓			
VI. Surrogate spikes				
Were all surrogate %R within QC limits?	✓			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			✓	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		✓		
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			

LDC #: 22234 M2q
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Reviewer: MO
2nd Reviewer: VV

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?			✓	
X. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds from the associated calibration standard?	✓			
XI. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?	✓			
XII. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIII. Tentatively identified compounds (TICs)				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?			✓	
Were relative intensities of the major ions within ± 20% between the sample and the reference spectra?			✓	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?		✓		
XIV. System performance				
System performance was found to be acceptable.	✓			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
XVI. Field duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target compounds were detected in the field duplicates.			✓	
XVII. Field blanks				
Field blanks were identified in this SDG.	✓			
Target compounds were detected in the field blanks.	✓			

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

A. Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene**	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene**	T. 4-Chloroaniline	II. 4-Nitrophenol*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP. Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TTT. 1,4-Dioxane
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	UUU Octachlorostyrene
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	VVV.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	WWW.

Notes:* = System performance check compound (SPCC) for RRF; ** = Calibration check compound (CCC) for %RSD.

LDC #: 22234 M2G

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: VG
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 Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis for each instrument?

Y N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?

Y N N/A Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤25.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	11/09/09	AV995	FFF (+)	25.6		7-11, 13-17	J+ dets/A (c)
	11/11/09	AW048	TTT (+)	27.6		12, 99725-MB	J+ J+

CONCAL.2S

LDC #: 22234 MRA
SDG #: Eu Cone

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 2
Reviewer: JVR
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270C)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was a method blank analyzed for each matrix?
Y N N/A Was a method blank analyzed for each concentration preparation level?
Y N N/A Was a method blank associated with every sample?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 10/28/09 **Blank analysis date:** 11/06/09 (bf)
Conc. units: ug/kg Associated Samples: 1-5

Compound	Blank ID	Sample Identification								
	99309-MB	2	3	4						
AAA	6.7	3.3/U	12/U	5.2/U						

Blank extraction date: 11/03/09 **Blank analysis date:** 11/10/09 (bf)
Conc. units: ug/L Associated Samples: 6

Compound	Blank ID	Sample Identification								
	99616-MB	6								
AAA	0.18	0.16/U								
XX	0.82									
YY	0.50									
UU	0.15									

5x Phthalates
2x all others

LDC #: 22234 M2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: JVC
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 Was a method blank analyzed for each matrix?
Y N N/A Was a method blank analyzed for each concentration preparation level?
Y N N/A Was a method blank associated with every sample?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 11/03/09 **Blank analysis date:** 11/11/09
Conc. units: ug/Kg Associated Samples: 7-13 (bl)

Compound	Blank ID	Sample Identification								
	99725-MB	7	8	9	10	11				
AAA	3.0	3.3/4	3.7/4	3.2/4	4.7/4	3.6/4				
FFF	15									

Blank extraction date: _____ **Blank analysis date:** _____
Conc. units: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								

5x Phthalates
2x all others

LDC #: 22234 M2G
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JVG
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Y N N/A Were field blanks identified in this SDG?
Y N N/A Were target compounds detected in the field blanks?

Blank units: ug/L **Associated sample units:** ug/Kg
Sampling date: 10/27/09
Field blank type: (circle one) Field Blank / Rinsate / Other: EB Associated Samples: 7-13

Compound	Blank ID	Sample Identification								
	6									
0.8 AAA	0.16	(All results either ND or > EB)								
CRQL										

Blank units: ug/L **Associated sample units:** ug/Kg
Sampling date: 8/28/09
Field blank type: (circle one) Field Blank / Rinsate / Other: Associated Samples: All soils (ND)

Compound	Blank ID	Sample Identification								
	FB082809-SO									
LL	0.37									
TTT	0.16									
CRQL										

LDC #: 22234M29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: AV6
2nd Reviewer:

METHOD: GC/MS BNA (EPA SW 846 Method 8270)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

Y N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y N N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		14/15	XX	( )	45 (50-150)	( )	7	No qual (MS in)
				( )	( )	( )		
				( )	( )	( )		
		16/17	XX	( )	( )	31 (30)	13	No qual (MS/MSD in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG.	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC #: 22234 M2g
SDG #: Sec Cmrg

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: GC/MS BNA (EPA SW 846 Method 8270C)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y (N) N/A Was a LCS required?
Y (N) N/A Were the LCS/LCSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		99309-LCS/D	TTT	39 (50-120)	92 (50-120)	( )	1-5, 99309-MB	J-/NJ/P (L)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		99725-LCS/D	TTT	( )	98 (50-120)	( )	7-13, 99725-MB	No qual (LCSin)
				( )	( )	( )		
				( )	( )	( )		
		99616-LCS/D	RRR	34 (50-120)	22 (50-120)	40 (30)	6, 99616-MB	J/NJ/P (L, Ld)
			TTT	41 ( )	38 ( )	( )		J-/NJ/P (L)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 22234 M 29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG
2nd Reviewer: [illegible]

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 = $(A_x)(C_{is})/(A_{is})(C_x)$
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard
S = Standard deviation of the RRFs, X = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported RRF (10.0 std)	Recalculated RRF (10.0 std)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported %RSD	Recalculated %RSD
1	ICAL	10/27/09	~~Phenol~~ RRR (1st internal standard)	MR	1.740	1.608	1.608	6.82	6.81
			Naphthalene (2nd internal standard)		1.005	1.096	1.096	5.73	5.73
	5973-C		Fluorene (3rd internal standard)		1.166	1.137	1.137	4.97	4.97
			~~Pentachlorophenol~~ UU (4th internal standard)		1.119	1.167	1.167	3.71	3.69
			Bis(2-ethylhexyl)phthalate (5th internal standard)		0.943	0.944	0.944	12.68	12.60
			~~Benzo(a)pyrene~~ (6th internal standard)		1.449	1.282	1.282	10.51	10.51
2	ICAL	10/16/09	~~Phenol~~ RRR (1st internal standard)		1.246	1.151	1.151	14.60	14.59
			Naphthalene (2nd internal standard)		1.036	1.044	1.044	3.38	3.36
	5973-B		Fluorene (3rd internal standard)		1.297	1.286	1.286	5.32	5.31
			~~Pentachlorophenol~~ UU (4th internal standard)		1.051	1.165	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~~ (6th internal standard)	↓	1.340	1.293	1.293	7.28	7.28
3			Phenol (1st internal standard)						
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Pentachlorophenol (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						

10/27/09 10/16/09

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 results.

	4.0	5.0	10.0	4.0	5.0	10.0
Pyridine	1.659	1.614	1.740	1.147	1.229	1.246
Naptha	1.121	1.078	1.005	1.022	1.063	1.036
Fluorene	1.212	1.156	1.160	1.256	1.348	1.297
Phenan	1.186	1.161	1.119	1.106	1.094	1.051
Bis(2-eh)ph	1.044	1.032	0.943	0.829	0.901	0.753
Benzo(a)py	1.361	1.370	1.449	1.290	1.290	1.348

LDC #: 22234 #29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 2
Reviewer: MP
2nd Reviewer:

METHOD: GC/MS BNA (EPA SW 846 Method 8270C)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	AV964	11/06/09	~~Phenol~~ RRR (1st internal standard)	1.608	1.869	1.869	16.2	16.2
			Naphthalene (2nd internal standard)	1.096	1.130	1.130	3.1	3.1
			Fluorene (3rd internal standard)	1.157	1.215	1.215	6.9	6.9
			~~Pentachlorophenol~~ NN (4th internal standard)	1.167	1.140	1.140	2.3	2.3
			Bis(2-ethylhexyl)phthalate (5th internal standard)	0.944	1.040	1.040	10.2	10.2
			Benzo(a)pyrene (6th internal standard)	1.287	1.268	1.268	1.6	1.1
2	AV965	11/09/09	~~Phenol~~ RRR (1st internal standard)		1.877	1.877	16.7	16.7
			Naphthalene (2nd internal standard)		1.124	1.124	2.6	2.5
			Fluorene (3rd internal standard)		1.231	1.231	8.3	8.3
			~~Pentachlorophenol~~ NN (4th internal standard)		1.157	1.157	0.9	0.8
			Bis(2-ethylhexyl)phthalate (5th internal standard)		1.052	1.052	11.4	11.4
			Benzo(a)pyrene (6th internal standard)		1.301	1.301	1.5	1.5
3	DC 296	11/10/09	~~Phenol~~ RRR (1st internal standard)	1.151	1.162	1.162	1.0	1.0
			Naphthalene (2nd internal standard)	1.044	1.104	1.104	5.7	5.7
			Fluorene (3rd internal standard)	1.286	1.337	1.337	4.0	4.0
			~~Pentachlorophenol~~ NN (4th internal standard)	1.105	1.133	1.133	2.5	2.5
			Bis(2-ethylhexyl)phthalate (5th internal standard)	0.787	0.772	0.772	1.9	1.9
			Benzo(a)pyrene (6th internal standard)	1.243	1.298	1.298	4.4	4.4

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.

LDC #: 22234 M 2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: JVG
2nd Reviewer:

METHOD: GC/MS BNA (EPA SW 846 Method 8270C)

The percent difference (%D) of the initial calibration average Relative Response Factors (RRFs) and the continuing calibration RRFs were recalculated for the compounds identified below using the following calculation:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF
RRF = $(A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	AW 048	11/11/09	~~Phenol~~ RRR (1st internal standard)	1.608	1.857	1.857	15.5	15.5
			Naphthalene (2nd internal standard)	1.096	1.135	1.135	3.6	3.6
			Fluorene (3rd internal standard)	1.137	1.199	1.199	5.5	5.5
			~~Pentachlorophenol~~ NH (4th internal standard)	1.167	1.136	1.136	2.7	2.7
			Bis(2-ethylhexyl)phthalate (5th internal standard)	0.944	1.107	1.107	17.3	17.3
			Benzo(a)pyrene (6th internal standard)	1.282	1.309	1.309	2.1	2.1
2			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)					
3			Phenol (1st internal standard)					
			Naphthalene (2nd internal standard)					
			Fluorene (3rd internal standard)					
			Pentachlorophenol (4th internal standard)					
			Bis(2-ethylhexyl)phthalate (5th internal standard)					
			Benzo(a)pyrene (6th internal standard)					

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22234 M29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: JM
2nd reviewer: [signature]

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270C)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: #1

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	2.00	1.82	91	91	0
2-Fluorobiphenyl		1.55	78	78	
Terphenyl-d14		1.81	91	91	
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID: _____

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5					
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

LDC #: 22234 MSq
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: JVG
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270C)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SSC - SC)/SA Where: SSC = Spiked sample concentration; SA = Spike added; SC = Sample concentation

RPD = | MSC - MSC | * 2/(MSC + MSDC) MSC = Matrix spike concentration MSDC = Matrix spike duplicate concentration

MS/MSD samples: 14/15

Compound	Spike Added (ug/kg)		Sample Concentration (ug/kg)	Spiked Sample Concentration (ug/kg)		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	0	MS	MSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol											
N-Nitroso-di-n-propylamine											
4-Chloro-3-methylphenol											
Acenaphthene	145	145	0	127	125	87	87.5	86	86	1	1
Pentachlorophenol											
Pyrene	145	145	0	154	153	106	106	106	106	1	1

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22234 M2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Page: 1 of 1
Reviewer: MC
2nd Reviewer: L

METHOD: GC/MS BNA (EPA SW 846 Method 8270C)

The percent recoveries (%R) and Relative Percent Difference (RPD) of the laboratory control sample and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SC/SA Where: SSC = Spike concentration
SA = Spike added

RPD = I LCSC - LCSDC I * 2/(LCSC + LCSDC) LCSC = Laboraotry control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS/LCSD samples: 99616 - LCS/D

Compound	Spike Added (ug/L)		Spike Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol	4.									
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene	4.0	4.0	3.23	2.88	81	81	72	72	11	11
Pentachlorophenol										
Pyrene	4.0	4.0	3.92	3.45	86	86	86	86	1	1

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 #: 22234 M29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: JM
2nd reviewer: [signature]

METHOD: GC/MS BNA (EPA SW 846 Method 8270C)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $\frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$

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_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).

V_i = Volume of extract injected in microliters (ul)

V_t = Volume of the concentrated extract in microliters (ul)

Df = Dilution Factor.

%S = Percent solids, applicable to soil and solid matrices only.

2.0 = Factor of 2 to account for GPC cleanup

Example:

Sample I.D. #2, XX:

Conc. = $\frac{(650637)(1.0)(1.0\,ml)(1000)(\quad)}{(323716)(1.825)(30.0\,g)(0.921)(\quad)}$

= 39.86

≈ 40 ug/kg

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Data Validation Reports
LDC #22234

Chlorinated Pesticides

LDC

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: August 5, 2009

LDC Report Date: January 1, 2010

Matrix: Soil

Parameters: Chlorinated Pesticides

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0904329

Sample Identification

RSAU5-0.5B
RSAU5-10B
RSAU5-25B
RSAU5-40B
RSAU5-40BRE
RSAU5-50B
RSAU5-55B

Introduction

This data review covers 7 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
RSAU5-40BRE	All TCL compounds	23	14	J- (all detects) UJ (all non-detects)	A

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/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.

Samples FB080309-SO and FB080309-SORE (both from SDG R0904279) were identified as field blanks. No chlorinated pesticide contaminants were found in these blanks.

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
RSAU5-40B	Not specified	Tetrachloro-m-xylene	15 (40-140)	All TCL compounds	J- (all detects) UJ (all non-detects)	A

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 R0904329	All compounds reported below the PQL.	J (all detects)	A

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
RSAU5-40BRE	All TCL compounds	X	A

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 R0904329

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0904329	RSAU5-40BRE	All TCL compounds	J- (all detects) UJ (all non-detects)	A	Technical holding times (h)
R0904329	RSAU5-40B	All TCL compounds	J- (all detects) UJ (all non-detects)	A	Surrogate spikes (%R) (s)
R0904329	RSAU5-0.5B RSAU5-10B RSAU5-25B RSAU5-40B RSAU5-40BRE RSAU5-50B RSAU5-55B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0904329	RSAU5-40BRE	All TCL compounds	X	A	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Laboratory Blank Data Qualification Summary - SDG R0904329

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Field Blank Data Qualification Summary - SDG R0904329

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234A3a
SDG #: R0904329
Laboratory: Columbia Analytical Services

Date: 12/26/09
Page: 1 of 1
Reviewer: JM
2nd Reviewer: [signature]

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: 8/05/09
II.	GC/ECD Instrument Performance Check	A	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 20 %
V.	Blanks	A	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	N	client spec
VIII.	Laboratory control samples	A	LCS/D
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	SW	
XIV.	Field duplicates	N	
XV.	Field blanks	ND	FB = FB080309-SO (CR0904279) FB080309-SORE ↓

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: Soil

1	RSAU5-0.5B	11	93549-MB	21		31	
2	RSAU5-10B	12 ✓	94803- ↓	22		32	
3	RSAU5-25B	13		23		33	
4	RSAU5-40B	14		24		34	
5 ✓	RSAU5-40BRE	15		25		35	
6	RSAU5-50B	16		26		36	
7	RSAU5-55B	17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 22234 A31
SDG #: Ref Cmel

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Page: 1 of 1
Reviewer: JV6
2nd Reviewer: L

All circled dates have exceeded the technical holding times.
(Y) N N/A Were all cooler temperatures within validation criteria?

METHOD : GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier	
5	S	N	8/05/09	8/28/09	9/01/09	23	J-/UJ/A	(h)

TECHNICAL HOLDING TIME CRITERIA

Water: Extracted within 7 days, analyzed within 40 days.
Soil: Extracted within 14 days, analyzed within 40 days.

LDC #: 22734 A39
SDG #: Lab Core

VALIDATION FINDINGS WORKSHEET
Surrogate Spikes

Reviewer: JV6
2nd Reviewer: [illegible]

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".

Y (N) N/A Were surrogates spiked into all samples, standards and blanks?
Y (N) N/A Did all surrogate percent recoveries (%R) meet the QC limits?

#	Date	Sample ID	Column	Surrogate Compound	%R (Limits)	Qualifications
		4	NS	A	15 (40-140)	J-/UJ/A (S)
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	

Letter Designation	Surrogate Compound	Recovery QC Limits (Soil)	Recovery QC Limits (Water)	Comments
A	Tetrachoro-m-xylene			
B	Decachlorobiphenyl			

LDC #: 22234 A39
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: JW
2nd 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.

Y N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		5	outside H.T.		X / A (0)

Comments:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: September 24 through September 25, 2009

LDC Report Date: December 29, 2009

Matrix: Water

Parameters: Chlorinated Pesticides

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905462

Sample Identification

M-89B
M-2AB
M-2009AB
M-89BMS
M-89BMSD

Introduction

This data review covers 5 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 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 FB080409-GW (from SDG R0904290) was identified as a field blank. No chlorinated pesticide contaminants were found in this blank.

Samples PB100209-A2 and PB100209-A2RE (both from SDG R0905636) were identified as pump blanks. No chlorinated pesticide contaminants were found in these blanks.

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 R0905462	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

Samples M-2AB and M-2009AB 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 R0905462

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905462	M-89B M-2AB M-2009AB	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 R0905462

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Field Blank Data Qualification Summary - SDG R0905462

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Pump Blank Data Qualification Summary - SDG R0905462

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234B3a
SDG #: R0905462
Laboratory: Columbia Analytical Services

Date: 10/23/09
Page: 1 of 1
Reviewer: VV
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
I.	Technical holding times	A	Sampling dates: 9/24-25/09
II.	GC/ECD Instrument Performance Check	A	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 20%
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS/D
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	ND	D = 2,3
XV.	Field blanks	ND	FB = FB080409-GW (R0904290) PB= PB100709-A2 (R0905636)

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

ND = No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank RE
EB = Equipment blank

Validated Samples: Water

1	M-89B	11	97131-MB	21		31	
2	M-2AB	12		22		32	
3	M-2009AB	13		23		33	
4	M-89BMS	14		24		34	
5	M-89BMSD	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: October 2 through October 7, 2009

LDC Report Date: December 30, 2009

Matrix: Water

Parameters: Chlorinated Pesticides

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905636

Sample Identification

PB100209-A2
PB100209-A2RE
M-76B
M-76009B
MC-94B
MC-94BDL

Introduction

This data review covers 6 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 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
PB100209-A2RE	All TCL compounds	11	7	J- (all detects) UJ (all non-detects)	A

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/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 FB080409-GW (from SDG R0904290) was identified as a field blank. No chlorinated pesticide contaminants were found in this blank.

Samples PB100209-A2 and PB100209-A2RE were identified as pump blanks. No chlorinated pesticide contaminants were found in these blanks.

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
PB100209-A2	Not specified	Decachlorobiphenyl	39 (40-140)	All TCL compounds	J- (all detects) UJ (all non-detects)	A

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 project quantitation limits were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
MC-94B	beta-BHC	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	A

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0905636	All compounds reported below the PQL.	J (all detects)	A

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
PB100209-A2RE	All TCL compounds	X	A
MC-94B	beta-BHC	X	A
MC-94BDL	All TCL compounds except beta-BHC	X	A

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples M-76B and M-76009B 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 R0905636

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905636	PB100209-A2RE	All TCL compounds	J- (all detects) UJ (all non-detects)	A	Technical holding times (h)
R0905636	PB100209-A2	All TCL compounds	J- (all detects) UJ (all non-detects)	A	Surrogate spikes (%R) (s)
R0905636	MC-94B	beta-BHC	J (all detects)	A	Project Quantitation Limit (e)
R0905636	PB100209-A2 PB100209-A2RE M-76B M-76009B MC-94B MC-94BDL	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0905636	PB100209-A2RE	All TCL compounds	X	A	Overall assessment of data (o)
R0905636	MC-94B	beta-BHC	X	A	Overall assessment of data (o)
R0905636	MC-94BDL	All TCL compounds except beta-BHC	X	A	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Laboratory Blank Data Qualification Summary - SDG R0905636

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Field Blank Data Qualification Summary - SDG R0905636

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Pump Blank Data Qualification Summary - SDG R0905636

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234C3a
SDG #: R0905636
Laboratory: Columbia Analytical Services

Date: 12/23/09
Page: 1 of 1
Reviewer: JVG
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
I.	Technical holding times	SW	Sampling dates: 10/12-09/19
II.	GC/ECD Instrument Performance Check	A	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 20 %
V.	Blanks	A	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	N	Client Spec
VIII.	Laboratory control samples	A	LCS/D
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	SW	
XIII.	Overall assessment of data	SW	
XIV.	Field duplicates	ND	D = 3, 4
XV.	Field blanks	ND	PB = 1, 2 FB = FB080409-GW (R0904290)

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	PB100209-A2	11	97635-MD	21		31	
2	PB100209-A2RE	12	98167-1	22		32	
3	M-76B	13		23		33	
4	M-76009B	14		24		34	
5	MC-94B	15		25		35	
6	MC-94BDL	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. Aroclor-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	II.
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ.
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. DB 608	KK.
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	LL.
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE. Hexachlorobenzene	MM.
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF.	NN.

Notes:_____

LDC #: 22334C3a
SDG #: Eu Conv

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Page: 1 of 1
Reviewer: JVG
2nd Reviewer: [signature]

All circled dates have exceeded the technical holding times.
(Y) N N/A Were all cooler temperatures within validation criteria?

METHOD : GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
2	W	N	10/02/09	10/13/09	10/28/09	11	J-/UJA (h)

TECHNICAL HOLDING TIME CRITERIA

Water: Extracted within 7 days, analyzed within 40 days.
Soil: Extracted within 14 days, analyzed within 40 days.

LDC #: 22234C31
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Spikes

Page: 1 of 1
Reviewer: DVS
2nd Reviewer:

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".

Y N N/A Were surrogates spiked into all samples, standards and blanks?
Y N N/A Did all surrogate percent recoveries (%R) meet the QC limits?

#	Date	Sample ID	Column	Surrogate Compound	%R (Limits)	Qualifications
		1	NS	B	39 (40-140)	J- (NJ/A) (S)
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	

Letter Designation	Surrogate Compound	Recovery QC Limits (Soil)	Recovery QC Limits (Water)	Comments
A	Tetrachoro-m-xylene			
B	Decachlorobiphenyl			

LDC #: 22234C3a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Reviewer: VV
2nd Reviewer: [signature]

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".

Level IV/D Only

Y N N/A Were CRQLs adjusted for sample dilutions, dry weight factors, etc.?

Y N N/A Did the reported results for detected target compounds agree within 10.0% of the recalculated results?

#	Compound Name	Finding	Associated Samples	Qualifications
	B	7 cal range	5	J dets/A (e)

Comments: See sample calculation verification worksheet for recalculations

LDC #: 22234C3a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: JVG
2nd 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.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		2	out side H.T.		X /A (o)
		5	B > cal range		
		6	All except B dil		

Comments: _____

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 6, 2009

LDC Report Date: January 1, 2010

Matrix: Soil/Water

Parameters: Chlorinated Pesticides

Validation Level: Stage 4

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905693

Sample Identification

EB100609-SO1A4
SA138-0.5B
SA138-10B
SA138009-10B
SA138009-10BRE
SA138-30B
SA138-30BRE
SA138-45B
SA103-0.5B
SA103-10B
SA103009-10B
SA103-25B
SA103-35B
RSAR5-0.5B
RSAR5-10B
RSAR5-25B
RSAR5-40B
RSAS5-0.5B
RSAS5-10B
RSAS5-25B
RSAS5-36B
RSAS5009-36B
RSAR5-40BMS
RSAR5-40BMSD

Introduction

This data review covers 23 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 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 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
SA138009-10BRE SA138-30BRE	All TCL compounds	27	14	J- (all detects) UJ (all non-detects)	A

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/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 with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Flag	A or P
11/12/09	FD416	STX-CLP1	delta-BHC	20.5	SA138009-10BRE SA138-30BRE 99642-MB	J- (all detects) UJ (all non-detects)	A

The percent difference (%D) of the second source calibration standard were less than or equal to 20.0% for all compounds with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Flag	A or P
10/13/09	FC810	STX-CLP1	Endosulfan I	23.3	EB100609-SO1A4 RSAS5-10B RSAS5-25B RSAS5-36B 97852-MB 98281-MB	J+ (all detects)	A

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.

Sample EB100609-SO1A4 was identified as an equipment blank. No chlorinated pesticide contaminants were found in this blank.

Samples FB080309-SO and FB080309-SORE (both from SDG R0904279) were identified as field blanks. No chlorinated pesticide contaminants were found in these blanks.

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
SA138009-10B	Not specified	Tetrachloro-m-xylene Decachlorobiphenyl	31 (40-140) 33 (40-140)	All TCL compounds	J- (all detects) UJ (all non-detects)	A
SA138-30B	Not specified	Tetrachloro-m-xylene	15 (40-140)	All TCL compounds	J- (all detects) UJ (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. 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 with the following exceptions:

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
99642-LCS/D (SA138009-10BRE SA138-30BRE 99642-MB)	Endrin aldehyde	27 (50-130)	25 (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

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 R0905693	All compounds reported below the PQL.	J (all detects)	A

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
SA138009-10BRE SA138-30BRE	All TCL compounds	X	A

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples SA138-10B and SA138009-10B, samples SA138-10B and SA138009-10BRE, samples SA103-10B and SA103009-10B, and samples RSAS5-36B and RSAS5009-36B 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 R0905693

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905693	SA138009-10BRE SA138-30BRE	All TCL compounds	J- (all detects) UJ (all non-detects)	A	Technical holding times (h)
R0905693	SA138009-10BRE SA138-30BRE	delta-BHC	J- (all detects) UJ (all non-detects)	A	Continuing calibration (%D) (c)
R0905693	EB100609-SO1A4 RSAS5-10B RSAS5-25B RSAS5-36B	Endosulfan I	J+ (all detects)	A	Continuing calibration (ICV %D) (c)
R0905693	SA138009-10B SA138-30B	All TCL compounds	J- (all detects) UJ (all non-detects)	A	Surrogate spikes (%R) (s)
R0905693	SA138009-10BRE SA138-30BRE	Endrin aldehyde	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0905693	EB100609-SO1A4 SA138-0.5B SA138-10B SA138009-10B SA138009-10BRE SA138-30B SA138-30BRE SA138-45B SA103-0.5B SA103-10B SA103009-10B SA103-25B SA103-35B RSAR5-0.5B RSAR5-10B RSAR5-25B RSAR5-40B RSAS5-0.5B RSAS5-10B RSAS5-25B RSAS5-36B RSAS5009-36B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0905693	SA138009-10BRE SA138-30BRE	All TCL compounds	X	A	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Laboratory Blank Data Qualification Summary - SDG R0905693

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Equipment Blank Data Qualification Summary - SDG R0905693

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Field Blank Data Qualification Summary - SDG R0905693

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 4

LDC #: 22234D3a
SDG #: R0905693
Laboratory: Columbia Analytical Services

Date: 12/28/09
Page: 1 of 1
Reviewer: SV
2nd Reviewer: [signature]

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: 10/06/09
II.	GC/ECD Instrument Performance Check	A	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	SW	CCV/ICV ≤ 20%
V.	Blanks	A	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	SW	LCS/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	SW	
XIV.	Field duplicates	ND	D_1 = 3,4 D_2 = 3,5 D_3 = 10,11 D_4 = 21,22
XV.	Field blanks	ND	EB = 1 FB = FB080309-SO (R0904279) RE

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	EB100609-SO1A4 W	11	SA103009-10B D_3	21	RSAS5-36B D_4	31	99642-MB
2	SA138-0.5B S	12	SA103-25B	22	RSAS5009-36B D_4	32	97852-
3	SA138-10B D_1, D_2	13	SA103-35B	23	RSAR5-40BMS	33	98155-
4	SA138009-10B D_4	14	RSAR5-0.5B	24	RSAR5-40BMSD	34	98281-
5	SA138009-10BRE D_2	15	RSAR5-10B	25		35	
6	SA138-30B	16	RSAR5-25B	26		36	
7	SA138-30BRE	17	RSAR5-40B	27		37	
8	SA138-45B	18	RSAS5-0.5B	28		38	
9	SA103-0.5B	19	RSAS5-10B	29		39	
10	SA103-10B D_3	20	RSAS5-25B	30		40	

LDC #: 22234 D34
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: JVL
2nd Reviewer: [illegible]

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?	✓			
Were all percent differences (%D) ≤ ~~15%~~ 20.0 or percent recoveries ~~85-115%~~ 80-120?		✓		
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?		✓		
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				

LDC #: 22234 D3a
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Reviewer: JVC
2nd Reviewer:

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.		✓		

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	I. Dieldrin	Q. Endrin ketone	Y. Aroclor-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	II.
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ.
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. DB 608	KK.
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	LL.
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE. Hexachlorobenzene	MM.
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF.	NN.

Notes:_____

LDC #: 22234D34
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Page: 1 of 1
Reviewer: VV
2nd Reviewer:

All circled dates have exceeded the technical holding times.
(Y) N N/A Were all cooler temperatures within validation criteria?

METHOD : GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
5,7	S	N	10/06/09	11/02/09	11/12/09	27	J-/UJ/A (H)

TECHNICAL HOLDING TIME CRITERIA

Water: Extracted within 7 days, analyzed within 40 days.
Soil: Extracted within 14 days, analyzed within 40 days.

LDC #: 22234D3a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET

Continuing Calibration

Page: 1 of 1
Reviewer: JVG
2nd 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".

[✓ Y] N N/A Were Evaluation mix standards run before initial calibration and before samples?
[✓ Y] N N/A Were Endrin & 4,4'-DDT breakdowns acceptable in the Evaluation Mix standard (≤15.0% for individual breakdowns)?
[✓ Y] N N/A Was at least one standard run daily to verify the working curve?
Y [✓ N] N/A Did the continuing calibration standards meet the percent difference (%D) of ≤20.0%?

Level IV/D Only

[✓ Y] N N/A Were the retention times for all calibrated compounds within their respective acceptance windows?

#	Date	Standard ID	Column	Compound	%D (Limit ≤ 20.0)	RT (Limits)	Associated Samples	Qualifications
	10/13/09	FC810	STX-CLP1	H (+)	23.3	( )	1, 97852-MB,	J+ dets/A (C)
		(ICV)				( )	19-21, 98281-MB	
						( )		
						( )		
	11/12/09	FD416	STX-CLP1	C (-)	20.5	( )	5, 7, 98642-MB	J-/UJ/A (C)
		(CCV)				( )		
						( )		
						( )		
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A. alpha-BHC
B. beta-BHC
C. delta-BHC
D. gamma-BHC
E. Heptachlor
F. Aldrin
G. Heptachlor epoxide
H. Endosulfan I
I. Dieldrin
J. 4,4'-DDE
K. Endrin
L. Endosulfan II
M. 4,4'-DDD
N. Endosulfan sulfate
O. 4,4'-DDT
P. Methoxychlor
Q. Endrin ketone
R. Endrin aldehyde
S. alpha-Chlordane
T. gamma-Chlordane
U. Toxaphene
V. Aroclor-1016
W. Aroclor-1221
X. Aroclor-1232
Y. Aroclor-1242
Z. Aroclor-1248
AA. Aroclor-1254
BB. Aroclor-1260
CC. DB 608
DD. DB 1701
EE.________
FF.________
GG.________
HH.________
II.________
JJ.________

LDC #: 22234 D3a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Spikes

Page: 1 of 1
Reviewer: VV
2nd Reviewer:

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".

(Y) N N/A Were surrogates spiked into all samples, standards and blanks?
Y (N) N/A Did all surrogate percent recoveries (%R) meet the QC limits?

#	Date	Sample ID	Column	Surrogate Compound	%R (Limits)	Qualifications
		4	SPX-CLP1	A	31 (40-140)	J- /NJ /A (S)
				B	33 ( )	
		*			( )	
					( )	
		6	↓	A	15 ( )	
					( )	
					( )	
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Letter Designation	Surrogate Compound	Recovery QC Limits (Soil)	Recovery QC Limits (Water)	Comments
A	Tetrachoro-m-xylene			
B	Decachlorobiphenyl			

LDC #: 22234D3a

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET

Laboratory Control Samples

Page: 1 of 1

Reviewer: JVG

2nd 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".

[✓ Y] N N/A Were a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG? ____________

Y [✓ N] N/A Were the LCS percent recoveries (%R) and relative percent differences (RPD) within the QC limits?

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?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		98155 LCS/D	Several	compounds)	outside limits	( )	2-4, 6, 8-18, 98155-MB	No qual
			(see	attached summary)	)	( )		(LCSD in)
				( )	( )	( )		
				( )	( )	( )		
		99642-LCS/D	R	27 (50-130)	25 (50-130)	( )	5, 7, 99642-MB	J-/UJ/P (1)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Northgate Environmental
Project: Tronox LLC Henderson/2027.001
Sample Matrix: Soil

Service Request: R0905693
Date Analyzed: 10/29/09

Lab Control Sample Summary
Organochlorine Pesticides by Gas Chromatography

Analytical Method: 8081A
Prep Method: EPA 3541

Units: µg/Kg
Basis: Dry

Extraction Lot: 98155

Analyte Name	Lab Control Sample RQ0909841-02 Result	Expected	% Rec		Duplicate Lab Control Sample RQ0909841-03 Result	Expected	% Rec	% Rec Limits	RPD		RPD Limit
4,4'-DDD	4.11	6.67	62		5.79	6.67	87	50 - 130	34	*	30
4,4'-DDE	3.94	6.67	59		6.00	6.67	90	50 - 130	41	*	30
4,4'-DDT	4.48	6.67	67		6.05	6.67	91	50 - 130	30		30
Aldrin	3.28	6.67	49	*	4.91	6.67	74	50 - 130	40	*	30
Dieldrin	4.10	6.67	61		6.20	6.67	93	50 - 130	41	*	30
Endosulfan I	3.76	6.67	56		5.50	6.67	82	50 - 130	37	*	30
Endosulfan II	4.17	6.67	62		5.78	6.67	87	50 - 130	32	*	30
Endosulfan Sulfate	4.49	6.67	67		6.02	6.67	90	50 - 130	29		30
Endrin	4.15	6.67	62		6.16	6.67	92	50 - 130	39	*	30
Endrin Aldehyde	3.50	6.67	52		4.56	6.67	68	50 - 130	26		30
Endrin Ketone	4.78	6.67	72		6.39	6.67	96	50 - 130	29		30
Heptachlor	3.48	6.67	52		5.18	6.67	78	50 - 130	39	*	30
Heptachlor Epoxide	4.01	6.67	60		5.90	6.67	88	50 - 130	38	*	30
Hexachlorobenzene	7.09	16.7	43	*	11.1	16.7	66	50 - 130	44	*	30
Methoxychlor	26.6	33.3	80		35.6	33.3	107	50 - 130	29		30
alpha-BHC	3.03	6.67	45	*	4.61	6.67	69	50 - 130	41	*	30
alpha-Chlordane	3.95	6.67	59		5.52	6.67	83	50 - 130	33	*	30
beta-BHC	3.87	6.67	58		5.22	6.67	78	50 - 130	30		30
delta-BHC	3.16	6.67	47	*	4.36	6.67	65	50 - 130	32	*	30
gamma-BHC (Lindane)	3.32	6.67	50		4.89	6.67	73	50 - 130	38	*	30
gamma-Chlordane	4.64	6.67	70		6.14	6.67	92	50 - 130	28		30

Comments:

LDC #: 22234 D3G
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: JVC
2nd Reviewer: [illegible]

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) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		5, 7	outside H.T.		X/A (o)

Comments: _____

LDC #: 22234 b 3A
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: JM
2nd Reviewer: [signature]

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)

Where: A = Area of compound
C = Concentration of compound
S = Standard deviation of calibration factors
X = Mean of calibration factors

#	Standard ID	Calibration Date	Compound	Reported CF (10 std)	Recalculated CF (10 std)	Reported CF (initial)	Recalculated CF (intial)	Reported %RSD	Recalculated %RSD
1	ICAL	10/12/09	H STX-CLP 1	2.017 e7	2.017 e7	2.185 e7	2.186 e7	8.30	8.29
			P 1	0.935	0.935	0.986	0.986	6.10	6.11
			H 2	5.997	5.997	6.265	6.265	5.05	5.05
			P 2	2.415	2.415	2.563	2.563	6.25	6.24
2	ICAL	10/27/09	H 1	2.283	2.283	2.440	2.440	5.78	5.78
			P 1	1.055	1.055	1.088	1.088	3.07	3.07
			H 2	5.828	5.828	5.984	5.984	3.97	3.97
			P 2	2.287	2.287	2.327	2.327	3.50	3.50
3	ICAL	11/11/09	H 1	2.727	2.727	2.790	2.790	4.17	4.17
			P 1	1.237	1.237	1.227	1.227	1.68	1.68
			H 2	7.440	7.440	6.856	6.856	7.81	7.81
			P 2	2.870	2.870	2.787	2.787	6.74	6.74
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 #: 22734 D39
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: JVG
2nd Reviewer: [illegible]

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)

	#	Standard ID	Calibration Date/Time	Compound		Average CF/ CCV Conc	Reported CF/Conc CCV	Recalculated CF/Conc CCV	Reported %D	Recalculated %D
#1 blk 2	1	CCV1A	10/13/09	H	STX-CLP 1	21.854 e6	22.738 e6	22737500	4.0	4.0
				P	1	9.861	10.019	10018750	1.6	1.6
				H	2	62.646	63.732	63732500	1.7	1.7
				P	2	25.629	26.573	26513250	3.4	3.4
9-21 blk 4	2	CCV11A	10/19/09	H	1		23.916	23915000	9.4	9.4
				P	1		10.224	10223500	3.7	3.7
				H	2		70.513	70515000	12.6	12.6
				P	2	↓	27.145	27145000	5.9	5.9
22	3	CCV2A	10/28/09	H	1	24.403	25.902	25900000	6.1	6.1
				P	1	10.883	11.780	11780000	8.2	8.2
				H	2	59.836	67.486	67485000	12.8	12.8
				P	2	23.273	25.522	25521500	9.7	9.7
2-4, 6,8,10 blk 3	4	CCV6A	10/29/09	H	1		25.276	25275000	3.6	3.6
				P	1		11.587	11587000	6.5	6.5
				H	2		65.623	65625000	9.7	9.7
				P	2	↓	24.989	24989000	7.4	7.4

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.

LDC #: 72234D3c
SDG #: Sa Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 2 of ___
Reviewer: JM
2nd Reviewer: [signature]

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)

	#	Standard ID	Calibration Date/Time	Compound		Average CF/ CCV Conc	Reported CF/Conc CCV	Recalculated CF/Conc CCV	Reported %D	Recalculated %D
11-13 5-17 23,24	1	CCV 7A	10/29/09	H STX-CLP	1	24.403 e6	25.139 e6	25140 000	3.0	3.0
				P	1	10.883	11.629	11629 000	6.9	6.9
				H	2	59.836	64.401	64400 000	7.6	7.6
				P	2	23.273	25.145	25 144 500	8.0	8.0
9,18	2	CCV 8A	10/30/09	H	1		25.288	25290 000	3.6	3.6
				P	1		11.654	11653 500	7.1	7.1
				H	2		65.979	65980 000	10.3	10.3
				P	2		25.242	25242500	8.5	8.5
14	3	CCV 12A	11/02/09	H	1		24.927	24 925 000	2.1	2.1
				P	1		11.528	11 520 000	5.9	5.9
				H	2		64.765	64 765 000	8.2	8.2
				P	2	✓	24.669	24669 500	6.0	6.0
5,7 Blk 1	4	CCV 3A	11/12/09	H	1	27.900	27.443	27.445 000	1.6	1.6
				P	1	12.270	10.970	10 970 500	10.6	10.6
				H	2	68.559	71.784	71 785 000	4.7	4.7
				P ✓	2	27.869	24.990	24 990 500	10.3	10.3

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22234D3a
SDG #: Sa Cruz

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Page: 1 of 1
Reviewer:
2nd reviewer:

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: #1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
Tetrachloro-m-xylene						
Tetrachloro-m-xylene	STX-CLP1	100	76.475	77	77	0
Decachlorobiphenyl	↓	↓	85.034	85	85	↓
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 #: 52234 D3G
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Page: 1 of 1
Reviewer: JM
2nd Reviewer: L

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

The percent recoveries (%R) and Relative Percent difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100* (SSC-SC)/SA

Where: SSC = Spiked sample concentration
SA = Spike added
SC = Concentration

RPD = | MS - MSD | * 2/(MS + MSD)

MS = Matrix spike percent recovery

MSD = Matrix spike duplicate percent recovery

MS/MSD samples: 23/24

Compound	Spike Added (ug/kg)		Sample Concentration (ug/kg)	Spiked Sample Concentration (ug/kg)		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	-	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
gamma-BHC	11.1	11.1	0	8.07	7.64	73	73	69	69	5	5
4,4'-DDT	↓	↓	↓	10.1	9.28	91	91	84	84	8	8
Aroclor 1260											

Comments: Refer ot Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22234D3c
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

Reviewer: VV
2nd Reviewer: [illegible]

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

Where: SSC = Spiked sample concentration
SA = Spike added
SC = Concentration

RPD = | LCS - LCSD | * 2/(LCS + LCSD)

LCS = Laboratory control sample percent recovery
LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: 98155 LCS/D

Compound	Spike Added (ug/kg)		Spiked Sample Concentration (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
gamma-BHC	6.67	6.67	3.37	4.89	50	50	73	73	38	38
4,4'-DDT	↓	↓	4.48	6.05	67	67	91	91	30	30
Aroclor 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.

LDC #: 22214D3a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: JVC
2nd reviewer:

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

(Y) N N/A Were all reported results recalculated and verified for all level IV samples?
Y (N) N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Example: SOW-CLP?

Sample I.D. # 2 EE:

$$\text{Conc.} = \frac{(336.0\ e6)\ (10ml)}{(3.171e7)\ (30.0g)\ (0.944)}$$

$$= 3.74$$

$$\approx 3.7\ ug/kg$$

#	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 7 through October 8, 2009

LDC Report Date: January 6, 2010

Matrix: Soil/Water

Parameters: Chlorinated Pesticides

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905744

Sample Identification

RSAP5-0.5B
RSAP5-10B
RSAP5009-10B
RSAP5-25B
RSAP5-39B
SA192-0.5B
SA192-10B
SA192-39B
EB100809-SO1A3
RSAP6-0.5B
RSAP6-10B
RSAP6-25B
RSAP6-44B
RSAP5-0.5BMS
RSAP5-0.5BMSD
SA192-10BMS
SA192-10BMSD

Introduction

This data review covers 16 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 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 with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Flag	A or P
10/13/09	FC810	STX-CLP1	Endosulfan I	23.3	98281-MB	J+ (all detects)	A

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 EB100809-SO1A3 was identified as an equipment blank. No chlorinated pesticide contaminants were found in this blank.

Samples FB080309-SO and FB080309-SORE (both from SDG R0904279) and FB082809-SO (from SDG R0904894) were identified as field blanks. No chlorinated pesticide contaminants were found in these blanks.

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 with the following exceptions:

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
98681-LCS/D (RSAP5009-10B 98681-MB)	Endrin aldehyde	49 (50-130)	49 (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 R0905744	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

Samples RSAP5-10B and RSAP5009-10B were identified as field duplicates. No chlorinated pesticides were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAP5-10B	RSAP5009-10B				
Hexachlorobenzene	4.7	7.8	-	3.1 (≤1.8)	J (all detects)	A

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Data Qualification Summary - SDG R0905744

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905744	RSAP5009-10B	Endrin aldehyde	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0905744	RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-25B RSAP5-39B SA192-0.5B SA192-10B SA192-39B EB100809-SO1A3 RSAP6-0.5B RSAP6-10B RSAP6-25B RSAP6-44B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0905744	RSAP5-10B RSAP5009-10B	Hexachlorobenzene	J (all detects)	A	Field duplicates (Difference) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Laboratory Blank Data Qualification Summary - SDG R0905744

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Equipment Blank Data Qualification Summary - SDG R0905744

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Field Blank Data Qualification Summary - SDG R0905744

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234E3a
SDG #: R0905744
Laboratory: Columbia Analytical Services

Date: 12/24/09
Page: 1 of 1
Reviewer: SVG
2nd Reviewer: [signature]

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: 10/07 - 08/09
II.	GC/ECD Instrument Performance Check	A	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	SW	CCV/ICV ≤ 20%
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	SW	LCS/D
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	SW	D = 2, 3
XV.	Field blanks	ND	FB = 9 FB = FB080309-SO (R0904279) ~~FB080309-SO-RE~~ ↓ = FB182809-SO (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: Soil + Water

1	1	RSAP5-0.5B	S	11	3	RSAP6-10B	S	21	1	98281 - MB	31	
2	1	RSAP5-10B	D	12	3	RSAP6-25B		22	2	98681 -	32	
3	2	RSAP5009-10B	D	13	3	RSAP6-44B		23	3	98362 -	33	
4	3	RSAP5-25B		14	1	RSAP5-0.5BMS		24	4	98167 -	34	
5	3	RSAP5-39B		15	1	RSAP5-0.5BMSD		25			35	
6	3	SA192-0.5B		16	3	SA192-10BMS		26			36	
7	3	SA192-10B		17	3	SA192-10BMSD		27			37	
8	3	SA192-39B		18				28			38	
9	4	EB100809-SO1A3	W	19				29			39	
10	3	RSAP6-0.5B	S	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	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	II.
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ.
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. DB 608	KK.
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	LL.
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE. Hexachlorobenzene	MM.
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF.	NN.

Notes:_____

LDC #: 22234 E39
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: DVG
2nd 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".

[✓ Y] N N/A Were Evaluation mix standards run before initial calibration and before samples?
[✓ Y] N N/A Were Endrin & 4,4'-DDT breakdowns acceptable in the Evaluation Mix standard (≤15.0% for individual breakdowns)?
[✓ Y] N N/A Was at least one standard run daily to verify the working curve?
Y [✓ N] N/A Did the continuing calibration standards meet the percent difference (%D) of ≤20.0%?

Level IV/D Only

Y N [✓ N/A] Were the retention times for all calibrated compounds within their respective acceptance windows?

#	Date	Standard ID	Column	Compound	%D (Limit ≤ 20.0)	RT (Limits)	Associated Samples	Qualifications
	10/13/09	FC 810 (ICV)	STX-CLP1	H (+)	23.3	( )	98281-MB	J + dets/A (c)
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
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						( )		
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						( )		
						( )		
						( )		
						( )		
						( )		
						( )		

A. alpha-BHC
B. beta-BHC
C. delta-BHC
D. gamma-BHC

E. Heptachlor
F. Aldrin
G. Heptachlor epoxide
H. Endosulfan I

I. Dieldrin
J. 4,4'-DDE
K. Endrin
L. Endosulfan II

M. 4,4'-DDD
N. Endosulfan sulfate
O. 4,4'-DDT
P. Methoxychlor

Q. Endrin ketone
R. Endrin aldehyde
S. alpha-Chlordane
T. gamma-Chlordane

U. Toxaphene
V. Aroclor-1016
W. Aroclor-1221
X. Aroclor-1232

Y. Aroclor-1242
Z. Aroclor-1248
AA. Aroclor-1254
BB. Aroclor-1260

CC. DB 608
DD. DB 1701
EE.________
FF.________

GG.________
HH.________
II.________
JJ.________

LDC #: 22234 E34

SDG #: Sucres

VALIDATION FINDINGS WORKSHEET

Laboratory Control Samples

Page: 1 of 1

Reviewer:

2nd 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".

[✓ Y] N N/A Were a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG? ____________

Y [✓ N] N/A Were the LCS percent recoveries (%R) and relative percent differences (RPD) within the QC limits?

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?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		98681- LCS/D	R	49 (50-130)	99 (50-130)	( )	3, 98681-MB	J-/UJ/P (2)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 22234 E3a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: JVB
2nd reviewer:

METHOD: GC Pesticides/PCBs (EPA SW846 Method 8081/8082)

Y N N/A Were field duplicate pairs identified in this SDG?
Y N N/A Were target compounds detected in thie field duplicate pairs?

Compound	Concentration (ug/Kg) 2	3	RPD Parent only
EE	4.7	7.8	3.1 (≤ 1.8 D) Jdets/A (fd)

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 12, 2009

LDC Report Date: January 1, 2010

Matrix: Soil/Water

Parameters: Chlorinated Pesticides

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905829

Sample Identification

EB101209-SO1A3
RSAR7-0.5B
RSAR7-9B
RSAR7009-9B
RSAR7-20B
RSAR7-34B
RSAO7-9B
RSAO7-19B
RSAO7-29B
RSAO7-47B

Introduction

This data review covers 9 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 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 EB101209-SO1A3 was identified as an equipment blank. No chlorinated pesticide contaminants were found in this blank.

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

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
98681-LCS/D (RSAO7-29B RSAO7-47B 98681-MB)	Endrin aldehyde	49 (50-130)	49 (50-130)	-	J- (all detects) UJ (all non-detects)	P
98362-LCS/D (RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B 98362-MB)	Endrin aldehyde	44 (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 R0905829	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

Samples RSAR7-9B and RSAR7009-9B were identified as field duplicates. No chlorinated pesticides were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAR7-9B	RSAR7009-9B				
Hexachlorobenzene	3.6	4.7	-	0.9 (≤1.8)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Data Qualification Summary - SDG R0905829

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905829	RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B	Endrin aldehyde	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0905829	EB101209-SO1A3 RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B	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 R0905829

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Equipment Blank Data Qualification Summary - SDG R0905829

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Field Blank Data Qualification Summary - SDG R0905829

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234F3a
SDG #: R0905829
Laboratory: Columbia Analytical Services

Date: 12/21/09
Page: 1 of 1
Reviewer: SV
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
I.	Technical holding times	A	Sampling dates: 10/12/09
II.	GC/ECD Instrument Performance Check	A	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 20 %
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	client spec.
VIII.	Laboratory control samples	SW	LCS/D
IX.	Regional quality assurance and quality control	N	
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	SW	D = 3,4
XV.	Field blanks	ND	EB = 1 FB = FB082809_SO (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: Soil + Water

1	EB101209-SO1A3	W	11	98498-MB	21		31		
2	RSAR7-0.5B	S	12	98362-MB	22		32		
3	RSAR7-9B	D	13	98681-MB	23		33		
4	RSAR7009-9B	D	14		24		34		
5	RSAR7-20B		15		25		35		
6	RSAR7-34B		16		26		36		
7	RSAO7-9B		17		27		37		
8	RSAO7-19B		18		28		38		
9	RSAO7-29B		19		29		39		
10	RSAO7-47B		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	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	II.
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ.
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. DB 608	KK.
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	LL.
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE. Hexachlorobenzene	MM.
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF.	NN.

Notes:_____

LDC #: 22234F39
SDG #: See Cover
METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples

Reviewer: [illegible]
2nd Reviewer: [illegible]

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG? ____________

Y (N) N/A Were the LCS percent recoveries (%R) and relative percent differences (RPD) within the QC limits?

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?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		98681 LCS/D	R	49 (50-130)	49 (50-130)	( )	9, 10, 98681-MB	J-/UJ/P (L)
				( )	( )	( )		
				( )	( )	( )		
		98362 LCS/D	R	44 (50-130)	( )	( )	2-8, 98362-MB	J-/UJ/P
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 27234F3A
SDG #: Su Creek

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: JVG
2nd reviewer:

METHOD: GC Pesticides/PCBs (EPA SW846 Method 8081/8082)

(Y) N N/A — Were field duplicate pairs identified in this SDG?
(Y) N N/A — Were target compounds detected in thie field duplicate pairs?

Compound	Concentration (ug/kg) 3	4	RPD (Parent only)
EE	3.6	4.7	0.9 (≤1.8 D)

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 13, 2009

LDC Report Date: January 1, 2010

Matrix: Soil

Parameters: Chlorinated Pesticides

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905882

Sample Identification

RSAN8-0.5B
RSAN8-10B
RSAN8-20B
RSAN8-28B
RSAN8-10BMS
RSAN8-10BMSD

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 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. Although the LCS/LCSD percent recoveries (%R) were not within QC limits for one compound, the MS/MSD percent recoveries (%R) were within QC limits and no data were qualified.

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 R0905882	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 R0905882

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905882	RSAN8-0.5B RSAN8-10B RSAN8-20B RSAN8-28B	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 R0905882

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Field Blank Data Qualification Summary - SDG R0905882

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234G3a
SDG #: R0905882
Laboratory: Columbia Analytical Services

Date: 12/24/09
Page: 1 of 1
Reviewer: JM
2nd Reviewer: [illegible]

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: 10/13 ~~-15~~ /09
II.	GC/ECD Instrument Performance Check	A	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 20%
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	SW	LCS/D
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-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: Soil

1	RSAN8-0.5B	11	98681-MB	21		31	
2	RSAN8-10B	12		22		32	
3	RSAN8-20B	13		23		33	
4	RSAN8-28B	14		24		34	
5	RSAN8-10BMS	15		25		35	
6	RSAN8-10BMSD	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. Aroclor-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	II.
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ.
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. DB 608	KK.
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	LL.
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE. Hexachlorobenzene	MM.
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF.	NN.

Notes:_____

LDC #: 22234 G39

SDG #: Su Cvr

VALIDATION FINDINGS WORKSHEET

Laboratory Control Samples

Page: 1 of 1

Reviewer:

2nd 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".

[✓ Y] N N/A Were a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG? ____________

Y [✓ N] N/A Were the LCS percent recoveries (%R) and relative percent differences (RPD) within the QC limits?

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?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		98681-LCS/D	R	49 (50-130)	49 (50-130)	( )	All + Blk	No qual
				( )	( )	( )		(MS/MSD in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 13, 2009

LDC Report Date: January 1, 2010

Matrix: Soil

Parameters: Chlorinated Pesticides

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905885

Sample Identification

RSAN8-10BSPLP2
RSAN8-10BSPLP3

Samples in this SDG underwent SPLP extraction

Introduction

This data review covers 2 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.

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	Not specified	Decachlorobiphenyl	24 (40-140)	All TCL compounds	J- (all detects) UJ (all non-detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

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 R0905885	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 R0905885

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905885	RSAN8-10BSPLP2 RSAN8-10BSPLP3	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 R0905885

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Field Blank Data Qualification Summary - SDG R0905885

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234H3a
SDG #: R0905885
Laboratory: Columbia Analytical Services

Date: 12/23/09
Page: 1 of 1
Reviewer: JVG
2nd Reviewer: LA

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: 10/13/09
II.	GC/ECD Instrument Performance Check	A	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 20 %
V.	Blanks	A	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	N	client spec.
VIII.	Laboratory control samples	A	LCS/D
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	N	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected D = Duplicate
R = Rinsate
FB = Field blank
TB = Trip blank
EB = Equipment blank

Validated Samples:

RSA S
Soil

1	RAN8-10BSPLP2	11	99420-MB	21		31	
2	RAN8-10BSPLP3	12	SPLP2-BLK	22		32	
3		13	SPLP3-BLK	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	

LDC #: 22239 H3
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Spikes

Page: 1 of 1
Reviewer: JV6
2nd Reviewer: [illegible]

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".

(Y) N N/A Were surrogates spiked into all samples, standards and blanks?
Y (N) N/A Did all surrogate percent recoveries (%R) meet the QC limits?

#	Date	Sample ID	Column	Surrogate Compound	%R (Limits)	Qualifications
		SPLP3-Blk	NS	B	24 (40-140)	J- /NJ/P (S)
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	

Letter Designation	Surrogate Compound	Recovery QC Limits (Soil)	Recovery QC Limits (Water)	Comments
A	Tetrachoro-m-xylene			
B	Decachlorobiphenyl			

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 20 through October 21, 2009

LDC Report Date: January 1, 2010

Matrix: Soil

Parameters: Chlorinated Pesticides

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906024

Sample Identification

SA156-0.5B
SA156-10B
SA156-30B
SA156-35B
SA156-45B
SA52-15B
SA52-15BDL
SA52-28B

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.

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.

Samples FB080309-SO and FB080309-SORE (both from SDG R0904279) and FB082809-SO (from SDG R0904894) were identified as field blanks. No chlorinated pesticide contaminants were found in these blanks.

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
SA52-15B	Not specified	Decachlorobiphenyl	162 (40-140)	All TCL compounds	J+ (all detects)	A

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 project quantitation limits were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
SA52-15B	Hexachlorobenzene	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	A

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0906024	All compounds reported below the PQL.	J (all detects)	A

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
SA52-15B	Hexachlorobenzene	X	A
SA52-15BDL	All TCL compounds except Hexachlorobenzene	X	A

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 R0906024

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906024	SA52-15B	All TCL compounds	J+ (all detects)	A	Surrogate spikes (%R) (s)
R0906024	SA52-15B	Hexachlorobenzene	J (all detects)	A	Project Quantitation Limit (e)
R0906024	SA156-0.5B SA156-10B SA156-30B SA156-35B SA156-45B SA52-15B SA52-15BDL SA52-28B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0906024	SA52-15B	Hexachlorobenzene	X	A	Overall assessment of data (o)
R0906024	SA52-15BDL	All TCL compounds except Hexachlorobenzene	X	A	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Laboratory Blank Data Qualification Summary - SDG R0906024

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Field Blank Data Qualification Summary - SDG R0906024

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234J3a
SDG #: R0906024
Laboratory: Columbia Analytical Services

Date: 10/23/09
Page: 1 of 1
Reviewer: JVG
2nd Reviewer: [signature]

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: 10/20-21/09
II.	GC/ECD Instrument Performance Check	A	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 20%
V.	Blanks	A	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	N	Client Spec.
VIII.	Laboratory control samples	A	LCS/D
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	SW	
XIII.	Overall assessment of data	SW	
XIV.	Field duplicates	N	
XV.	Field blanks	ND	FB = FB080309-SO (R0904279) ~~FB080309-SORE~~ FB082809-SO (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:

Soil

1 +	SA156-0.5B	11	99194-MB	21		31	
2 -	SA156-10B	12		22		32	
3 -	SA156-30B	13		23		33	
4 +	SA156-35B	14		24		34	
5 -	SA156-45B	15		25		35	
6 +	SA52-15B	16		26		36	
7 +	SA52-15BDL	17		27		37	
8 -	SA52-28B	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. Aroclor-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	II.
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ.
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. DB 608	KK.
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	LL.
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE. Hexachlorobenzene	MM.
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF.	NN.

Notes:_____

LDC #: 22234 J3a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Spikes

Page: 1 of 1
Reviewer: JV6
2nd Reviewer:

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".

Y (N) N/A Were surrogates spiked into all samples, standards and blanks?
Y (N) N/A Did all surrogate percent recoveries (%R) meet the QC limits?

#	Date	Sample ID	Column	Surrogate Compound	%R (Limits)	Qualifications
		1 (10x)	NS	B	437 (40-140)	No qual
		6		B	16x ( )	J+ dets/A (2)
		7 (50x)		A	DO ( )	No qual
				B	↓ ( )	↓
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	

Letter Designation	Surrogate Compound	Recovery QC Limits (Soil)	Recovery QC Limits (Water)	Comments
A	Tetrachoro-m-xylene			
B	Decachlorobiphenyl			

LDC #: 22234 J39
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Page: 1 of 1
Reviewer: JVC
2nd Reviewer: [illegible]

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".

Level IV/D Only

Y N N/A Were CRQLs adjusted for sample dilutions, dry weight factors, etc.?
Y N N/A Did the reported results for detected target compounds agree within 10.0% of the recalculated results?

#	Compound Name	Finding	Associated Samples	Qualifications
	EE	> Cal range	6	J dets/A (e)

Comments: See sample calculation verification worksheet for recalculations

LDC #: 22234J34
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Reviewer: JVG
2nd Reviewer: [signature]

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) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		6	EE > cal range		X /A (O)
		7	All except EE dil		

Comments: _____

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 23 through October 30, 2009

LDC Report Date: December 28, 2009

Matrix: Water

Parameters: Chlorinated Pesticides

Validation Level: Stage 4

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906095

Sample Identification

M-141B
M-141009B
PB102309-A3
M-139B
M-145B
M-144B
M-146B
M-138B
M-138009B
M-148B
M-137B
EB103009-GWA4

Introduction

This data review covers 12 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.

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 with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Flag	A or P
11/7/09	CCV23A	STX-CLP1	Endrin	20.7	M-141B M-141009B PB102309-A3 M-139B M-145B M-144B M-146B 99497-MB	J+ (all detects)	A
11/7/09	CCV23A	STX-CLP2	Endosulfan I Dieldrin Endrin 4,4'-DDD	22.1 20.6 24.6 22.1	M-141B M-141009B PB102309-A3 M-139B M-145B M-144B M-146B 99497-MB	J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects)	A

Date	Standard	Column	Compound	%D	Associated Samples	Flag	A or P
11/7/09	CCV23B	STX-CLP2	gamma-Chlordane alpha-Chlordane 4,4'-DDE Endosulfan II Endrin aldehyde Endosulfan sulfate	22.6 23.6 21.5 23.3 20.2 20.7	M-141B M-141009B PB102309-A3 M-139B M-145B M-144B M-146B 99497-MB	J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects)	A
11/8/09	CCV24A	STX-CLP1	Endrin	20.8	M-138B M-138009B	J+ (all detects)	P
11/8/09	CCV24A	STX-CLP2	Endosulfan I Dieldrin Endrin 4,4'-DDD 4,4'-DDT Methoxychlor	24.7 26.1 24.6 20.4 23.8 20.4	M-138B M-138009B	J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects)	P
11/8/09	CCV24B	STX-CLP2	Aldrin Heptachlor epoxide gamma-Chlordane alpha-Chlordane 4,4'-DDE Endosulfan II Endrin aldehyde Endosulfan sulfate Endrin ketone	22.2 21.3 23.7 26.2 23.3 24.5 22.0 24.7 23.9	M-138B M-138009B	J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects)	P

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.

Sample EB103009-GWA4 was identified as an equipment blank. No chlorinated pesticide contaminants were found in this blank.

Sample FB080409-GW (from SDG R0904290) was identified as a field blank. No chlorinated pesticide contaminants were found in this blank.

Samples PB100209-A2 and PB100209-A2RE (both from SDG R0905636) and PB102309-A3 were identified as pump blanks. No chlorinated pesticide contaminants were found in these blanks.

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
99497-LCS/D (M-141B M-141009B PB102309-A3 M-139B M-145B M-144B M-146B M-138B M-138009B 99497-MB)	Endrin aldehyde	26 (50-130)	27 (50-130)	-	J- (all detects) UJ (all non-detects)	P
99757-LCS/D (M-137B M-148B EB103009-GWA4 99757-MB)	Endrin aldehyde	19 (50-130)	19 (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

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 R0906095	All compounds reported below the PQL.	J (all detects)	A

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-141B and M-141009B and samples M-138B and M-138009B 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 R0906095

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906095	M-141B M-141009B PB102309-A3 M-139B M-145B M-144B M-146B	Endrin Endosulfan I Dieldrin Endrin 4,4'-DDD gamma-Chlordane alpha-Chlordane 4,4'-DDE Endosulfan II Endrin aldehyde Endosulfan sulfate	J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects)	A	Continuing calibration (%D) (c)
R0906095	M-138B M-138009B	Endosulfan I Dieldrin Endrin 4,4'-DDD 4,4'-DDT Methoxychlor Aldrin Heptachlor epoxide gamma-Chlordane alpha-Chlordane 4,4'-DDE Endosulfan II Endrin aldehyde Endosulfan sulfate Endrin ketone	J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects)	P	Continuing calibration (%D) (c)
R0906095	M-141B M-141009B PB102309-A3 M-139B M-145B M-144B M-146B M-138B M-138009B M-148B M-137B EB103009-GWA4	Endrin aldehyde	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0906095	M-141B M-141009B PB102309-A3 M-139B M-145B M-144B M-146B M-138B M-138009B M-148B M-137B EB103009-GWA4	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 R0906095

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Equipment Blank Data Qualification Summary - SDG R0906095

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Field Blank Data Qualification Summary - SDG R0906095

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Pump Blank Data Qualification Summary - SDG R0906095

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 4

LDC #: 22234L3a
SDG #: R0906095
Laboratory: Columbia Analytical Services

Date: 12/28/09
Page: 1 of 1
Reviewer: SVL
2nd Reviewer: V

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: 10/23-30/09
II.	GC/ECD Instrument Performance Check	A	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	SW	CCV/ICV ≤ 20%
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	client spec
VIII.	Laboratory control samples	SW	LCS/D
IX.	Regional quality assurance and quality control	N	
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	ND	D_1 = 1, 2 D_2 = 8, 9
XV.	Field blanks	ND	PB = 3 EB = 12 PB = PB100209-A2 (R0905636) FB = FB080409-GW (R0904290)

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-141B D_1	11	M-137B	21	99497-MB (4/30)	31	
2	M-141009B D_1	12	EB103009-GWA4	22	99757-↓ (7/2)	32	
3	PB102309-A3	13		23		33	
4	M-139B	14		24		34	
5	M-145B	15		25		35	
6	M-144B	16		26		36	
7	M-146B	17		27		37	
8	M-138B D_2	18		28		38	
9	M-138009B D_2	19		29		39	
10	M-148B	20		30		40	

LDC #: 27234 L3a
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Reviewer: JVG
2nd Reviewer: V

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% for individual breakdown in the Evaluation mix standards?	✓			
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 20% or percent recovieries 80-120%?		✓		
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?	✓			
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				

LDC #: 22234 L3c
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Reviewer: JVG
2nd Reviewer: V

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.		✓		

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	I. Dieldrin	Q. Endrin ketone	Y. Aroclor-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	II.
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ.
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. DB 608	KK.
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	LL.
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE.	MM.
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF.	NN.

Notes:_____

LDC #: 22234 L3a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 4
Reviewer: JVC
2nd 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".

(Y) N N/A Were Evaluation mix standards run before initial calibration and before samples?
(Y) N N/A Were Endrin & 4,4'-DDT breakdowns acceptable in the Evaluation Mix standard (≤15.0% for individual breakdowns)?
(Y) N N/A Was at least one standard run daily to verify the working curve?
Y (N) N/A Did the continuing calibration standards meet the percent difference (%D) of ≤20.0%?

Level IV/D Only
(Y) N N/A Were the retention times for all calibrated compounds within their respective acceptance windows?

#	Date	Standard ID	Column	Compound	%D (Limit ≤ 20.0)	RT (Limits)	Associated Samples	Qualifications
	11/07/09	CCV 23A	STX-CLP1	K (+)	20.7	( )	1-7, 99497-MB	J+ dcts/A (C)
			STX-CLP2	H (+)	22.1	( )		
				I (+)	20.6	( )		
				K (+)	24.6	( )		
				M (+)	22.1	( )		
						( )		
		CCV 23B	STX-CLP2	T (+)	22.6	( )		
				S (+)	23.6	( )		
				J (+)	21.5	( )		
				L (+)	23.3	( )		
				R (+)	20.2	( )		
				N (+)	20.7	( )		
						( )		
						( )		
	11/08/09	CCV 24A	STX-CLP1	K (+)	20.8	( )	8, 9	J+ dcts/P
			STX-CLP2	H (+)	24.7	( )		
				I (+)	26.1	( )		
				K (+)	24.6	( )		
				M (+)	20.4	( )		
				O (+)	23.8	( )		
				P (+)	20.4	( )		
						( )		
		CCV 24B	STX-CLP2	F (+)	22.2	( )		
				G (+)	21.3	( )		

A. alpha-BHC
B. beta-BHC
C. delta-BHC
D. gamma-BHC
E. Heptachlor
F. Aldrin
G. Heptachlor epoxide
H. Endosulfan I
I. Dieldrin
J. 4,4'-DDE
K. Endrin
L. Endosulfan II
M. 4,4'-DDD
N. Endosulfan sulfate
O. 4,4'-DDT
P. Methoxychlor
Q. Endrin ketone
R. Endrin aldehyde
S. alpha-Chlordane
T. gamma-Chlordane
U. Toxaphene
V. Aroclor-1016
W. Aroclor-1221
X. Aroclor-1232
Y. Aroclor-1242
Z. Aroclor-1248
AA. Aroclor-1254
BB. Aroclor-1260
CC. DB 608
DD. DB 1701
EE.
FF.
GG.
HH.
II.
JJ.

CCV 23B - Ave still w/in 20

LDC #: 22234 L3a
SDG #: Sq Cmay

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG
2nd 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".

(Y) N N/A Were Evaluation mix standards run before initial calibration and before samples?
(Y) N N/A Were Endrin & 4,4'-DDT breakdowns acceptable in the Evaluation Mix standard (≤15.0% for individual breakdowns)?
(Y) N N/A Was at least one standard run daily to verify the working curve?
Y (N) N/A Did the continuing calibration standards meet the percent difference (%D) of ≤20.0%?

Level IV/D Only
(Y) N N/A Were the retention times for all calibrated compounds within their respective acceptance windows?

#	Date	Standard ID	Column	Compound	%D (Limit ≤ 20.0)	RT (Limits)	Associated Samples	Qualifications
	11/08/09	CCV 24B	STX-CLPX	T (+)	23.7	( )	8, 9	J+ Mets/P (c)
				S (+)	26.2	( )	↓	↓
				J (+)	23.3	( )	↓	↓
				L (+)	24.5	( )	↓	↓
				R (+)	22.0	( )	↓	↓
				N (+)	24.7	( )	↓	↓
				Q (+)	23.9	( )	↓	↓
						( )		
						( )		
						( )		
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						( )		
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						( )		
						( )		

A. alpha-BHC
B. beta-BHC
C. delta-BHC
D. gamma-BHC
E. Heptachlor
F. Aldrin
G. Heptachlor epoxide
H. Endosulfan I
I. Dieldrin
J. 4,4'-DDE
K. Endrin
L. Endosulfan II
M. 4,4'-DDD
N. Endosulfan sulfate
O. 4,4'-DDT
P. Methoxychlor
Q. Endrin ketone
R. Endrin aldehyde
S. alpha-Chlordane
T. gamma-Chlordane
U. Toxaphene
V. Aroclor-1016
W. Aroclor-1221
X. Aroclor-1232
Y. Aroclor-1242
Z. Aroclor-1248
AA. Aroclor-1254
BB. Aroclor-1260
CC. DB 608
DD. DB 1701
EE.
FF.
GG.
HH.
II.
JJ.

LDC #: 22234 L34

SDG #: [illegible]

VALIDATION FINDINGS WORKSHEET

Laboratory Control Samples

Page: 1 of 1

Reviewer: JVG

2nd Reviewer: r l

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".

[✓ Y] N N/A Were a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG? __________

Y [✓ N] N/A Were the LCS percent recoveries (%R) and relative percent differences (RPD) within the QC limits?

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?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		99497-LCS/D	R	26 (50-130)	27 (50-130)	( )	1-9, 99497-MB	J-/UJ/P (L)
				( )	( )	( )		
				( )	( )	( )		
		99757-LCS/D	R	19 ( )	19 ( )	( )	10-12, 99757-MB	
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 22234 L3A
SDG #: Sx Cmrl

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG
2nd Reviewer: [illegible]

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)

Where: A = Area of compound
C = Concentration of compound
S = Standard deviation of calibration factors
X = Mean of calibration factors

#	Standard ID	Calibration Date	Compound	Reported CF (10 std)	Recalculated CF ( )D std)	Reported CF (initial)	Recalculated CF (intial)	Reported %RSD	Recalculated %RSD
1	ICAL	10/27/09	H STX-CRP1	2.288 e7	2.283e7	2.440 e7	2.440 e7	5.78	5.79
			p 1	1.055	1.055	1.088	1.088	3.67	3.07
			H 2	5.828	5.828	5.984	5.984	3.92	3.92
			p 2	2.287	2.287	2.327	2.327	3.50	3.49
2	ICAL	11/11/09	H 1	2.727 e7	2.727 e7	2.790 e7	2.790 e7	4.17	4.17
			p 1	1.237	1.237	1.227	1.227	1.68	1.68
			H 2	7.44	7.44	6.856	6.856	7.81	7.81
			p 2	2.870	2.870	2.787	2.787	6.79	6.79
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 #: 22234L34
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: SV6
2nd Reviewer:

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)

Standard ID	Calibration Date/Time	Compound		Average CF/ CCV Conc	Reported CF/Conc CCV	Recalculated CF/Conc CCV	Reported %D	Recalculated %D
CCV23A	11/07/09	H	STX-CLP 1	24.403 e6	28.356 e6	28.355 e6	16.2	16.2
		P	1	10.883	12,562	12,562	15,4	15,4
		H	2	59.836	73.066	73.065	22,1	22,1
		P	2	23.273	27.374	27.374	17.6	17.6
CCV24A	11/08/09	H	1		28.582	28.582	17,1	17,1
		P	1		12.636	12,636	16,1	16,1
		H	2		74.595	74.595	24.7	24.7
		P	2		28.011	28.010	20,4	20,4
CCV1A	11/12/09	H	1	27.900	28.541	28.540	2.3	2.3
		P	1	12.270	12,536	12.536	2.2	2.2
		H	2	68.59	73.465	73.465	7.2	7.2
		P	2	27.869	28.434	28.434	2.0	2.0

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 #: 22234L39
SDG #: Sy Creek

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

Reviewer: DK
2nd Reviewer: [illegible]

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 Where: SSC = Spiked sample concentration; SA = Spike added; SC = Concentration

RPD = I LCS - LCSD I * 2/(LCS + LCSD) LCS = Laboratory control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: _____

Compound	Spike Added (ug/L)		Spiked Sample Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
gamma-BHC	0.200	0.200	0.191	0.196	96	96	98	98	3	3
4,4'-DDT	↓	↓	0.196	0.219	98	98	110	110	11	11
Aroclor 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.

LDC #: 22234 L34
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Page: 1 of 1
Reviewer: JVG
2nd reviewer:

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: # 1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
Tetrachloro-m-xylene						
Tetrachloro-m-xylene	STX-CLP1	100	85.7	86	86	0
Decachlorobiphenyl	↓	↓	108.19	108	108	↓
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 #: 22234L34
SDG #: Sq Cmpl

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: MG
2nd reviewer: [signature]

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Example:

Sample I.D. _____ ND:

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 27, 2009

LDC Report Date: January 14, 2010

Matrix: Soil/Water

Parameters: Chlorinated Pesticides

Validation Level: Stage 4

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906123

Sample Identification

EB102709-SO1A3
SA140-0.5B
SA140-0.5BRE
SA140-10B
SA140-10BRE
SA140009-10B
SA140009-10BRE
SA140-20B
SA140-20BRE
SA140-30B
SA140-30BRE
SA140-40B
SA140-40BRE
RSAP7-0.5B
RSAP7-0.5BRE
RSAP7-14B
RSAP7-25B
RSAP7-41B
RSAQ7-0.5B
RSAQ7-10B
RSAQ7-38B
RSAQ7-38BRE
SA140-30BREMS
SA140-30BREMSD
RSAP7-0.5BMS
RSAP7-0.5BMSD
RSAP7-0.5BREMS
RSAP7-0.5BREMSD
RSAQ7-38BMS
RSAQ7-38BMSD
RSAQ7-38BREMS
RSAQ7-38BREMSD

Introduction

This data review covers 31 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 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 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
SA140-0.5BRE SA140-10BRE SA140009-10BRE SA140-20BRE SA140-30BRE SA140-40BRE SA140-30BREMS SA140-30BREMSD	All TCL compounds	27	14	J- (all detects) UJ (all non-detects)	A
RSAP7-0.5BRE RSAQ7-38BRE RSAP7-0.5BREMS RSAP7-0.5BREMSD RSAQ7-38BREMS RSAQ7-38BREMSD	All TCL compounds	21	14	J- (all detects) UJ (all non-detects)	A

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. GC/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 with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Flag	A or P
11/7/09	CCV23A	STX-CLP1	Endrin	20.7	99497-MB	J+ (all detects)	A
11/7/09	CCV23A	STX-CLP2	Endosulfan I Dieldrin Endrin 4,4'-DDD	22.1 20.6 24.0 22.1	99497-MB	J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects)	A
11/7/09	CCV23B	STX-CLP2	gamma-Chlordane alpha-Chlordane 4,4'-DDE Endosulfan II Endrin aldehyde Endosulfan sulfate	22.6 23.6 21.5 23.3 20.2 20.7	99497-MB	J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects)	P
11/8/09	CCV24A	STX-CLP1	Endrin	20.8	EB102709-SO1A3	J+ (all detects)	A
11/8/09	CCV24A	STX-CLP2	Endosulfan I Dieldrin Endrin 4,4'-DDD 4,4'-DDT Methoxychlor	24.7 26.1 24.6 20.4 23.8 20.4	EB102709-SO1A3	J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects)	P
11/8/09	CCV24B	STX-CLP2	Aldrin Heptachlor epoxide gamma-Chlordane alpha-Chlordane 4,4'-DDE Endosulfan II Endrin aldehyde Endosulfan sulfate Endrin ketone	22.2 21.3 23.7 26.2 23.3 24.5 22.0 24.7 23.9	EB102709-SO1A3	J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects)	P
11/12/09	CCV3B	STX-CLP1	delta-BHC	20.5	99642-MB	J- (all detects) UJ (all non-detects)	A

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.

Sample EB102709-SO1A3 was identified as an equipment blank. No chlorinated pesticide contaminants were found in this blank.

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
SA140-0.5B	STX-CLP1	Tetrachloro-m-xylene Decachlorobiphenyl	28 (40-140) 32 (40-140)	All TCL compounds	J- (all detects) UJ (all non-detects)	A
SA140-10B	STX-CLP1	Tetrachloro-m-xylene Decachlorobiphenyl	25 (40-140) 38 (40-140)	All TCL compounds	J- (all detects) UJ (all non-detects)	A
SA140009-10B	STX-CLP1	Tetrachloro-m-xylene	25 (40-140)	All TCL compounds	J- (all detects) UJ (all non-detects)	A
SA140-20B	STX-CLP1	Tetrachloro-m-xylene	27 (40-140)	All TCL compounds	J- (all detects) UJ (all non-detects)	A
SA140-30B	STX-CLP1	Tetrachloro-m-xylene	36 (40-140)	All TCL compounds	J- (all detects) UJ (all non-detects)	A
SA140-40B	STX-CLP1	Tetrachloro-m-xylene	38 (40-140)	All TCL compounds	J- (all detects) UJ (all non-detects)	A
RSAP7-0.5B	STX-CLP1	Tetrachloro-m-xylene	34 (40-140)	All TCL compounds	J- (all detects) UJ (all non-detects)	A
RSAQ7-38B	STX-CLP1	Tetrachloro-m-xylene Decachlorobiphenyl	16 (40-140) 32 (40-140)	All TCL compounds	J- (all detects) UJ (all non-detects)	A
RSAQ7-38BRE	STX-CLP1	Tetrachloro-m-xylene	36 (40-140)	All TCL compounds	J- (all detects) UJ (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
99497-LCS/D (All water samples in SDG R0906123)	Endrin aldehyde	26 (50-130)	27 (50-130)	-	J- (all detects) UJ (all non-detects)	P
99356-LCS/D (SA140-0.5B SA140-10B SA140009-10B SA140-20B SA140-30B SA140-40B RSAP7-14B RSAP7-25B RSAP7-41B 99356-MB)	Endrin aldehyde	45 (50-130)	47 (50-130)	-	J- (all detects) UJ (all non-detects)	P
	Hexachlorobenzene	43 (50-130)	41 (50-130)	-	J- (all detects) UJ (all non-detects)	

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 R0906123	All compounds reported below the PQL.	J (all detects)	A

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
SA140-0.5BRE SA140-10BRE SA140009-10BRE SA140-20BRE SA140-30BRE SA140-40BRE RSAP7-0.5BRE RSAQ7-38BRE	All TCL compounds	X	A

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples SA140-10B and SA140009-10B and samples SA140-10BRE and SA140009-10BRE 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 R0906123

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906123	SA140-0.5BRE SA140-10BRE SA140009-10BRE SA140-20BRE SA140-30BRE SA140-40BRE RSAP7-0.5BRE RSAQ7-38BRE	All TCL compounds	J- (all detects) UJ (all non-detects)	A	Technical holding times (h)
R0906123	EB102709-SO1A3	Endrin	J+ (all detects)	A	Continuing calibration (%D) (c)
R0906123	EB102709-SO1A3	Dieldrin Endrin 4,4'-DDD 4,4'-DDT Methoxychlor Aldrin Heptachlor epoxide gamma-Chlordane alpha-Chlordane 4,4'-DDE Endosulfan II Endrin aldehyde Endosulfan sulfate Endrin ketone Endosulfan I	J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects) J+ (all detects)	P	Continuing calibration (%D) (c)
R0906123	SA140-0.5B SA140-10B SA140009-10B SA140-20B SA140-30B SA140-40B RSAP7-0.5B RSAQ7-38B RSAQ7-38BRE	All TCL compounds	J- (all detects) UJ (all non-detects)	A	Surrogate spikes (%R) (s)
R0906123	EB102709-SO1A3	Endrin aldehyde	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0906123	SA140-0.5B SA140-10B SA140009-10B SA140-20B SA140-30B SA140-40B RSAP7-14B RSAP7-25B RSAP7-41B	Endrin aldehyde Hexachlorobenzene	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906123	EB102709-SO1A3 SA140-0.5B SA140-0.5BRE SA140-10B SA140-10BRE SA140009-10B SA140009-10BRE SA140-20B SA140-20BRE SA140-30B SA140-30BRE SA140-40B SA140-40BRE RSAP7-0.5B RSAP7-0.5BRE RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-10B RSAQ7-38B RSAQ7-38BRE	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0906123	SA140-0.5BRE SA140-10BRE SA140009-10BRE SA140-20BRE SA140-30BRE SA140-40BRE RSAP7-0.5BRE RSAQ7-38BRE	All TCL compounds	X	A	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Laboratory Blank Data Qualification Summary - SDG R0906123

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Equipment Blank Data Qualification Summary - SDG R0906123

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Chlorinated Pesticides - Field Blank Data Qualification Summary - SDG R0906123

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 4

LDC #: 22234M3a
SDG #: R0906123
Laboratory: Columbia Analytical Services

Date: 1/13/10
Page: 1 of 1
Reviewer: JM
2nd Reviewer: V

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: 10/27/09
II.	GC/ECD Instrument Performance Check	A	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	SW	CCV/ICV ≤ 20 2
V.	Blanks	A	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	LCS/D
IX.	Regional quality assurance and quality control	N	
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	SW	
XIV.	Field duplicates	ND	D1 = 4,6 D2 = 5,7
XV.	Field blanks	ND	EB = 1 FB = FB082809-SO (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: Soil + Water

1	EB102709-SO1A3	W	11	SA140-30BRE	S	21	RSAQ7-38B	S	31	RSAQ7-38BREMS	S	
2	SA140-0.5B	S	12	SA140-40B		22	RSAQ7-38BRE		32	RSAQ7-38BREMSD		Dx 10/30
3	SA140-0.5BRE		13	SA140-40BRE		23	SA140-30BMS (RE)		33	99497-MB		
4	SA140-10B	D1	14	RSAP7-0.5B		24	SA140-30BMSD (RE)		34	99356-		10/30
5	SA140-10BRE	D2	15	RSAP7-0.5BRE		25	RSAP7-0.5BMS		35	101337-		11/23
6	SA140009-10B	D1	16	RSAP7-14B		26	RSAP7-0.5BMSD		36	99642-		11/02
7	SA140009-10BRE	D2	17	RSAP7-25B		27	RSAP7-0.5BREMS		37	100806-		11/17
8	SA140-20B		18	RSAP7-41B		28	RSAP7-0.5BREMSD		38	99779-		11/04
9	SA140-20BRE		19	RSAQ7-0.5B		29	RSAQ7-38BMS		39			
10	SA140-30B		20	RSAQ7-10B		30	RSAQ7-38BMSD		40			

LDC #: 72274 M3a
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: JVG
2nd Reviewer: V

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% for individual breakdown in the Evaluation mix standards?	✓			
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 20% or percent recovieries 80-120%?		✓		
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?		✓		
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				

LDC #: 27234 M3a
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Reviewer: JW6
2nd Reviewer: V

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.		✓		

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	I. Dieldrin	Q. Endrin ketone	Y. Aroclor-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	II.
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ.
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. DB 608	KK.
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	LL.
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE. Hexachlorobenzene	MM.
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF.	NN.

Notes:_____

LDC #: 22234M3a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Reviewer: JM
2nd Reviewer: L

All circled dates have exceeded the technical holding times.
(Y) N N/A Were all cooler temperatures within validation criteria?

METHOD : GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
3,5,7,9,11,13, 23,24	S	N	10/27/09	11/23/09	11/24/09	27	J-/UJ/A (h)
15,22,27,28 31,32	↓	↓	↓	11/17/09	11/23/09	21	J-/UJ/A (h)

TECHNICAL HOLDING TIME CRITERIA

Water: Extracted within 7 days, analyzed within 40 days.
Soil: Extracted within 14 days, analyzed within 40 days.

LDC #: 22234 M3A
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: VG
2nd 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".

Y N N/A Were Evaluation mix standards run before initial calibration and before samples?
Y N N/A Were Endrin & 4,4'-DDT breakdowns acceptable in the Evaluation Mix standard (≤15.0% for individual breakdowns)?
Y N N/A Was at least one standard run daily to verify the working curve?
Y N N/A Did the continuing calibration standards meet the percent difference (%D) of ≤20.0%?

Level IV/D Only

Y N N/A Were the retention times for all calibrated compounds within their respective acceptance windows?

#	Date	Standard ID	Column	Compound	%D (Limit ≤ 20.0)	RT (Limits)	Associated Samples	Qualifications
	11/07/09	CCV23A	STX-CLP1	K (+)	20.7	( )	99497-MB	J+ dcts/A (c)
			STX-CLP2	H (+)	22.1	( )		
				I (+)	20.6	( )		
				K (+)	24.0	( )		
				M (+)	22.1	( )		
		CCV23B	STX-CLP2	T (+)	22.6	( )		J+ dcts/P
				S (+)	23.6	( )		
				J (+)	21.5	( )		
				L (+)	23.3	( )		
				R (+)	20.2	( )		
				N (+)	20.7	( )		
						( )		
						( )		
	11/08/09	CCV24A	STX-CLP1	K (+)	20.8	( )		J+ dcts/A
			STX-CLP2	H (+)	24.7	( )		J+ dcts/P
				I (+)	26.1	( )		
				K (+)	24.6	( )		
				M (+)	20.4	( )		
				O (+)	23.8	( )		
				P (+)	20.4	( )		
		CCV24B	STX-CLP2	F (+)	22.2	( )		
				G (+)	21.3	( )		
				T (+)	23.7	( )		
				S (+)	26.7	( )		

A. alpha-BHC
B. beta-BHC
C. delta-BHC
D. gamma-BHC
E. Heptachlor
F. Aldrin
G. Heptachlor epoxide
H. Endosulfan I
I. Dieldrin
J. 4,4'-DDE
K. Endrin
L. Endosulfan II
M. 4,4'-DDD
N. Endosulfan sulfate
O. 4,4'-DDT
P. Methoxychlor
Q. Endrin ketone
R. Endrin aldehyde
S. alpha-Chlordane
T. gamma-Chlordane
U. Toxaphene
V. Aroclor-1016
W. Aroclor-1221
X. Aroclor-1232
Y. Aroclor-1242
Z. Aroclor-1248
AA. Aroclor-1254
BB. Aroclor-1260
CC. DB 608
DD. DB 1701
EE.
FF.
GG.
HH.
II.
JJ.

LDC #: 22234 M3c
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 2 of 2
Reviewer: JVG
2nd 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".

Y N N/A Were Evaluation mix standards run before initial calibration and before samples?
Y N N/A Were Endrin & 4,4'-DDT breakdowns acceptable in the Evaluation Mix standard (≤15.0% for individual breakdowns)?
Y N N/A Was at least one standard run daily to verify the working curve?
Y N N/A Did the continuing calibration standards meet the percent difference (%D) of ≤20.0%?

Level IV/D Only

Y N N/A Were the retention times for all calibrated compounds within their respective acceptance windows?

#	Date	Standard ID	Column	Compound	%D (Limit ≤ 20.0)	RT (Limits)	Associated Samples	Qualifications
	11/08/09	CCV24B	STX-CLP1	J (+)	23.3	( )	1	J+ dets/p (c)
			↓	L (+)	24.5	( )	↓	↓
				R (+)	22.0	( )		
				N (+)	24.7	( )		
				Q (+)	23.9	( )		
			↓			( )		
						( )		
	11/12/09	CCV3B	STXCLP1	C (-)	20.5	( )	9966r-MB	J-/UJ/A
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		
						( )		

A. alpha-BHC	E. Heptachlor	I. Dieldrin	M. 4,4'-DDD	Q. Endrin ketone	U. Toxaphene	Y. Aroclor-1242	CC. DB 608	GG.	
B. beta-BHC	F. Aldrin	J. 4,4'-DDE	N. Endosulfan sulfate	R. Endrin aldehyde	V. Aroclor-1016	Z. Aroclor-1248	DD. DB 1701	HH.	
C. delta-BHC	G. Heptachlor epoxide	K. Endrin	O. 4,4'-DDT	S. alpha-Chlordane	W. Aroclor-1221	AA. Aroclor-1254	EE.	II.	
D. gamma-BHC	H. Endosulfan I	L. Endosulfan II	P. Methoxychlor	T. gamma-Chlordane	X. Aroclor-1232	BB. Aroclor-1260	FF.	JJ.	

LDC #: 22234 M3g
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Spikes

Page: 1 of 1
Reviewer: JVG
2nd Reviewer: [signature]

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".

(Y) N N/A Were surrogates spiked into all samples, standards and blanks?
Y (N) N/A Did all surrogate percent recoveries (%R) meet the QC limits?

#	Date	Sample ID	Column	Surrogate Compound	%R (Limits)	Qualifications
		2	STX-CLP1	A	28 (40-140)	J-/UJ/A (S)
				B	32 ( )	
		4			( )	
		4		A	25 ( )	
				B	38 ( )	
					( )	
		6		A	25 ( )	
					( )	
		8		A	27 ( )	
					( )	
		10		A	36 ( )	
					( )	
		12		A	38 ( )	
					( )	
		14		A	34 ( )	
					( )	
		21		A	16 ( )	
				B	32 ( )	
					( )	
		22		A	36 ( )	

Letter Designation	Surrogate Compound	Recovery QC Limits (Soil)	Recovery QC Limits (Water)	Comments
A	Tetrachoro-m-xylene			
B	Decachlorobiphenyl			

LDC #: 22234 M3A
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: MG
2nd Reviewer: [illegible]

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".

Y N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG?
Y N N/A Was a MS/MSD analyzed every 20 samples for each matrix or whenever a sample extraction was performed?
Y N N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		25/26	F	( )	( )	33 (30)	14	No qual (MS/MSD in)
			G	( )	60 (61-120)	( )		(MS in)
			A	( )	45 (53-130)	( )		
				( )	( )	( )		
				( )	( )	( )		
		29/30	M	( )	53 (58-121)	( )	21	No qual (MS in)
			J	( )	48 (56-125)	( )		
			H	( )	53 (56-119)	( )		
			L	( )	58 (65-127)	( )		
			G	59 (61-120)	49 (61-120)	( )		(LCS/D in)
			A	51 (53-130)	44 (53-130)	( )		
				( )	( )	( )		
				( )	( )	( )		
		27/28	G	49 (61-120)	( )	( )	15	No qual (MSD in)
			A	32 (53-130)	43 (53-130)	( )		(LCS/D in)
				( )	( )	( )		
				( )	( )	( )		
		31/32	EE	13 (20-150)	( )	50 (30)	22	No qual (MSD in)
			A	29 (53-130)	42 (53-130)	37 ( )		(LCS/D in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 222 34 M3a
SDG #: Sa Cmv

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples

Page: 1 of 1
Reviewer: JM
2nd 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".

Y N N/A Were a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG?

Y N N/A Were the LCS percent recoveries (%R) and relative percent differences (RPD) within the QC limits?

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?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		99497 LCS/D	R	26 (50-130)	27 (50-130)	( )	1, 99497-MB	J-/UJ/P (l)
		99356- LCS/D	R	45 ( )	47 ( )	( )	2,4,6,8,10,12,16-18	J-/UJ/P (l)
			EE	43 ( )	41 ( )	( )	99356-MB	↓ ↓
		99642 LCS/D	R	27 ( )	25 (✓)	( )	14, 21, 99642-MB	No qual (MS/MSD in)
		100806 LCS/D	EE	49 (✓)	( )	( )	15, 22, 100806-MB	No qual (LCSD in)

V:\Validation Worksheets\Pesticides\LCS.3S

LDC #: 22234 M3a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Reviewer: JV6
2nd Reviewer: [illegible]

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) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		3, 5, 7, 9, 11, 13, 15, 22	Outside H.T.		X R/A (o)

Comments: _____

OVR.3S

LDC #: 22234M3a
SDG #: Sq Grp

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: JG
2nd Reviewer: [illegible]

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)

Where: A = Area of compound
C = Concentration of compound
S = Standard deviation of calibration factors
X = Mean of calibration factors

#	Standard ID	Calibration Date	Compound		Reported CF (10 std)	Recalculated CF (10 std)	Reported CF (initial)	Recalculated CF (intial)	Reported %RSD	Recalculated %RSD
1	ICAL	10/27/09	H STX-CUP	1	2.283 e7	2.283e7	2.440 e7	2.440 e7	5.78	5.78
			P	1	1.055	1.055	1.088	1.088	3.07	3.07
			H	2	5.828	5.828	5.984	5.984	3.92	3.92
			P	2	2.286	2.286	2.327	2.327	3.50	3.50
2	ICAL	11/11/09	H	1	2.727	2.727	2.790	2.790	4.17	4.17
			P	1	1.237	1.237	1.227	1.227	1.68	1.68
			H	2	7.440	7.440	6.856	6.856	7.81	7.81
			P	2	2.870	2.870	2.787	2.787	6.79	6.79
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 #: 22234 M39
SDG #: Sep Cmp

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 3
Reviewer: JVG
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)

	#	Standard ID	Calibration Date/Time	Compound		Average CF/ CCV Conc	Reported CF/Conc CCV	Recalculated CF/Conc CCV	Reported %D	Recalculated %D
B1	1	CCV2A	11/07/09	H STX-CUP	1	24.403 e6	28.582 e6	28.58 e6	17.1	17.1
				P	1	10.883	12.636	12.636	16.1	16.1
				H	2	59.836	74.595	74.595	24.7	24.7
				P	2	23.273	28.011	28.011	20.4	20.4
B1	2	CCV2A	11/08/09	H	1		28.356	28.355	16.2	16.2
				P	1		12.562	12.562	15.4	15.4
				H	2		73.066	73.066	22.1	22.0
				P	2		27.374	27.374	17.6	17.6
B4 14 21 25,26	3	CCV3A	11/12/09	H	1	27.900	27.443	27.445	1.6	1.6
				P	1	12.270	10.970	10.970	10.6	10.6
				H	2	68.559	71.784	71.784	4.7	4.7
				P	2	27.869	24.990	24.990	10.3	10.3
29 30	4	CCV6A	11/14/09	H	1		27.190	27.19	2.5	2.5
				P	1		12.110	12.110	1.3	1.3
				H	2		72.023	72.023	5.1	5.1
				P	2		26.647	26.647	4.4	4.4

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.

LDC #: 22234 M3a
SDG #: Eu Cmw

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: SVG
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)

#	Standard ID	Calibration Date/Time	Compound		Average CF/ CCV Conc	Reported CF/Conc CCV	Recalculated CF/Conc CCV	Reported %D	Recalculated %D
1	CCV19A	11/19/09	H	STX-CLP 1	27.900 e6	28,525 e6	28,525 e6	2.2	2.2
			P	1	12.270	12.125	12.125	1.2	1.2
			H	2	68.559	70.184	70.184	2.4	2.4
			P	2	27.869	26.214	26.215	5.9	5.9
2 4 6 8	2	CCV20A	11/19/09	H	1		27.336	27.335	2.0	2.0
				P	1		11.447	11.447	6.7	6.7
				H	2		68.374	68.374	0.3	0.3
				P	2		24.290	24.290	12.8	12.8
10 12 16-18	3	CCV21A	11/20/09	H	1		27.474	27.474	1.5	1.5
				P	1		11.615	11.615	5.3	5.3
				H	2		68.564	68.563	0	0.5
				P	2		25.068	25.068	10.1	10.1
BC	4	CCV23A	11/23/09	H	1		27.500	27.500	1.4	1.4
				P	1		11.630	11.630	5.2	5.2
				H	2		~~68~~ 71.663	71.665	4.5	4.5
				P	2	✓	25.162 ✓	25.162 ✓	9.7	9.7

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 #: 22234 M3a
SDG #: Sw Curry

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: JVG
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)

#	Standard ID	Calibration Date/Time	Compound		Average CF/ CCV Conc	Reported CF/Conc CCV	Recalculated CF/Conc CCV	Reported %D	Recalculated %D
15 19 20 B5 22 27,28 31,32	1 CCV24A	11/23/09	H STX-CLP	1	27.900 e6	27.493 e6	27.495 e6	1.5	1.5
			P	1	12.270	11.785	11.785	4.0	4.6
			H	2	68.559	70.627	70.627	3.0	3.0
			P	2	27.869	26.456	26.456	5.1	5.1
B3 3 5 7 9 11 13 23,24	2 CCV27A	11/24/09	H	1		28.814	28.814	3.3	3.3
			P	1		12.119	12.119	1.2	1.2
			H	2		73.919	73.919	7.8	7.8
			P	2		26.625	26.625	4.5	4.5
	3								
	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.

LDC #: 22234 H34

SDG #: Eu Corr

VALIDATION FINDINGS WORKSHEET

Surrogate Results Verification

Page: 1 of 1

Reviewer: PG

2nd reviewer: W

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

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: #2

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
Tetrachloro-m-xylene						
Tetrachloro-m-xylene	STX-CLP1	100	28.295	28	28	0
Decachlorobiphenyl	↓	↓	32.48	32	32	↓
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 #: 22234 M3C
SDG #: Sy Cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Page: 1 of 1
Reviewer: JM
2nd Reviewer:

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

The percent recoveries (%R) and Relative Percent difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100* (SSC-SC)/SA

Where: SSC = Spiked sample concentration
SA = Spike added
SC = Concentration

RPD = I MS - MSD I * 2/(MS + MSD)

MS = Matrix spike percent recovery

MSD = Matrix spike duplicate percent recovery

MS/MSD samples: 23/24

Compound	Spike Added (ug/kg)		Sample Concentration (ug/kg)	Spiked Sample Concentration (ug/kg)		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	-	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
gamma-BHC	7.14	7.14	0	5.63	5.86	79	79	81	81	3	3
4,4'-DDT	↓	↓	↓	6.65	6.48	93	93	91	91	3	3
Aroclor 1260											

Comments: Refer ot Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22234 M34
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

Reviewer: JVG
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 and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100* (SSC-SC)/SA

Where: SSC = Spiked sample concentration
SA = Spike added
SC = Concentration

RPD = I LCS - LCSD I * 2/(LCS + LCSD)

LCS = Laboratory control sample percent recovery
LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: 99997_LCS/D

Compound	Spike Added (ug/L)		Spiked Sample Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
gamma-BHC	0.200	0.200	0.191	0.196	96	96	98	98	3	3
4,4'-DDT	↓	↓	0.196	0.219	98	98	110	110	11	11
Aroclor 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.

LDC #: 22234 M34
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: VR
2nd reviewer:

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Example:

Sample I.D. #2 EE

STX CLP2

Conc. = $\frac{(1589.1 e6)\ (10 ml)}{(101.868 e6)\ (20 g)\ (0.90)}$

= 5.78

≈ 5.8 ug/kg

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

Note:

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Data Validation Reports
LDC #22234

Polychlorinated Biphenyls

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: August 5, 2009

LDC Report Date: December 31, 2009

Matrix: Soil

Parameters: Polychlorinated Biphenyls

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0904329

Sample Identification

RSAU5-0.5B
RSAU5-50B

Introduction

This data review covers 2 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.

Samples FB080309-SO (from SDG R0904279) and FB080309-SORE (from SDG R0904279) were identified as field blanks. No polychlorinated biphenyl contaminants were found in these blanks.

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 R0904329	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
Polychlorinated Biphenyls - Data Qualification Summary - SDG R0904329

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0904329	RSAU5-0.5B RSAU5-50B	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 R0904329

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Polychlorinated Biphenyls - Field Blank Data Qualification Summary - SDG R0904329

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234A3b
SDG #: R0904329
Laboratory: Columbia Analytical Services

Date: 12/26/09
Page: 1 of 1
Reviewer: JVG
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: 8/05/09
II.	GC/ECD Instrument Performance Check	N	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 20 %
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	client spec
VIII.	Laboratory control samples	A	LCS/D
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 = FB080309-SO (R0904279) FB080309-SO RE

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Soil

1	RSAU5-0.5B	11		21		31	
2	RSAU5-50B	12		22		32	
3	93549-MB	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: October 6, 2009

LDC Report Date: January 1, 2010

Matrix: Soil

Parameters: Polychlorinated Biphenyls

Validation Level: Stage 4

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905693

Sample Identification

RSAS5-0.5B
RSAS5-36B
RSAS5009-36B
RSAS5-0.5BMS
RSAS5-0.5BMSD

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 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.

Samples FB080309-SO and FB080309-SORE (both from SDG R0904279) were identified as field blanks. No polychlorinated biphenyl contaminants were found in these blanks.

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 recovery (%R) was not within QC limits for one compound, the MSD 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

All target compound identifications were within validation criteria.

XII. Project Quantitation Limit

All project quantitation limits were within validation criteria.

The sample results for detected compounds from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Compound	RPD	Flag	A or P
RSAS5-0.5B	Aroclor-1260	42.98	J (all detects)	A

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0905693	All compounds reported below the PQL.	J (all detects)	A

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples RSAS5-36B and RSAS5009-36B were identified as field duplicates. No polychlorinated biphenyls were detected in any of the samples.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Polychlorinated Biphenyls - Data Qualification Summary - SDG R0905693

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905693	RSAS5-0.5B	Aroclor-1260	J (all detects)	A	Project Quantitation Limit (RPD) (dc)
R0905693	RSAS5-0.5B RSAS5-36B RSAS5009-36B	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 R0905693

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Polychlorinated Biphenyls - Field Blank Data Qualification Summary - SDG R0905693

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 4

LDC #: 22234D3b
SDG #: R0905693
Laboratory: Columbia Analytical Services

Date: 12/28/09
Page: 1 of 1
Reviewer: JV6
2nd Reviewer: V

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: 10/06/09
II.	GC/ECD Instrument Performance Check	N	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 20%
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	LCS/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	SW	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	ND	D = 2,3
XV.	Field blanks	ND	FB = FB080309-SO (R0904279) RE

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: Soil

1	RSAS5-0.5B	11	98155-MB	21		31	
2	RSAS5-36B D	12	98281	22		32	
3	RSAS5009-36B D	13		23		33	
4	RSAS5-0.5BMS	14		24		34	
5	RSAS5-0.5BMSD	15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 22234 D3b
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: JVG
2nd Reviewer: V

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% for individual breakdown in the Evaluation mix standards?			✓	
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 20% or percent recovieries 80-120%?	✓			
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?	✓			
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				

LDC #: 22234 B3b
SDG #: Sw Creek

VALIDATION FINDINGS CHECKLIST

Reviewer: SVG
2nd Reviewer:

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.		✓		

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	I. Dieldrin	Q. Endrin ketone	Y. Aroclor-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	II.
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ.
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. DB 608	KK.
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. DB 1701	LL.
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE.	MM.
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF.	NN.

Notes:_____

LDC #: 22234 D3b
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: JVG
2nd 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".

[✓ Y] N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG?
[✓ Y] N N/A Was a MS/MSD analyzed every 20 samples for each matrix or whenever a sample extraction was performed?
Y [✓ N] N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		4/5	Y	151 (50-150)	( )	( )	5	No qual (MSD in m) ~~J+ dets/A~~
				( )	( )	( )		~~([illegible] all TCL)~~
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		

LDC #: 22234D36
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Reviewer: JV6
2nd Reviewer: [signature]

METHOD: ✓ GC __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Level IV/D Only

Y N N/A Were CRQLs adjusted for sample dilutions, dry weight factors, etc.?
Y N N/A Did the reported results for detected target compounds agree within 10.0% of the recalculated results?
Y N N/A Did the percent difference of detected compounds between two columns./detectors ≤40%?
If no, please see findings bellow.

#	Compound Name	Sample ID	%RPD/%D Between Two Columns/Detectors Limit (≤ 40%)	Qualifications
	BB	1	42.98	J dets/A (dc)

Comments: See sample calculation verification worksheet for recalculations

LDC #: 22234 D3b
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG
2nd Reviewer: [illegible]

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)

Where: A = Area of compound
C = Concentration of compound
S = Standard deviation of calibration factors
X = Mean of calibration factors

#	Standard ID	Calibration Date	Compound	Reported CF (100 std)	Recalculated CF (100 std)	Reported CF (initial)	Recalculated CF (intial)	Reported %RSD	Recalculated %RSD
1	ICAL	10/07/09	1260-1 (DB-1701)	5.260 ex	526.01	4.537 ex	4.537 ex	10.65	10.65
			17	5.227	522.69	4.325 ex	4.325 ex	13.57	13.57
2	ICAL	10/28/09	1701	6.273 ex	627.29	5.012 ex	5.012 ex	16.95	16.95
			17	5.637	563.66	4.417	4.417	18.24	18.24
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 #: 72234D3b
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: JVG
2nd Reviewer: ✓

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)

Standard ID	Calibration Date/Time	Compound	Average CF/ CCV Conc	Reported CF/Conc CCV	Recalculated CF/Conc CCV	Reported %D	Recalculated %D
CCV07	10/15/09	1260 DB-1701	453.733	455.439	455.438	0.4	0.4
		17	432.53	408.807	408.807	5.5	5.5
CCV08	10/16/09	1701		471.170	471.17	3.8	3.8
		17		418.823	418.823	3.2	3.2
CCV1	10/29/09	1701	501.235	514.303	514.304	2.6	2.6
		17	441.195	445.424	445.424	1.0	1.0

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 #: 22734D3b
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Page: 1 of 1
Reviewer:
2nd reviewer:

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: #1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
Tetrachloro-m-xylene						
Tetrachloro-m-xylene	DB-1701	100	82.972	83	83	0
Decachlorobiphenyl	↓	↓	106.608	107	107	↓
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 #: 22234 D3b
SDG #: Sa Lmay

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Page: 1 of 1
Reviewer: NV
2nd Reviewer:

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

The percent recoveries (%R) and Relative Percent difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100* (SSC-SC)/SA

Where: SSC = Spiked sample concentration
SA = Spike added
SC = Concentration

RPD = I MS - MSD I * 2/(MS + MSD)

MS = Matrix spike percent recovery

MSD = Matrix spike duplicate percent recovery

MS/MSD samples: 9/5

Compound	Spike Added (ug/kg)		Sample Concentration (ug/kg)	Spiked Sample Concentration (ug/kg)		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	-	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
gamma-BHC											
4,4'-DDT											
Aroclor 1260 1242	175	175	0	264	240	151	151	138	137	9	9

Comments: Refer ot Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22234 D3b
SDG #: Su Cmar

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

Reviewer: JVG
2nd Reviewer: [illegible]

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 Where: SSC = Spiked sample concentration; SA = Spike added; SC = Concentration

RPD = | LCS - LCSD | * 2/(LCS + LCSD) LCS = Laboratory control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: 98281 LCS/D

Compound	Spike Added (ug/kg)		Spiked Sample Concentration (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
gamma-BHC										
4,4'-DDT										
Aroclor ~~1260~~ 1242	167	167	155	161	93	93	97	96	4	4

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 #: 22234 D3b
SDG #: Sq Cmr

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: DVB
2nd reviewer: [signature]

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Example:

DB 1701

Sample I.D. #1 1260:
1260-1

Conc. = (40615) / (5.012 e2)

= 81.036

1260 Ave = (81.036 + 83.437 + 60.709 + 180.720 + 81.255) / 5

= 97.5302

final conc. = (97.5302)(10 ml) / (30g)(0.954)

= 34.08

≈ 34 ug/kg

#	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 7 through October 8, 2009

LDC Report Date: January 1, 2010

Matrix: Soil

Parameters: Polychlorinated Biphenyls

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905744

Sample Identification

SA192-0.5B
SA192-39B

Introduction

This data review covers 2 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.

Samples FB080309-SO and FB080309-SORE (both from SDG R0904279) were identified as field blanks. No polychlorinated biphenyl contaminants were found in these blanks.

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
SA192-39B	Not specified	Tetrachloro-m-xylene	156 (40-140)	All TCL compounds	J+ (all detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

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 R0905744	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
Polychlorinated Biphenyls - Data Qualification Summary - SDG R0905744

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905744	SA192-39B	All TCL compounds	J+ (all detects)	P	Surrogate spikes (%R) (s)
R0905744	SA192-0.5B SA192-39B	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 R0905744

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Polychlorinated Biphenyls - Field Blank Data Qualification Summary - SDG R0905744

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234E3b
SDG #: R0905744
Laboratory: Columbia Analytical Services

Date: 12/24/09
Page: 1 of 1
Reviewer: JVG
2nd Reviewer: [signature]

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: 10/07 - 08/09
II.	GC/ECD Instrument Performance Check	N	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 20%
V.	Blanks	A	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	N	Client spec
VIII.	Laboratory control samples	A	LCS/D
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 = FB080309-SO (R0904279) FB080309-SO RE

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Soil

1	SA192-0.5B	11		21		31	
2	SA192-39B	12		22		32	
3	98362-MB	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	

LDC #: 22234 E36
SDG #: Sq Cmer

VALIDATION FINDINGS WORKSHEET
Surrogate Spikes

Page: 1 of 1
Reviewer: JV6
2nd Reviewer: [signature]

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".

Y (N) N/A Were surrogates spiked into all samples, standards and blanks?
Y (N) N/A Did all surrogate percent recoveries (%R) meet the QC limits?

#	Date	Sample ID	Column	Surrogate Compound	%R (Limits)	Qualifications
		2	NS	A	156 (40-140)	J+ detS/P (S)
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	

Letter Designation	Surrogate Compound	Recovery QC Limits (Soil)	Recovery QC Limits (Water)	Comments
A	Tetrachoro-m-xylene			
B	Decachlorobiphenyl			

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 13, 2009

LDC Report Date: December 31, 2009

Matrix: Soil

Parameters: Polychlorinated Biphenyls

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905882

Sample Identification

RSAN8-10B
RSAN8-20B
RSAN8-20BMS
RSAN8-20BMSD

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) 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 R0905882	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
Polychlorinated Biphenyls - Data Qualification Summary - SDG R0905882

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905882	RSAN8-10B RSAN8-20B	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 R0905882

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Polychlorinated Biphenyls - Field Blank Data Qualification Summary - SDG R0905882

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234G3b
SDG #: R0905882
Laboratory: Columbia Analytical Services

Date: 12/24/09
Page: 1 of 1
Reviewer: JVG
2nd Reviewer: [illegible]

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: 10/13/09
II.	GC/ECD Instrument Performance Check	N	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 20%
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS
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-SO (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:

Soil

1	RSAN8-10B	11	98631-MB	21		31	
2	RSAN8-20B	12		22		32	
3	RSAN8-20BMS	13		23		33	
4	RSAN8-20BMSD	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: October 20 through October 21, 2009

LDC Report Date: January 1, 2010

Matrix: Soil

Parameters: Polychlorinated Biphenyls

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906024

Sample Identification

SA33-0.5B
SA33009-0.5B
SA33-33B
SA33-0.0B
SA52-15B
SA52-28B
SA33-33BMS
SA33-33BMSD

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 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.

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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 with the following exceptions:

Sample	Column	Surrogate	%R (Limits)	Compound	Flag	A or P
SA33-0.5B	Not specified	Decachlorobiphenyl	460 (40-140)	All TCL compounds	J+ (all detects)	P

Sample	Column	Surrogate	%R (Limits)	Compound	Flag	A or P
SA33009-0.5B	Not specified	Decachlorobiphenyl	653 (40-140)	All TCL compounds	J+ (all detects)	P
SA33-0.0B	Not specified	Decachlorobiphenyl	366 (40-140)	All TCL compounds	J+ (all detects)	P
SA52-15B	Not specified	Decachlorobiphenyl	215 (40-140)	All TCL compounds	J+ (all detects)	P

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 R0906024	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

Samples SA33-0.5B and SA33009-0.5B were identified as field duplicates. No polychlorinated biphenyls were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA33-0.5B	SA33009-0.5B				
Aroclor-1260	320	510	46 (≤50)	-	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Polychlorinated Biphenyls - Data Qualification Summary - SDG R0906024

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906024	SA33-0.5B SA33009-0.5B SA33-0.0B SA52-15B	All TCL compounds	J+ (all detects)	P	Surrogate spikes (%R) (s)
R0906024	SA33-0.5B SA33009-0.5B SA33-33B SA33-0.0B SA52-15B SA52-28B	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 R0906024

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Polychlorinated Biphenyls - Field Blank Data Qualification Summary - SDG R0906024

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234J3b
SDG #: R0906024
Laboratory: Columbia Analytical Services

Date: 12/23/09
Page: 1 of 1
Reviewer: JVG
2nd Reviewer: V

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: 10/20 - 21/09
II.	GC/ECD Instrument Performance Check	N	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 20%
V.	Blanks	A	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS/D
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	SW	D = 1,2
XV.	Field blanks	ND	FB = FB082809-SO (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: Soil

1	SA33-0.5B D	11	99194-MB	21		31	
2	SA33009-0.5B D	12		22		32	
3	SA33-33B	13		23		33	
4	SA33-0.0B	14		24		34	
5	SA52-15B	15		25		35	
6	SA52-28B	16		26		36	
7	SA33-33BMS	17		27		37	
8	SA33-33BMSD	18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 22734J26
SDG #: Su Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Spikes

Reviewer: DVG
2nd Reviewer: L

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".

(Y) N N/A Were surrogates spiked into all samples, standards and blanks?

Y (N) N/A Did all surrogate percent recoveries (%R) meet the QC limits?

#	Date	Sample ID	Column	Surrogate Compound	%R (Limits)	Qualifications
		1	NS	B	460 (40-140)	J+ dets / P
		2			653 ( )	
		4			366 ( )	
		5	✓	✓	215 (✓)	✓ ✓
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	

Letter Designation	Surrogate Compound	Recovery QC Limits (Soil)	Recovery QC Limits (Water)	Comments
A	Tetrachloro-m-xylene			
B	Decachlorobiphenyl			

LDC #: 22234J3b
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: JVB
2nd reviewer: [signature]

METHOD: GC Pesticides/PCBs (EPA SW846 Method 8081/8082)

(Y) N N/A Were field duplicate pairs identified in this SDG?
Y (N) N/A Were target compounds detected in thie field duplicate pairs?

Compound	Concentration (ug/kg)		RPD (≤50% Parent only)
	1	2	
Aroclor 1260	320	510	46

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 26, 2009

LDC Report Date: January 15, 2010

Matrix: Soil

Parameters: Polychlorinated Biphenyls

Validation Level: Stage 4

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906123

Sample Identification

SA34-10B
SA34-31B

Introduction

This data review covers 2 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.

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

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 R0906123	All compounds reported below the PQL.	J (all detects)	A

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 R0906123

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906123	SA34-10B SA34-31B	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 R0906123

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Polychlorinated Biphenyls - Field Blank Data Qualification Summary - SDG R0906123

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 4

LDC #: 22234M3b
SDG #: R0906123
Laboratory: Columbia Analytical Services

Date: 1/13/10
Page: 1 of 1
Reviewer: JVL
2nd Reviewer: [signature]

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: 10/26/09
II.	GC/ECD Instrument Performance Check	N	
III.	Initial calibration	A	
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 20%
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	client spec
VIII.	Laboratory control samples	A	LCS/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	ND	FB = FB082809-SO (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: soil

1	SA34-10B	11		21		31	
2	SA34-31B	12		22		32	
3	99356-MB	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	

LDC #: 22234 M3b
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Reviewer: JVG
2nd Reviewer: [illegible]

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% for individual breakdown in the Evaluation mix standards?			✓	
Was a continuing calibration analyzed daily?			✓	
Were all percent differences (%D) ≤ 20% or percent recovieries 80-120%?	✓			
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?	✓			
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				

LDC #: 27334 M3b
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Reviewer: JVG
2nd Reviewer: W

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 #: 22234 #36
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: JVG
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
Average CF = sum of the CF/number of standards
%RSD = 100 * (S/X)

Where: A = Area of compound
C = Concentration of compound
S = Standard deviation of calibration factors
X = Mean of calibration factors

#	Standard ID	Calibration Date	Compound	Reported CF (1st std)	Recalculated CF (1st std)	Reported CF (initial)	Recalculated CF (intial)	Reported %RSD	Recalculated %RSD
1	ICAL	11/04/09	1260-1 (DB 1701)	6.617e2	661.66	5.571 ex	5.571 ex	13.70	13.70
			↓ (DB 17)	6.014 ex	601.37	5.007 ex	5.007 ex	14.40	14.40
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 #: 22234#36
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: JM
2nd Reviewer: [signature]

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)

#	Standard ID	Calibration Date/Time	Compound	Average CF/ CCV Conc	Reported CF/Conc CCV	Recalculated CF/Conc CCV	Reported %D	Recalculated %D
1	CCV05B	11/05/09	260-1 (DB-1701)	557.115	542.458	542.458	2.6	2.6
			↓ (DB-17)	500.695	477.130	477.130	4.7	4.7
2								
3								
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.

LDC #: 22234 M3b
SDG #: Su Cover

VALIDATION FINDINGS WORKSHEET

Surrogate Results Verification

Page: 1 of 1
Reviewer: JVG
2nd reviewer: ✓

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: #1

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
Tetrachloro-m-xylene						
Tetrachloro-m-xylene	~~DB~~ DB1701	100	66.56 ✓	67	67	0
Decachlorobiphenyl	DB17	↓	76.96 ✓	77	77	↓
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 #: 22234 M3b
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

Page: 1 of 1
Reviewer: JVG
2nd Reviewer: L

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

Where: SSC = Spiked sample concentration
SA = Spike added
SC = Concentration

RPD = I LCS - LCSD I * 2/(LCS + LCSD)

LCS = Laboratory control sample percent recovery
LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: 99356 LCS/D

Compound	Spike Added (ug/kg)		Spiked Sample Concentration (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
gamma-BHC										
4,4'-DDT										
Aroclor 1260	167	167	98.5	118.	59	59	71	71	18	18

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 #: 22234 M3b
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: JM
2nd reviewer:

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Example:

Sample I.D. _____ ND:

Conc. = (_____)
( )

=

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

Note: _____

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Data Validation Reports
LDC #22234

Polychlorinated Biphenyls as Congeners

LDC

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: August 5, 2009

LDC Report Date: January 6, 2010

Matrix: Soil

Parameters: Polychlorinated Biphenyls as Congeners

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0904329

Sample Identification

RSAU5-0.5B
RSAU5-50B

Introduction

This data review covers 2 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 1668A for Polychlorinated Biphenyls as Congeners.

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 Polychlorinated Dioxins/Dibenzofurans Data Review (September 2005) 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. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required daily frequency and all criteria were met.

III. Initial Calibration

A five point initial calibration was performed as required by the method.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for unlabeled compounds and less than or equal to 35.0% for labeled compounds.

The ion abundance ratios for all compounds were within validation criteria.

IV. Routine Calibration (Continuing)

Routine calibration was performed at the required frequencies.

All of the routine calibration percent differences (%D) between the initial calibration RRF and the routine calibration RRF were less than or equal to 30.0% for unlabeled compounds and less than or equal to 50.0% for labeled compounds.

The ion abundance ratios for all compounds were within validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polychlorinated biphenyls as congeners contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Extraction Date	Compound	Concentration	Associated Samples
EQ0900308-01	8/11/09	PCB-8	26.4 ng/Kg	All samples in SDG R0904329
		PCB-11	209 ng/Kg	
		PCB-19	2.46 ng/Kg	
		PCB-18+30	23.0 ng/Kg	
		PCB-17	11.2 ng/Kg	
		PCB-27	1.51 ng/Kg	
		PCB-16	12.4 ng/Kg	
		PCB-32	6.55 ng/Kg	
		PCB-26+29	7.36 ng/Kg	
		PCB-25	3.60 ng/Kg	

Method Blank ID	Extraction Date	Compound	Concentration	Associated Samples
EQ0900308-01 (continued)	8/11/09	PCB-31	40.7 ng/Kg	All samples in SDG R0904329
		PCB-20+28	42.4 ng/Kg	
		PCB-21+33	27.7 ng/Kg	
		PCB-22	16.0 ng/Kg	
		PCB-35	2.30 ng/Kg	
		PCB-37	11.6 ng/Kg	
		PCB-52	49.2 ng/Kg	
		PCB-49+69	16.7 ng/Kg	
		PCB-48	5.33 ng/Kg	
		PCB-44+47+65	30.6 ng/Kg	
		PCB-42	6.13 ng/Kg	
		PCB-41+71+40	12.1 ng/Kg	
		PCB-64	11.3 ng/Kg	
		PCB-70+61+74+76	39.6 ng/Kg	
		PCB-66	16.2 ng/Kg	
		PCB-56	7.57 ng/Kg	
		PCB-60	5.04 ng/Kg	
		PCB-77	1.99 ng/Kg	
		PCB-103	6.61 ng/Kg	
		PCB-94	4.58 ng/Kg	
		PCB-95	94.0 ng/Kg	
		PCB-88+91	9.34 ng/Kg	
		PCB-84	19.1 ng/Kg	
		PCB-121	7.87 ng/Kg	
		PCB-92	28.7 ng/Kg	
		PCB-90+101+113	114 ng/Kg	
		PCB-83+99	22.8 ng/Kg	
		PCB-85+116	6.27 ng/Kg	
		PCB-110+115	81.4 ng/Kg	
		PCB-82	3.61 ng/Kg	
		PCB-120	5.56 ng/Kg	
		PCB-118	45.8 ng/Kg	
		PCB-105	12.7 ng/Kg	
		PCB-136	24.5 ng/Kg	
		PCB-135+151	68.5 ng/Kg	
		PCB-144	11.1 ng/Kg	
		PCB-147+149	127 ng/Kg	
		PCB-134	7.75 ng/Kg	
		PCB-131	1.70 ng/Kg	
		PCB-132	44.4 ng/Kg	
		PCB-133	3.77 ng/Kg	
		PCB-146	18.8 ng/Kg	
		PCB-153+168	143 ng/Kg	
		PCB-141	33.1 ng/Kg	
		PCB-130	4.69 ng/Kg	
		PCB-164	9.74 ng/Kg	
		PCB-129+138+163	138 ng/Kg	
		PCB-158	12.0 ng/Kg	
		PCB-128+166	12.7 ng/Kg	
		PCB-159	0.949 ng/Kg	
		PCB-167	4.76 ng/Kg	
		PCB-156+157	10.5 ng/Kg	
		PCB-179	12.6 ng/Kg	
		PCB-176	5.34 ng/Kg	
		PCB-178	5.60 ng/Kg	
		PCB-175	1.31 ng/Kg	
		PCB-187	31.2 ng/Kg	
		PCB-183	11.3 ng/Kg	
		PCB-174	27.7 ng/Kg	
		PCB-177	6.40 ng/Kg	
		PCB-171+173	7.63 ng/Kg	

Method Blank ID	Extraction Date	Compound	Concentration	Associated Samples
EQ0900308-01 (continued)	8/11/09	PCB-172	6.36 ng/Kg	All samples in SDG R0904329
		PCB-180+193	42.2 ng/Kg	
		PCB-170	21.0 ng/Kg	
		PCB-190	3.37 ng/Kg	
		PCB-202	3.69 ng/Kg	
		PCB-201	1.47 ng/Kg	
		PCB-200	1.32 ng/Kg	
		PCB-198+199	19.0 ng/Kg	
		PCB-196	4.00 ng/Kg	
		PCB-203	10.1 ng/Kg	
		PCB-195	1.98 ng/Kg	
		PCB-194	6.86 ng/Kg	
		PCB-208	9.95 ng/Kg	
		PCB-207	2.89 ng/Kg	
		PCB-206	30.9 ng/Kg	
		PCB-209	101 ng/Kg	
		Total DiCB	235 ng/Kg	
		Total TriCB	209 ng/Kg	
		Total TetraCB	202 ng/Kg	
		Total PentaCB	517 ng/Kg	
		Total HexaCB	678 ng/Kg	
		Total HeptaCB	182 ng/Kg	
		Total OctaCB	48.4 ng/Kg	
		Total NonaCB	43.8 ng/Kg	

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 Concentration	Modified Final Concentration
RSAU5-0.5B	PCB-8	44.1 ng/Kg	44.1U ng/Kg
	PCB-11	660 ng/Kg	660U ng/Kg
	PCB-19	4.86 ng/Kg	4.86U ng/Kg
	PCB-18+30	21.9 ng/Kg	21.9U ng/Kg
	PCB-17	19.6 ng/Kg	19.6U ng/Kg
	PCB-27	2.55 ng/Kg	2.55U ng/Kg
	PCB-16	26.4 ng/Kg	26.4U ng/Kg
	PCB-32	11.1 ng/Kg	11.1U ng/Kg
	PCB-26+29	9.64 ng/Kg	9.64U ng/Kg
	PCB-25	4.05 ng/Kg	4.05U ng/Kg
	PCB-31	51.0 ng/Kg	51.0U ng/Kg
	PCB-20+28	62.4 ng/Kg	62.4U ng/Kg
	PCB-21+33	36.0 ng/Kg	36.0U ng/Kg
	PCB-22	22.1 ng/Kg	22.1U ng/Kg
	PCB-35	4.40 ng/Kg	4.40U ng/Kg
	PCB-37	12.5 ng/Kg	12.5U ng/Kg
	PCB-52	52.0 ng/Kg	52.0U ng/Kg
	PCB-49+69	18.8 ng/Kg	18.8U ng/Kg
	PCB-48	6.71 ng/Kg	6.71U ng/Kg
	PCB-44+47+65	35.5 ng/Kg	35.5U ng/Kg
	PCB-42	6.87 ng/Kg	6.87U ng/Kg
	PCB-41+71+40	13.7 ng/Kg	13.7U ng/Kg
	PCB-64	12.2 ng/Kg	12.2U ng/Kg
	PCB-70+61+74+76	42.8 ng/Kg	42.8U ng/Kg
	PCB-66	16.6 ng/Kg	16.6U ng/Kg

Sample	Compound	Reported Concentration	Modified Final Concentration
RSAU5-0.5B (continued)	PCB-56	10.1 ng/Kg	10.1U ng/Kg
	PCB-60	6.48 ng/Kg	6.48U ng/Kg
	PCB-77	4.12 ng/Kg	4.12U ng/Kg
	PCB-103	2.93 ng/Kg	2.93U ng/Kg
	PCB-94	1.38 ng/Kg	1.38U ng/Kg
	PCB-95	76.3 ng/Kg	76.3U ng/Kg
	PCB-88+91	11.1 ng/Kg	11.1U ng/Kg
	PCB-84	17.5 ng/Kg	17.5U ng/Kg
	PCB-121	4.83 ng/Kg	4.83U ng/Kg
	PCB-92	15.3 ng/Kg	15.3U ng/Kg
	PCB-90+101+113	105 ng/Kg	105U ng/Kg
	PCB-83+99	24.1 ng/Kg	24.1U ng/Kg
	PCB-85+116	10.5 ng/Kg	10.5U ng/Kg
	PCB-110+115	91.7 ng/Kg	91.7U ng/Kg
	PCB-82	4.68 ng/Kg	4.68U ng/Kg
	PCB-120	4.56 ng/Kg	4.56U ng/Kg
	PCB-118	42.6 ng/Kg	42.6U ng/Kg
	PCB-105	14.6 ng/Kg	14.6U ng/Kg
	PCB-136	19.1 ng/Kg	19.1U ng/Kg
	PCB-135+151	62.5 ng/Kg	62.5U ng/Kg
	PCB-144	13.3 ng/Kg	13.3U ng/Kg
	PCB-147+149	124 ng/Kg	124U ng/Kg
	PCB-134	9.07 ng/Kg	9.07U ng/Kg
	PCB-131	5.13 ng/Kg	5.13U ng/Kg
	PCB-132	51.2 ng/Kg	51.2U ng/Kg
	PCB-133	8.54 ng/Kg	8.54U ng/Kg
	PCB-146	33.2 ng/Kg	33.2U ng/Kg
	PCB-153+168	122 ng/Kg	122U ng/Kg
	PCB-141	33.9 ng/Kg	33.9U ng/Kg
	PCB-130	12.6 ng/Kg	12.6U ng/Kg
	PCB-164	20.0 ng/Kg	20.0U ng/Kg
	PCB-129+138+163	139 ng/Kg	139U ng/Kg
	PCB-158	16.3 ng/Kg	16.3U ng/Kg
	PCB-128+166	20.1 ng/Kg	20.1U ng/Kg
	PCB-167	11.8 ng/Kg	11.8U ng/Kg
	PCB-156+157	18.0 ng/Kg	18.0U ng/Kg
	PCB-179	21.2 ng/Kg	21.2U ng/Kg
	PCB-176	19.2 ng/Kg	19.2U ng/Kg
	PCB-178	22.1 ng/Kg	22.1U ng/Kg
	PCB-187	53.0 ng/Kg	53.0U ng/Kg
	PCB-183	44.0 ng/Kg	44.0U ng/Kg
	PCB-174	44.1 ng/Kg	44.1U ng/Kg
	PCB-177	15.2 ng/Kg	15.2U ng/Kg
	PCB-180+193	99.0 ng/Kg	99.0U ng/Kg
	PCB-170	36.2 ng/Kg	36.2U ng/Kg
	Total DiCB	755 ng/Kg	755U ng/Kg
	Total TriCB	289 ng/Kg	289U ng/Kg
	Total TetraCB	260 ng/Kg	260U ng/Kg
	Total PentaCB	468 ng/Kg	468U ng/Kg
	Total HexaCB	798 ng/Kg	798U ng/Kg
	Total HeptaCB	622 ng/Kg	622U ng/Kg

Sample	Compound	Reported Concentration	Modified Final Concentration
RSAU5-50B	PCB-11	766 ng/Kg	766U ng/Kg
	PCB-19	5.50 ng/Kg	5.50U ng/Kg
	PCB-18+30	29.2 ng/Kg	29.2U ng/Kg
	PCB-17	20.5 ng/Kg	20.5U ng/Kg
	PCB-27	2.78 ng/Kg	2.78U ng/Kg
	PCB-32	12.3 ng/Kg	12.3U ng/Kg
	PCB-26+29	13.8 ng/Kg	13.8U ng/Kg
	PCB-25	4.86 ng/Kg	4.86U ng/Kg
	PCB-31	68.7 ng/Kg	68.7U ng/Kg
	PCB-20+28	77.2 ng/Kg	77.2U ng/Kg
	PCB-21+33	47.7 ng/Kg	47.7U ng/Kg
	PCB-22	28.3 ng/Kg	28.3U ng/Kg
	PCB-35	3.20 ng/Kg	3.20U ng/Kg
	PCB-37	12.0 ng/Kg	12.0U ng/Kg
	PCB-52	50.1 ng/Kg	50.1U ng/Kg
	PCB-49+69	18.4 ng/Kg	18.4U ng/Kg
	PCB-48	6.85 ng/Kg	6.85U ng/Kg
	PCB-44+47+65	34.8 ng/Kg	34.8U ng/Kg
	PCB-42	7.97 ng/Kg	7.97U ng/Kg
	PCB-41+71+40	14.4 ng/Kg	14.4U ng/Kg
	PCB-64	12.8 ng/Kg	12.8U ng/Kg
	PCB-70+61+74+76	40.5 ng/Kg	40.5U ng/Kg
	PCB-66	16.3 ng/Kg	16.3U ng/Kg
	PCB-56	11.6 ng/Kg	11.6U ng/Kg
	PCB-60	6.23 ng/Kg	6.23U ng/Kg
	PCB-77	1.48 ng/Kg	1.48U ng/Kg
	PCB-95	44.6 ng/Kg	44.6U ng/Kg
	PCB-88+91	4.30 ng/Kg	4.30U ng/Kg
	PCB-84	11.2 ng/Kg	11.2U ng/Kg
	PCB-92	12.0 ng/Kg	12.0U ng/Kg
	PCB-90+101+113	80.3 ng/Kg	80.3U ng/Kg
	PCB-83+99	20.0 ng/Kg	20.0U ng/Kg
	PCB-85+116	4.45 ng/Kg	4.45U ng/Kg
	PCB-110+115	58.5 ng/Kg	58.5U ng/Kg
	PCB-82	2.13 ng/Kg	2.13U ng/Kg
	PCB-118	37.4 ng/Kg	37.4U ng/Kg
	PCB-105	12.5 ng/Kg	12.5U ng/Kg
	PCB-136	11.6 ng/Kg	11.6U ng/Kg
	PCB-135+151	30.5 ng/Kg	30.5U ng/Kg
	PCB-144	4.53 ng/Kg	4.53U ng/Kg
	PCB-147+149	85.1 ng/Kg	85.1U ng/Kg
	PCB-134	4.91 ng/Kg	4.91U ng/Kg
	PCB-131	1.25 ng/Kg	1.25U ng/Kg
	PCB-132	35.4 ng/Kg	35.4U ng/Kg
	PCB-133	1.30 ng/Kg	1.30U ng/Kg
	PCB-146	14.2 ng/Kg	14.2U ng/Kg
	PCB-153+168	94.0 ng/Kg	94.0U ng/Kg
	PCB-141	26.4 ng/Kg	26.4U ng/Kg
	PCB-130	5.25 ng/Kg	5.25U ng/Kg
	PCB-164	8.01 ng/Kg	8.01U ng/Kg
	PCB-129+138+163	98.0 ng/Kg	98.0U ng/Kg
	PCB-158	9.39 ng/Kg	9.39U ng/Kg
	PCB-128+166	11.6 ng/Kg	11.6U ng/Kg
	PCB-159	1.04 ng/Kg	1.04U ng/Kg
	PCB-167	3.79 ng/Kg	3.79U ng/Kg
	PCB-156+157	8.82 ng/Kg	8.82U ng/Kg
	PCB-179	7.98 ng/Kg	7.98U ng/Kg
	PCB-176	2.43 ng/Kg	2.43U ng/Kg
	PCB-178	4.27 ng/Kg	4.27U ng/Kg
	PCB-187	22.4 ng/Kg	22.4U ng/Kg
	PCB-183	15.6 ng/Kg	15.6U ng/Kg

Sample	Compound	Reported Concentration	Modified Final Concentration
RSAU5-50B (continued)	PCB-174	22.1 ng/Kg	22.1U ng/Kg
	PCB-177	2.91 ng/Kg	2.91U ng/Kg
	PCB-171+173	6.77 ng/Kg	6.77U ng/Kg
	PCB-172	3.27 ng/Kg	3.27U ng/Kg
	PCB-180+193	40.0 ng/Kg	40.0U ng/Kg
	PCB-170	19.7 ng/Kg	19.7U ng/Kg
	PCB-190	3.61 ng/Kg	3.61U ng/Kg
	PCB-202	4.88 ng/Kg	4.88U ng/Kg
	PCB-201	1.09 ng/Kg	1.09U ng/Kg
	PCB-198+199	23.5 ng/Kg	23.5U ng/Kg
	PCB-196	4.08 ng/Kg	4.08U ng/Kg
	PCB-203	14.5 ng/Kg	14.5U ng/Kg
	PCB-194	9.41 ng/Kg	9.41U ng/Kg
	PCB-208	12.0 ng/Kg	12.0U ng/Kg
	PCB-207	3.33 ng/Kg	3.33U ng/Kg
	PCB-206	41.6 ng/Kg	41.6U ng/Kg
	PCB-209	106 ng/Kg	106U ng/Kg
	Total DiCB	766 ng/Kg	766U ng/Kg
	Total TriCB	339 ng/Kg	339U ng/Kg
	Total TetraCB	239 ng/Kg	239U ng/Kg
	Total PentaCB	329 ng/Kg	329U ng/Kg
	Total HexaCB	458 ng/Kg	458U ng/Kg
	Total HeptaCB	151 ng/Kg	151U ng/Kg
	Total OctaCB	57.4 ng/Kg	57.4U ng/Kg
	Total NonaCB	56.9 ng/Kg	56.9U ng/Kg

No field blanks were identified in this SDG.

VI. 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.

VII. 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
EQ0900308-02/03 (All samples in SDG R0904329)	PCB-209	167 (50-150)	163 (50-150)	-	J+ (all detects)	P

VIII. Regional Quality Assurance and Quality Control

Not applicable.

IX. Internal Standards

All internal standard percent recoveries (%R) were within QC limits.

X. Target Compound Identifications

Raw data were not reviewed for this SDG.

XI. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0904329	All compounds reported below the PQL.	J (all detects)	A

All compounds reported as EMPC were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0904329	All compounds reported as estimated maximum possible concentration (EMPC).	JK (all detects)	A

Raw data were not reviewed for this SDG.

XII. System Performance

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 as Congeners - Data Qualification Summary - SDG R0904329

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0904329	RSAU5-0.5B RSAU5-50B	PCB-209	J+ (all detects)	P	Laboratory control samples (%R) (l)
R0904329	RSAU5-0.5B RSAU5-50B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0904329	RSAU5-0.5B RSAU5-50B	All compounds reported as EMPC	JK (all detects)	A	Project Quantitation Limit (k)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Polychlorinated Biphenyls as Congeners - Laboratory Blank Data Qualification Summary - SDG R0904329

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0904329	RSAU5-0.5B	PCB-8	44.1U ng/Kg	A	bl
		PCB-11	660U ng/Kg		
		PCB-19	4.86U ng/Kg		
		PCB-18+30	21.9U ng/Kg		
		PCB-17	19.6U ng/Kg		
		PCB-27	2.55U ng/Kg		
		PCB-16	26.4U ng/Kg		
		PCB-32	11.1U ng/Kg		
		PCB-26+29	9.64U ng/Kg		
		PCB-25	4.05U ng/Kg		
		PCB-31	51.0U ng/Kg		
		PCB-20+28	62.4U ng/Kg		
		PCB-21+33	36.0U ng/Kg		
		PCB-22	22.1U ng/Kg		
		PCB-35	4.40U ng/Kg		
		PCB-37	12.5U ng/Kg		
		PCB-52	52.0U ng/Kg		
		PCB-49+69	18.8U ng/Kg		
		PCB-48	6.71U ng/Kg		
		PCB-44+47+65	35.5U ng/Kg		
		PCB-42	6.87U ng/Kg		
		PCB-41+71+40	13.7U ng/Kg		
		PCB-64	12.2U ng/Kg		
		PCB-70+61+74+76	42.8U ng/Kg		
		PCB-66	16.6U ng/Kg		

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0904329	RSAU5-0.5B (continued)	PCB-56	10.1U ng/Kg	A	bl
		PCB-60	6.48U ng/Kg		
		PCB-77	4.12U ng/Kg		
		PCB-103	2.93U ng/Kg		
		PCB-94	1.38U ng/Kg		
		PCB-95	76.3U ng/Kg		
		PCB-88+91	11.1U ng/Kg		
		PCB-84	17.5U ng/Kg		
		PCB-121	4.83U ng/Kg		
		PCB-92	15.3U ng/Kg		
		PCB-90+101+113	105U ng/Kg		
		PCB-83+99	24.1U ng/Kg		
		PCB-85+116	10.5U ng/Kg		
		PCB-110+115	91.7U ng/Kg		
		PCB-82	4.68U ng/Kg		
		PCB-120	4.56U ng/Kg		
		PCB-118	42.6U ng/Kg		
		PCB-105	14.6U ng/Kg		
		PCB-136	19.1U ng/Kg		
		PCB-135+151	62.5U ng/Kg		
		PCB-144	13.3U ng/Kg		
		PCB-147+149	124U ng/Kg		
		PCB-134	9.07U ng/Kg		
		PCB-131	5.13U ng/Kg		
		PCB-132	51.2U ng/Kg		
		PCB-133	8.54U ng/Kg		
		PCB-146	33.2U ng/Kg		
		PCB-153+168	122U ng/Kg		
		PCB-141	33.9U ng/Kg		
		PCB-130	12.6U ng/Kg		
		PCB-164	20.0U ng/Kg		
		PCB-129+138+163	139U ng/Kg		
		PCB-158	16.3U ng/Kg		
		PCB-128+166	20.1U ng/Kg		
		PCB-167	11.8U ng/Kg		
		PCB-156+157	18.0U ng/Kg		
		PCB-179	21.2U ng/Kg		
		PCB-176	19.2U ng/Kg		
		PCB-178	22.1U ng/Kg		
		PCB-187	53.0U ng/Kg		
		PCB-183	44.0U ng/Kg		
		PCB-174	44.1U ng/Kg		
		PCB-177	15.2U ng/Kg		
		PCB-180+193	99.0U ng/Kg		
		PCB-170	36.2U ng/Kg		
		Total DiCB	755U ng/Kg		
		Total TriCB	289U ng/Kg		
		Total TetraCB	260U ng/Kg		
		Total PentaCB	468U ng/Kg		
		Total HexaCB	798U ng/Kg		
		Total HeptaCB	622U ng/Kg		

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0904329	RSAU5-50B	PCB-11	766U ng/Kg	A	bl
		PCB-19	5.50U ng/Kg		
		PCB-18+30	29.2U ng/Kg		
		PCB-17	20.5U ng/Kg		
		PCB-27	2.78U ng/Kg		
		PCB-32	12.3U ng/Kg		
		PCB-26+29	13.8U ng/Kg		
		PCB-25	4.86U ng/Kg		
		PCB-31	68.7U ng/Kg		
		PCB-20+28	77.2U ng/Kg		
		PCB-21+33	47.7U ng/Kg		
		PCB-22	28.3U ng/Kg		
		PCB-35	3.20U ng/Kg		
		PCB-37	12.0U ng/Kg		
		PCB-52	50.1U ng/Kg		
		PCB-49+69	18.4U ng/Kg		
		PCB-48	6.85U ng/Kg		
		PCB-44+47+65	34.8U ng/Kg		
		PCB-42	7.97U ng/Kg		
		PCB-41+71+40	14.4U ng/Kg		
		PCB-64	12.8U ng/Kg		
		PCB-70+61+74+76	40.5U ng/Kg		
		PCB-66	16.3U ng/Kg		
		PCB-56	11.6U ng/Kg		
		PCB-60	6.23U ng/Kg		
		PCB-77	1.48U ng/Kg		
		PCB-95	44.6U ng/Kg		
		PCB-88+91	4.30U ng/Kg		
		PCB-84	11.2U ng/Kg		
		PCB-92	12.0U ng/Kg		
		PCB-90+101+113	80.3U ng/Kg		
		PCB-83+99	20.0U ng/Kg		
		PCB-85+116	4.45U ng/Kg		
		PCB-110+115	58.5U ng/Kg		
		PCB-82	2.13U ng/Kg		
		PCB-118	37.4U ng/Kg		
		PCB-105	12.5U ng/Kg		
		PCB-136	11.6U ng/Kg		
		PCB-135+151	30.5U ng/Kg		
		PCB-144	4.53U ng/Kg		
		PCB-147+149	85.1U ng/Kg		
		PCB-134	4.91U ng/Kg		
		PCB-131	1.25U ng/Kg		
		PCB-132	35.4U ng/Kg		
		PCB-133	1.30U ng/Kg		
		PCB-146	14.2U ng/Kg		
		PCB-153+168	94.0U ng/Kg		
		PCB-141	26.4U ng/Kg		
		PCB-130	5.25U ng/Kg		
		PCB-164	8.01U ng/Kg		
		PCB-129+138+163	98.0U ng/Kg		
		PCB-158	9.39U ng/Kg		
		PCB-128+166	11.6U ng/Kg		
		PCB-159	1.04U ng/Kg		
		PCB-167	3.79U ng/Kg		
		PCB-156+157	8.82U ng/Kg		
		PCB-179	7.98U ng/Kg		
		PCB-176	2.43U ng/Kg		
		PCB-178	4.27U ng/Kg		
		PCB-187	22.4U ng/Kg		
		PCB-183	15.6U ng/Kg		

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0904329	RSAU5-50B (continued)	PCB-174	22.1U ng/Kg	A	bl
		PCB-177	2.91U ng/Kg		
		PCB-171+173	6.77U ng/Kg		
		PCB-172	3.27U ng/Kg		
		PCB-180+193	40.0U ng/Kg		
		PCB-170	19.7U ng/Kg		
		PCB-190	3.61U ng/Kg		
		PCB-202	4.88U ng/Kg		
		PCB-201	1.09U ng/Kg		
		PCB-198+199	23.5U ng/Kg		
		PCB-196	4.08U ng/Kg		
		PCB-203	14.5U ng/Kg		
		PCB-194	9.41U ng/Kg		
		PCB-208	12.0U ng/Kg		
		PCB-207	3.33U ng/Kg		
		PCB-206	41.6U ng/Kg		
		PCB-209	106U ng/Kg		
		Total DiCB	766U ng/Kg		
		Total TriCB	339U ng/Kg		
		Total TetraCB	239U ng/Kg		
		Total PentaCB	329U ng/Kg		
		Total HexaCB	458U ng/Kg		
		Total HeptaCB	151U ng/Kg		
		Total OctaCB	57.4U ng/Kg		
		Total NonaCB	56.9U ng/Kg		

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Polychlorinated Biphenyls as Congeners - Field Blank Data Qualification Summary - SDG R0904329

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234A3c
SDG #: R0904329
Laboratory: Columbia Analytical Services

Date: 12/31/09
Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Polychlorinated Biphenyl Congeners (EPA Method 1668A)

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: 8/5/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	
IV.	Routine calibration/ICV	A	
V.	Blanks	SW	
VI.	Matrix spike/Matrix spike duplicates	N	client specified.
VII.	Laboratory control samples	SW	LCS/D
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	A	
X.	Target compound identifications	N	
XI.	Compound quantitation and CRQLs	N	
XII.	System performance	N	
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:

1	RSAU5-0.5B	11	220900308-01	21	U220215	31	
2	RSAU5-50B	12		22	U220227	32	
3		13		23	U220183	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	

LDC #: 22234A3c
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS PCB Congeners (EPA Method 1668)

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 method blank?
Y N N/A Was a method blank performed for each matrix and whenever a sample extraction was performed?
Y N N/A Was the method blank contaminated? If yes, please see qualification below.

Blank extraction date: 8/11/09 **Blank analysis date:** 8/22/09
Conc. units: ng/Kg **Associated samples:** All

Compound	Blank ID	Sample Identification								
	FQ0900308-01	(5X)	1	2						
PCB 8	26.4	132	44.1/U							
PCB 11	209	1045	660/U	766/U						
PCB 19	2.46	12.3	4.86/U	5.50/U						
PCBs 18+30	23.0	115	21.9/U	29.2U						
PCB 17	11.2	56	19.6/U	20.5/U						
PCB 27	1.51	7.55	2.55/U	2.78/U						
PCB 16	12.4	62	26.4/U							
PCB 32	6.55	32.75	11.1/U	12.3/U						
PCBs 26+29	7.36	36.8	9.64/U	13.8/U						
PCB 25	3.60	18	4.05/U	4.86/U						
PCB 31	40.7	203.5	51.0/U	68.7/U						
PCBs 20+28	42.4	212	62.4/U	77.2/U						
PCBs 21+33	27.7	138.5	36.0/U	47.7/U						
PCB 22	16.0	80	22.1/U	28.3/U						
PCB 35	2.30	11.5	4.40/U	3.20/U						
PCB 37	11.6	58	12.5/U	12.0/U						
PCB 52	49.2	246	52.0/U	50.1/U						
PCBs 49+69	16.7	83.5	18.8/U	18.4/U						
PCB 48	5.33	26.65	6.71/U	6.85/U						
PCBs 44+47+65	30.6	153	35.5/U	34.8/U						
PCB 42	6.13	30.65	6.87/U	7.97/U						

PCB 41+71+40	12.1	60.5	13.7/U	14.4/U						
PCB 64	11.3	56.5	12.2/U	12.8/U						
PCBs 70+61+74+76	39.6	198	42.8/U	40.5/U						
PCB 66	16.2	81	16.6/U	16.3/U						
PCB 56	7.57	37.85	10.1/U	11.6/U						
PCB 60	5.04	25.2	6.48/U	6.23/U						
PCB 77	1.99	9.95	4.12/U	1.48/U						
PCB 103	6.61	33.05	2.93/U							
PCB 94	4.58	22.9	1.38/U							
PCB 95	94.0	470	76.3/U	44.6/U						
PCBs 88+91	9.34	46.7	11.1/U	4.30/U						
PCB 84	19.1	95.5	17.5/U	11.2/U						
PCB 121	7.87	39.35	4.83/U							
PCB 92	28.7	143.5	15.3/U	12.0/U						
PCBs 90+101+113	114	570	105/U	80.3/U						
PCBs 83+99	22.8	114	24.1/U	20.0/U						
PCBs 85+116	6.27	31.35	10.5/U	4.45/U						
PCBs 110+115	81.4	407	91.7/U	58.5/U						
PCB 82	3.61	18.05	4.68/U	2.13/U						
PCB 120	5.56	27.8	4.56/U							
PCB 118	45.8	229	42.6/U	37.4/U						
PCB 105	12.7	63.5	14.6/U	12.5/U						
PCB 136	24.5	122.5	19.1/U	11.6/U						
PCB 135+151	68.5	342.5	62.5/U	30.5/U						
PCB 144	11.1	55.5	13.3/U	4.53/U						
PCBs 147+149	127	635	124/U	85.1/U						
PCB 134	7.75	38.75	9.07/U	4.91/U						
PCB 131	1.70	8.5	5.13/U	1.25/U						
PCB 132	44.4	222	51.2/U	35.4/U						
PCB 133	3.77	18.85	8.54/U	1.30/U						
PCB 146	18.8	94	33.2/U	14.2/U						

PCBs 153+168	143	715	122/U	94.0/U						
PCB 141	33.1	165.5	33.9/U	26.4/U						
PCB 130	4.69	23.45	12.6/U	5.25/U						
PCB 164	9.74	48.7	20.0/U	8.01/U						
PCBs 129+138+163	138	690	139/U	98.0/U						
PCB 158	12.0	60	16.3/U	9.39/U						
PCBs 128+166	12.7	63.5	20.1/U	11.6/U						
PCB 159	0.949	4.745	-	1.04/U						
PCB 167	4.76	23.8	11.8/U	3.79/U						
PCBs 156+157	10.5	52.5	18.0/U	8.82/U						
PCB 179	12.6	63	21.2/U	7.98/U						
PCB 176	5.34	26.7	19.2/U	2.43/U						
PCB 178	5.60	28	22.1/U	4.27/U						
PCB 175	1.31	6.55	-							
PCB 187	31.2	156	53.0/U	22.4/U						
PCB 183	11.3	56.5	44.0/U	15.6/U						
PCB 174	27.7	138.5	44.1/U	22.1/U						
PCB 177	6.40	32	15.2/U	2.91/U						
PCB 171+173	7.63	38.15	-	6.77/U						
PCB 172	6.36	31.8	-	3.27/U						
PCBs 180+193	42.2	211	99.0/U	40.0/U						
PCB 170	21.0	105	36.2/U	19.7/U						
PCB 190	3.37	16.85	-	3.61/U						
PCB 202	3.69	18.45	-	4.88/U						
PCB 201	1.47	7.35	-	1.09/U						
PCB 200	1.32	6.6	-							
PCBs 198+199	19.0	95	-	23.5/U						
PCB 196	4.00	20	-	4.08/U						
PCB 203	10.1	50.5	-	14.5/U						
PCB 195	1.98	9.9	-							
PCB 194	6.86	34.3	-	9.41/U						

PCB 208	9.95	49.75	-	12.0/U						
PCB 207	2.89	14.45	-	3.33/U						
PCB 206	30.9	154.5	-	41.6/U						
PCB 209	101	505	-	106/U						
Total DiCB	235	1175	755/U	766/U						
Total TriCB	209	1045	289/U	339/U						
Total TetraCB	202	1010	260/U	239/U						
Total PentaCB	517	2585	468/U	329/U						
Total HexaCB	678	3390	798/U	458/U						
Total HeptaCB	182	910	622/U	151/U						
Total OctaCB	48.4	242	-	57.4/U						
Total NonaCB	43.8	219	-	56.9/U						

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentr/ation were qualified as not detected, "U".

LDC #: 22234A3c
SDG #: Facility

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: 9
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Polychlorinated Biphenyls (EPA Method 1668)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was a LCS required?
Y N N/A Was a LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?
Y N N/A Were the LCS concentrations and relative percent difference (RPD) within the QC limits stated below?

#	Date	Lab ID/Reference	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		EQ090038-02/-03	PCB209	167 (50-150)	163 (50-150)	( )	All + Blk	Vt det's/P (L)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

Compound	QC Limits* (ng/mL)	QC Limits* RPD	Compound	QC Limits* (ng/mL)	QC Limits* RPD
PCB-77	7.0-16		PCB-157	6.4-17	
PCB-81	7.0-14		PCB-167	6.4-17	
PCB-105	6.8-16		PCB-169	7.0-14	
PCB-114	1.4-33		PCB-170	7.0-14	
PCB-118	6.4-16		PCB-180	7.0-14	
PCB-123	1.4-33		PCB-189	7.0-14	
PCB-126	6.8-16		*Based on a 10 ng/mL spike concentration		
PCB-156	6.4-17				

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Data Validation Reports
LDC #22234

Metals

LDC

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: August 4 through August 5, 2009

LDC Report Date: January 7, 2010

Matrix: Soil

Parameters: Metals

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0904329

Sample Identification

SA146-0.5B
SA146-10B
SA146-25B
SA146009-25B
SA146-40B
SA146-55B
SA147-0.5B
SA147-10B
SA147-25B
SA147009-25B
SA147-40B
SA147-56B
RSAU5-0.5B
RSAU5-10B
RSAU5-25B
RSAU5-40B
RSAU5-50B
RSAU5-55B
SA146-0.5BMS
SA146-0.5BDUP

Introduction

This data review covers 20 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 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 Manganese Tin	0.04 mg/Kg 0.02 mg/Kg 3.8 mg/Kg	All samples in SDG R0904329
ICB/CCB	Boron Magnesium Strontium Tungsten	8.0 ug/L 2.0 ug/L 0.10 ug/L 0.079 ug/L	All samples in SDG R0904329
ICB/CCB	Barium Manganese	0.60 ug/L 0.10 ug/L	SA146-0.5B SA146-10B SA146-25B SA146009-25B SA146-40B SA146-55B SA147-0.5B SA147-10B SA147-25B SA147009-25B SA147-40B SA147-56B

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Barium Manganese Titanium	0.40 ug/L 0.30 ug/L 2.0 ug/L	RSAU5-0.5B RSAU5-10B RSAU5-25B RSAU5-40B RSAU5-50B RSAU5-55B
ICB/CCB	Beryllium Chromium	0.014 ug/L 0.06 ug/L	SA146-0.5B SA146-10B SA146-25B SA146009-25B SA146-40B SA146-55B SA147-0.5B SA147-10B SA147-25B SA147009-25B

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
SA146-0.5B	Tin	4.1 mg/Kg	10.4U mg/Kg
SA146-10B	Tin	4.4 mg/Kg	10.5U mg/Kg
SA146-25B	Tin	4.0 mg/Kg	10.8U mg/Kg
SA146009-25B	Tin	3.9 mg/Kg	10.5U mg/Kg
SA146-40B	Tin	4.6 mg/Kg	10.7U mg/Kg
SA146-55B	Tin	4.7 mg/Kg	11.6U mg/Kg
SA147-0.5B	Boron Tin	6.1 mg/Kg 4.2 mg/Kg	10.6U mg/Kg 10.6U mg/Kg
SA147-10B	Tin	4.1 mg/Kg	10.7U mg/Kg
SA147-25B	Tin Tungsten	4.0 mg/Kg 0.10 mg/Kg	10.8U mg/Kg 0.10U mg/Kg
SA147009-25B	Tin	4.6 mg/Kg	11.0U mg/Kg
SA147-40B	Tin	4.6 mg/Kg	12.1U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA147-56B	Tin	4.6 mg/Kg	11.6U mg/Kg
RSAU5-0.5B	Tin	4.1 mg/Kg	10.6U mg/Kg
RSAU5-10B	Tin	4.4 mg/Kg	10.7U mg/Kg
RSAU5-25B	Tin	4.1 mg/Kg	10.9U mg/Kg
RSAU5-40B	Tin	4.9 mg/Kg	12.5U mg/Kg
RSAU5-50B	Tin	5.0 mg/Kg	12.5U mg/Kg
RSAU5-55B	Tin	4.4 mg/Kg	11.4U mg/Kg

Sample FB080309-SO (from SDG R0904279) 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
FB080309-SO	8/3/09	Aluminum Barium Calcium Iron Lead Magnesium Manganese Sodium Strontium Titanium Tungsten Zinc	18.6 ug/L 0.8 ug/L 113 ug/L 136 ug/L 0.042 ug/L 33.6 ug/L 7.5 ug/L 66.0 ug/L 1.0 ug/L 1.5 ug/L 0.04 ug/L 0.8 ug/L	All samples in SDG R0904329

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
SA147-25B	Tungsten	0.10 mg/Kg	0.10U mg/Kg

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
SA146-0.5BMS (All samples in SDG R0904329)	Antimony	54.5 (75-125)	J- (all detects) UJ (all non-detects)	A
	Tungsten	47.3 (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
SA146-0.5BL	Chromium Beryllium Uranium	13 (≤10) 43 (≤10) 11 (≤10)	All samples in SDG R0904329	J (all detects) UJ (all non-detects)	A

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 R0904329	All analytes 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

Samples SA146-25B and SA146009-25B and samples SA147-25B and SA147009-25B were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA146-25B	SA146009-25B				
Aluminum	8490	6940	20 (≤50)	-	-	-
Arsenic	5.14	6.07	-	0.93 (≤2.2)	-	-
Barium	92.8	100	7 (≤50)	-	-	-
Beryllium	0.406	0.382	6 (≤50)	-	-	-
Boron	16.6	15.8	-	0.8 (≤10.8)	-	-
Cadmium	0.04U	0.06	-	0.02 (≤0.11)	-	-
Calcium	9230	11100	18 (≤50)	-	-	-
Chromium	13	13	0 (≤50)	-	-	-
Cobalt	4.4	4.3	-	0.1 (≤2.2)	-	-
Copper	12.4	12.6	2 (≤50)	-	-	-
Iron	11400	10900	4 (≤50)	-	-	-
Lead	7.6	7.2	-	0.4 (≤2.2)	-	-

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA146-25B	SA146009-25B				
Magnesium	10600	8450	23 (≤50)	-	-	-
Manganese	117	143	20 (≤50)	-	-	-
Mercury	0.006	0.01	-	0.004 (≤0.018)	-	-
Molybdenum	1.25	1.3	-	0.05 (≤0.32)	-	-
Nickel	13.5	12	12 (≤50)	-	-	-
Platinum	0.012	0.012	-	0 (≤0.10)	-	-
Potassium	1950	1550	23 (≤50)	-	-	-
Sodium	1540	1290	18 (≤50)	-	-	-
Strontium	174	154	12 (≤50)	-	-	-
Thallium	0.076	0.079	-	0.003 (≤0.021)	-	-
Tin	4	3.9	-	0.1 (≤10.8)	-	-
Titanium	554	498	11 (≤50)	-	-	-
Tungsten	0.15	0.15	-	0 (≤0.10)	-	-
Uranium	1.42	1.42	0 (≤50)	-	-	-
Vanadium	31.5	29.2	8 (≤50)	-	-	-
Zinc	21.9	21	4 (≤50)	-	-	-

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA147-25B	SA147009-25B				
Aluminum	7990	8630	8 (≤50)	-	-	-
Arsenic	3.38	4.82	-	1.44 (≤2.2)	-	-

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA147-25B	SA147009-25B				
Barium	122	123	1 (≤50)	-	-	-
Beryllium	0.388	0.388	0 (≤50)	-	-	-
Boron	20	28	-	8 (≤11.0)	-	-
Cadmium	0.11	0.17	-	0.06 (≤0.11)	-	-
Calcium	32700	51500	45 (≤50)	-	-	-
Chromium	8.39	11.3	30 (≤50)	-	-	-
Cobalt	5.8	6.3	-	0.5 (≤2.2)	-	-
Copper	15.9	15.4	3 (≤50)	-	-	-
Iron	16000	17200	7 (≤50)	-	-	-
Lead	7.6	6.5	-	1.1 (≤2.2)	-	-
Magnesium	10300	14700	35 (≤50)	-	-	-
Manganese	217	229	5 (≤50)	-	-	-
Mercury	0.011	0.014	-	0.003 (≤0.016)	-	-
Molybdenum	0.68	1.01	-	0.33 (≤0.33)	-	-
Nickel	15.5	16.1	4 (≤50)	-	-	-
Platinum	0.008	0.018	-	0.01 (≤0.11)	-	-
Potassium	1490	1670	11 (≤50)	-	-	-
Selenium	0.8U	0.8	-	0 (≤4.4)	-	-
Sodium	837	863	3 (≤50)	-	-	-
Strontium	320	361	12 (≤50)	-	-	-

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA147-25B	SA147009-25B				
Thallium	0.073	0.086	-	0.013 (≤0.022)	-	-
Tin	4	4.6	-	0.6 (≤11.0)	-	-
Titanium	548	531	3 (≤50)	-	-	-
Tungsten	0.1	0.15	-	0.05 (≤0.11)	-	-
Uranium	1.07	1.74	48 (≤50)	-	-	-
Vanadium	33.7	33.2	1 (≤50)	-	-	-
Zinc	25.4	23.4	8 (≤50)	-	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Data Qualification Summary - SDG R0904329

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0904329	SA146-0.5B SA146-10B SA146-25B SA146009-25B SA146-40B SA146-55B SA147-0.5B SA147-10B SA147-25B SA147009-25B SA147-40B SA147-56B RSAU5-0.5B RSAU5-10B RSAU5-25B RSAU5-40B RSAU5-50B RSAU5-55B	Antimony Tungsten	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	A	Matrix spike analysis (%R) (m)
R0904329	SA146-0.5B SA146-10B SA146-25B SA146009-25B SA146-40B SA146-55B SA147-0.5B SA147-10B SA147-25B SA147009-25B SA147-40B SA147-56B RSAU5-0.5B RSAU5-10B RSAU5-25B RSAU5-40B RSAU5-50B RSAU5-55B	Chromium Beryllium Uranium	J (all detects) UJ (all non-detects)	A	ICP serial dilution (%D) (sd)
R0904329	SA146-0.5B SA146-10B SA146-25B SA146009-25B SA146-40B SA146-55B SA147-0.5B SA147-10B SA147-25B SA147009-25B SA147-40B SA147-56B RSAU5-0.5B RSAU5-10B RSAU5-25B RSAU5-40B RSAU5-50B RSAU5-55B	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 R0904329

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R904329	SA146-0.5B	Tin	10.4U mg/Kg	A	bl
R904329	SA146-10B	Tin	10.5U mg/Kg	A	bl
R904329	SA146-25B	Tin	10.8U mg/Kg	A	bl
R904329	SA146009-25B	Tin	10.5U mg/Kg	A	bl
R904329	SA146-40B	Tin	10.7U mg/Kg	A	bl
R904329	SA146-55B	Tin	11.6U mg/Kg	A	bl
R904329	SA147-0.5B	Boron Tin	10.6U mg/Kg 10.6U mg/Kg	A	bl
R904329	SA147-10B	Tin	10.7U mg/Kg	A	bl
R904329	SA147-25B	Tin Tungsten	10.8U mg/Kg 0.10U mg/Kg	A	bl
R904329	SA147009-25B	Tin	11.0U mg/Kg	A	bl
R904329	SA147-40B	Tin	12.1U mg/Kg	A	bl
R904329	SA147-56B	Tin	11.6U mg/Kg	A	bl
R904329	RSAU5-0.5B	Tin	10.6U mg/Kg	A	bl
R904329	RSAU5-10B	Tin	10.7U mg/Kg	A	bl
R904329	RSAU5-25B	Tin	10.9U mg/Kg	A	bl
R904329	RSAU5-40B	Tin	12.5U mg/Kg	A	bl
R904329	RSAU5-50B	Tin	12.5U mg/Kg	A	bl
R904329	RSAU5-55B	Tin	11.4U mg/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Field Blank Data Qualification Summary - SDG R0904329

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0904329	SA147-25B	Tungsten	0.10U mg/Kg	A	bf

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234A4
SDG #: R0904329
Laboratory: Columbia Analytical Services

Date: 12-29-09
Page: 1 of 1
Reviewer: EB
2nd Reviewer: V

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
I.	Technical holding times	A	Sampling dates: 8/4/09 - 8/5/09
II.	ICP/MS Tune	A	
III.	Calibration	A	
IV.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	SW	MS
VII.	Duplicate Sample Analysis	A	DUP
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	N	Not reviewed
X.	Furnace Atomic Absorption QC	N	Not utilized
XI.	ICP Serial Dilution	SW	
XII.	Sample Result Verification	N	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	SW	(3,4), (9,10)
XV	Field Blanks	SW	FB = FB080309-SO (SDG# R0904279)

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Soil

1	SA146-0.5B	11	SA147-40B	21		31	PBS
2	SA146-10B	12	SA147-56B	22		32	
3	SA146-25B	13	RSAU5-0.5B	23		33	
4	SA146009-25B	14	RSAU5-10B	24		34	
5	SA146-40B	15	RSAU5-25B	25		35	
6	SA146-55B	16	RSAU5-40B	26		36	
7	SA147-0.5B	17	RSAU5-50B	27		37	
8	SA147-10B	18	RSAU5-55B	28		38	
9	SA147-25B	19	SA146-0.5BMS	29		39	
10	SA147009-25B	20	SA146-0.5BDUP	30		40	

Notes: _____

LDC #: 22234A
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: [illegible]
2nd reviewer: [illegible]

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-18	Soil	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:19		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
20		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
Analysis Method		
ICP	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
ICP-MS	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
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 #: 22234A4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000) Soil preparation factor applied: 100x Reason Code: bl

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: All

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
B		8.0								6.1 / 10.6											
Cr	0.04																				
Mg		2.0																			
Mn	0.02																				
Sn	3.8			4.1 / 10.4	4.4 / 10.5	4.0 / 10.8	3.9 / 10.5	4.6 / 10.7	4.7 / 11.6	4.2 / 10.6	4.1 / 10.7	4.0 / 10.8	4.6 / 11.0	4.6 / 12.1	4.6 / 11.6	4.1 / 10.6	4.4 / 10.7	4.1 / 10.9	4.9 / 12.5	5.0 / 12.5	4.4 / 11.4
Sr		0.10																			
W		0.079										0.10 / 0.10									

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 1-12

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Quals.
Ba		0.60		
Mn		0.10		

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 13-18

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Quals.
Ba		0.40		
Mn		0.30		
Ti		2.0		

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 1-10

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Quals.
Be		0.014		
Cr		0.06		

Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC #: 22234A4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: CR
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW846 6010B/7000)

Y N N/A 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 Reason Code: bf
Sampling date: 8/3/09 Soil factor applied 100x
Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: All

Analyte	Blank ID	Sample Identification										
	FB080309-SO (SDG# R0904279)	Action Level	9									
Al	18.6											
Ba	0.8											
Ca	113	113										
Fe	136	136										
Pb	0.042	0.042										
Mg	33.6	33.6										
Mn	7.5	7.5										
Na	66.0											
Sr	1.0											
Ti	1.5											
W	0.04		0.10 / 0.10									
Zn	0.8											

LDC #: 22234A4
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Reviewer: CA
2nd Reviewer: LA

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".

Y N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y N N/A Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

Y N N/A Was a post digestion spike analyzed for ICP elements that did not meet the required criteria for matrix spike recovery?

LEVEL IV ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
	19	soil	Sb	54.5	All	J-/UJ/A (m)
			W	47.3	↓	↓

Comments: _____

LDC #: 22234A4
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
ICP Serial Dilution

Reviewer: AR
2nd Reviewer: [illegible]

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".

Y N N/A If analyte concentrations were > 50X the IDL, was an ICP serial dilution analyzed?
Y (N) N/A Were ICP serial dilution percent differences (%D) ≤10%?
Y (N) N/A Is there evidence of negative interference? If yes, professional judgement will be used to qualify the data.

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Diluted Sample ID	Matrix	Analyte	%D	Associated Samples	Qualifications
	1	Soil	Cr	13	All	J/UJ/A (sd)
			Be	43	↓	↓
			U	11		

Comments:

LDC 22234A4
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer:

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg) 3	Concentration (mg/Kg) 4	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Aluminum	8490	6940	20			
Arsenic	5.14	6.07		0.93	(≤2.2)	
Barium	92.8	100	7			
Beryllium	0.406	0.382	6			
Boron	16.6	15.8		0.8	(≤10.8)	
Cadmium	0.04U	0.06		0.02	(≤0.11)	
Calcium	9230	11100	18			
Chromium	13.0	13.0	0			
Cobalt	4.4	4.3		0.1	(≤2.2)	
Copper	12.4	12.6	2			
Iron	11400	10900	4			
Lead	7.6	7.2		0.4	(≤2.2)	
Magnesium	10600	8450	23			
Manganese	117	143	20			
Mercury	0.006	0.010		0.004	(≤0.018)	
Molybdenum	1.25	1.30		0.05	(≤0.32)	
Nickel	13.5	12.0	12			
Platinum	0.012	0.012		0	(≤0.10)	
Potassium	1950	1550	23			

LDC#: 22234A4
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg) 3	Concentration (mg/Kg) 4	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Sodium	1540	1290	18			
Strontium	174	154	12			
Thallium	0.076	0.079		0.003	(≤0.021)	
Tin	4.0	3.9		0.1	(≤10.8)	
Titanium	554	498	11			
Tungsten	0.15	0.15		0	(≤0.10)	
Uranium	1.42	1.42	0			
Vanadium	31.5	29.2	8			
Zinc	21.9	21.0	4			

LDC#: 22234A4
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer: [signature]

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg) 9	Concentration (mg/Kg) 10	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Aluminum	7990	8630	8			
Arsenic	3.38	4.82		1.44	(≤2.2)	
Barium	122	123	1			
Beryllium	0.388	0.388	0			
Boron	20.0	28.0		8	(≤11.0)	
Cadmium	0.11	0.17		0.06	(≤0.11)	
Calcium	32700	51500	45			
Chromium	8.39	11.3	30			
Cobalt	5.8	6.3		0.5	(≤2.2)	
Copper	15.9	15.4	3			
Iron	16000	17200	7			
Lead	7.6	6.5		1.1	(≤2.2)	
Magnesium	10300	14700	35			
Manganese	217	229	5			
Mercury	0.011	0.014		0.003	(≤0.016)	
Molybdenum	0.68	1.01		0.33	(≤0.33)	
Nickel	15.5	16.1	4			
Platinum	0.008	0.018		0.01	(≤0.11)	
Potassium	1490	1670	11			

LDC#: 22234A4
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer:

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg) 9	Concentration (mg/Kg) 10	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Selenium	0.8U	0.8		0	(≤4.4)	
Sodium	837	863	3			
Strontium	320	361	12			
Thallium	0.073	0.086		0.013	(≤0.022)	
Tin	4.0	4.6		0.6	(≤11.0)	
Titanium	548	531	3			
Tungsten	0.10	0.15		0.05	(≤0.11)	
Uranium	1.07	1.74	48			
Vanadium	33.7	33.2	1			
Zinc	25.4	23.4	8			

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 7 through October 8, 2009

LDC Report Date: January 8, 2010

Matrix: Soil/Water

Parameters: Metals

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905744

Sample Identification

RSAP5-0.5B
RSAP5-10B
RSAP5009-10B
RSAP5-25B
RSAP5-39B
SA192-0.5B
SA192-10B
SA192-25B
SA192-39B
EB100809-SO1A3
SA130-0.5B
SA130-10B
SA130-25B
SA130-43B
RSAP6-0.5B
RSAP6-10B
RSAP6-25B
RSAP6-44B
RSAP5-0.5BMS
RSAP5-0.5BDUP
SA192-10BMS
SA192-10BDUP

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 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)	Aluminum	3.8 ug/L	All water samples in SDG R0905744
ICB/CCB	Barium Boron Chromium Strontium Thallium	0.5 ug/L 2.5 ug/L 0.8 ug/L 0.1 ug/L 0.002 ug/L	All water samples in SDG R0905744
PB (prep blank)	Boron Calcium Chromium Magnesium Manganese Nickel Tin Strontium	0.5 mg/Kg 2.1 mg/Kg 0.08 mg/Kg 0.6 mg/Kg 0.06 mg/Kg 0.10 mg/Kg 3.7 mg/Kg 0.02 mg/Kg	All soil samples in SDG R0905744
ICB/CCB	Boron	2.0 ug/L	All soil samples in SDG R0905744

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Barium Iron Magnesium Manganese Strontium	0.80 ug/L 5.0 ug/L 2.0 ug/L 0.90 ug/L 0.20 ug/L	RSAP6-25B RSAP6-44B
ICB/CCB	Manganese	0.50 ug/L	SA192-0.5B SA192-10B SA192-25B SA192-39B SA130-0.5B SA130-10B SA130-25B SA130-43B RSAP6-10B
ICB/CCB	Barium Manganese	0.60 ug/L 0.30 ug/L	RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-25B RSAP5-39B
ICB/CCB	Strontium	0.10 ug/L	RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-25B RSAP5-39B SA192-0.5B SA192-10B SA192-25B SA192-39B SA130-0.5B SA130-10B SA130-25B SA130-43B RSAP6-0.5B RSAP6-10B
ICB/CCB	Manganese	0.40 ug/L	RSAP6-0.5B
ICB/CCB	Thallium	0.011 ug/L	RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-25B RSAP5-39B SA192-0.5B SA192-10B SA192-25B SA192-39B SA130-0.5B SA130-10B SA130-25B SA130-43B RSAP6-0.5B RSAP6-10B RSAP6-25B

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Thallium Tungsten	0.008 ug/L 0.113 ug/L	RSAP6-44B
ICB/CCB	Tungsten	0.097 ug/L	SA192-10B SA192-25B SA192-39B SA130-0.5B SA130-10B SA130-25B SA130-43B RSAP6-0.5B RSAP6-10B RSAP6-25B
ICB/CCB	Tungsten	0.055 ug/L	RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-25B RSAP5-39B SA192-0.5B

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
EB100809-SO1A3	Aluminum Barium Chromium Strontium Thallium	3.4 ug/L 3.9 ug/L 0.7 ug/L 1.6 ug/L 0.005 ug/L	50.0U ug/L 5.0U ug/L 5.0U ug/L 10.0U ug/L 0.020U ug/L
RSAP5-0.5B	Boron Tin	7.9 mg/Kg 4.0 mg/Kg	10.8U mg/Kg 10.8U mg/Kg
RSAP5-10B	Boron Tin	9.3 mg/Kg 3.7 mg/Kg	10.6U mg/Kg 10.6U mg/Kg
RSAP5009-10B	Boron Tin	9.4 mg/Kg 4.1 mg/Kg	10.7U mg/Kg 10.7U mg/Kg
RSAP5-25B	Tin	4.0 mg/Kg	10.9U mg/Kg
RSAP5-39B	Tin	3.9 mg/Kg	10.7U mg/Kg
SA192-0.5B	Boron Tin	5.7 mg/Kg 4.1 mg/Kg	10.5U mg/Kg 10.5U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA192-10B	Boron Tin	6.6 mg/Kg 4.2 mg/Kg	10.6U mg/Kg 10.6U mg/Kg
SA192-25B	Tin	4.1 mg/Kg	11.1U mg/Kg
SA192-39B	Tin	4.4 mg/Kg	10.5U mg/Kg
SA130-0.5B	Tin	4.2 mg/Kg	10.0U mg/Kg
SA130-10B	Boron Tin	4.5 mg/Kg 3.9 mg/Kg	10.4U mg/Kg 10.4U mg/Kg
SA130-25B	Boron Tin	8.6 mg/Kg 3.9 mg/Kg	10.7U mg/Kg 10.7U mg/Kg
SA130-43B	Boron Tin	6.5 mg/Kg 3.9 mg/Kg	10.3U mg/Kg 10.3U mg/Kg
RSAP6-0.5B	Tin	3.0 mg/Kg	10.7U mg/Kg
RSAP6-10B	Boron Tin	5.3 mg/Kg 3.5 mg/Kg	10.5U mg/Kg 10.5U mg/Kg
RSAP6-25B	Boron Tin	7.2 mg/Kg 4.3 mg/Kg	10.6U mg/Kg 10.6U mg/Kg
RSAP6-44B	Boron Tin	7.3 mg/Kg 4.0 mg/Kg	10.3U mg/Kg 10.3U mg/Kg

Sample EB100809-SO1A3 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
EB100809-SO1A3	10/8/09	Aluminum	3.4 ug/L	SA130-0.5B
		Barium	3.9 ug/L	SA130-10B
		Calcium	131 ug/L	SA130-25B
		Chromium	0.7 ug/L	SA130-43B
		Iron	28.3 ug/L	RSAP6-0.5B
		Lead	0.067 ug/L	RSAP6-10B
		Magnesium	28.1 ug/L	RSAP6-25B
		Manganese	11.2 ug/L	RSAP6-44B
		Potassium	83 ug/L	
		Sodium	57.3 ug/L	
		Strontium	1.6 ug/L	
		Thallium	0.005 ug/L	
		Tungsten	0.03 ug/L	
		Zinc	0.7 ug/L	

Sample concentrations were compared to concentrations detected in the equipment blanks as required by the QAPP. No sample data was qualified.

Samples FB080309-SO (from SDG R0904279) and FB082809-SO (from SDG R0904894) were identified as field blanks. No metal contaminants were found in these blanks with the following exceptions:

Field Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
FB080309-SO	8/3/09	Aluminum	18.6 ug/L	RSAP5-0.5B
		Barium	0.8 ug/L	RSAP5-10B
		Calcium	113 ug/L	RSAP5009-10B
		Iron	136 ug/L	RSAP5-25B
		Lead	0.042 ug/L	RSAP5-39B
		Magnesium	33.6 ug/L	SA192-0.5B
		Manganese	7.5 ug/L	SA192-10B
		Sodium	66.0 ug/L	SA192-25B
		Strontium	1.0 ug/L	SA192-39B
		Titanium	1.5 ug/L	
		Tungsten	0.04 ug/L	
		Zinc	0.8 ug/L	
FB082809-SO	8/28/09	Aluminum	3.3 ug/L	SA130-0.5B
		Calcium	17 ug/L	SA130-10B
		Lead	0.006 ug/L	SA130-25B
		Magnesium	5.0 ug/L	SA130-43B
		Manganese	0.2 ug/L	RSAP6-0.5B
		Sodium	39.2 ug/L	RSAP6-10B
		Strontium	0.1 ug/L	RSAP6-25B
		Zinc	1.0 ug/L	RSAP6-44B

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
RSAP5-0.5BMS (RSAP5-0.5B	Antimony	54.4 (75-125)	J- (all detects) UJ (all non-detects)	A
RSAP5-10B RSAP5009-10B RSAP5-25B RSAP5-39B SA192-0.5B SA192-10B SA192-25B SA192-39B)	Tungsten	73.0 (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.

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 R0905744	All analytes 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

Samples RSAP5-10B and RSAP5009-10B were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAP5-10B	RSAP5009-10B				
Aluminum	8750	9600	9 (≤50)	-	-	-
Antimony	1.2	0.9	-	0.3 (≤2.1)	-	-
Arsenic	2.21	2.33	-	0.12 (≤0.53)	-	-
Barium	184	176	4 (≤50)	-	-	-
Beryllium	0.423	0.422	0 (≤50)	-	-	-
Boron	9.3	9.4	-	0.1 (≤10.7)	-	-
Calcium	30000	30700	2 (≤50)	-	-	-
Chromium	7.15	7.48	5 (≤50)	-	-	-
Cobalt	8	8.3	-	0.3 (≤2.1)	-	-
Copper	19.3	20.9	8 (≤50)	-	-	-
Iron	16100	17900	11 (≤50)	-	-	-
Lead	8.1	9.3	-	1.2 (≤2.1)	-	-
Magnesium	11000	11400	4 (≤50)	-	-	-

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAP5-10B	RSAP5009-10B				
Manganese	371	373	1 (≤50)	-	-	-
Mercury	0.012	0.013	-	0.001 (≤0.018)	-	-
Molybdenum	0.83	0.75	-	0.08 (≤0.32)	-	-
Nickel	16.2	17.9	10 (≤50)	-	-	-
Platinum	0.007	0.007	-	0 (≤0.11)	-	-
Potassium	2480	2670	7 (≤50)	-	-	-
Sodium	616	712	14 (≤50)	-	-	-
Strontium	241	229	5 (≤50)	-	-	-
Thallium	0.144	0.112	25 (≤50)	-	-	-
Tin	3.7	4.1	-	0.4 (≤10.7)	-	-
Titanium	844	993	16 (≤50)	-	-	-
Tungsten	0.24	0.21	-	0.03 (≤0.11)	-	-
Uranium	0.983	0.957	3 (≤50)	-	-	-
Vanadium	49.1	56.5	14 (≤50)	-	-	-
Zinc	34.4	38.7	12 (≤50)	-	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Data Qualification Summary - SDG R0905744

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0905744	RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-25B RSAP5-39B SA192-0.5B SA192-10B SA192-25B SA192-39B	Antimony Tungsten	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	A	Matrix spike analysis (%R) (m)
R0905744	RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-25B RSAP5-39B SA192-0.5B SA192-10B SA192-25B SA192-39B EB100809-SO1A3 SA130-0.5B SA130-10B SA130-25B SA130-43B RSAP6-0.5B RSAP6-10B RSAP6-25B RSAP6-44B	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 R0905744

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905744	EB100809-SO1A3	Aluminum Barium Chromium Strontium Thallium	50.0U ug/L 5.0U ug/L 5.0U ug/L 10.0U ug/L 0.020U ug/L	A	bl
R0905744	RSAP5-0.5B	Boron Tin	10.8U mg/Kg 10.8U mg/Kg	A	bl
R0905744	RSAP5-10B	Boron Tin	10.6U mg/Kg 10.6U mg/Kg	A	bl
R0905744	RSAP5009-10B	Boron Tin	10.7U mg/Kg 10.7U mg/Kg	A	bl

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905744	RSAP5-25B	Tin	10.9U mg/Kg	A	bl
R0905744	RSAP5-39B	Tin	10.7U mg/Kg	A	bl
R0905744	SA192-0.5B	Boron Tin	10.5U mg/Kg 10.5U mg/Kg	A	bl
R0905744	SA192-10B	Boron Tin	10.6U mg/Kg 10.6U mg/Kg	A	bl
R0905744	SA192-25B	Tin	11.1U mg/Kg	A	bl
R0905744	SA192-39B	Tin	10.5U mg/Kg	A	bl
R0905744	SA130-0.5B	Tin	10.0U mg/Kg	A	bl
R0905744	SA130-10B	Boron Tin	10.4U mg/Kg 10.4U mg/Kg	A	bl
R0905744	SA130-25B	Boron Tin	10.7U mg/Kg 10.7U mg/Kg	A	bl
R0905744	SA130-43B	Boron Tin	10.3U mg/Kg 10.3U mg/Kg	A	bl
R0905744	RSAP6-0.5B	Tin	10.7U mg/Kg	A	bl
R0905744	RSAP6-10B	Boron Tin	10.5U mg/Kg 10.5U mg/Kg	A	bl
R0905744	RSAP6-25B	Boron Tin	10.6U mg/Kg 10.6U mg/Kg	A	bl
R0905744	RSAP6-44B	Boron Tin	10.3U mg/Kg 10.3U mg/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Equipment Blank Data Qualification Summary - SDG R0905744

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Field Blank Data Qualification Summary - SDG R0905744

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234E4
SDG #: R0905744
Laboratory: Columbia Analytical Services

Date: 12-29-09
Page: 1 of 1
Reviewer: CR
2nd Reviewer: W

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
I.	Technical holding times	A	Sampling dates: 10/7/09 - 10/8/09
II.	ICP/MS Tune	A	
III.	Calibration	A	
IV.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	SW	MS
VII.	Duplicate Sample Analysis	A	DUP
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	N	Not reviewed
X.	Furnace Atomic Absorption QC	N	Not utilized
XI.	ICP Serial Dilution	A	
XII.	Sample Result Verification	N	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	SW	(2,3)
XV	Field Blanks	SW	FB = FB080309-SO, FB082809-SO. EB = 10 (SDG# R0904279) (SDG# 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: all Soil except 10 = water

1	RSAP5-0.5B	11	SA130-0.5B	21	SA192-10BMS	31	PBS
2	RSAP5-10B	12	SA130-10B	22	SA192-10BDUP	32	PBW
3	RSAP5009-10B	13	SA130-25B	23		33	
4	RSAP5-25B	14	SA130-43B	24		34	
5	RSAP5-39B	15	RSAP6-0.5B	25		35	
6	SA192-0.5B	16	RSAP6-10B	26		36	
7	SA192-10B	17	RSAP6-25B	27		37	
8	SA192-25B	18	RSAP6-44B	28		38	
9	SA192-39B	19	RSAP5-0.5BMS	29		39	
10	EB100809-SO1A3	20	RSAP5-0.5BDUP	30		40	

Notes: _____

LDC #: 22234E4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: CR
2nd reviewer:

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
19, 11-18	Soil	[✓ 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]
10	Water	[✓ 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
QC19		[✓ 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]
20		[✓ 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]
21		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
22		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
Analysis Method		
ICP	S/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
ICP-MS	S/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
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 #: 22234E4
SDG #: See Cover
METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)
Sample Concentration units, unless otherwise noted: ug/L

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES
Soil preparation factor applied: 100x
Associated Samples: All Water
Reason Code: bl

Analyte	Maximum PB[a] (ug/L)	Maximum ICB/CCB[a] (ug/L)	Action Limit	10													
Al	3.8			3.4 / 50.0													
Ba		0.5		3.9 / 5.0													
B		2.5															
Cr		0.8		0.7 / 5.0													
Sr		0.1		1.6 / 10.0													
Tl		0.002		0.005 / 0.020													

Sample Concentration units, unless otherwise noted: mg/Kg
Associated Samples: All Soil

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	17	18
B	0.5	2.0		7.9 / 10.8	9.3 / 10.6	9.4 / 10.7			5.7 / 10.5	6.6 / 10.6				4.5 / 10.4	8.6 / 10.7	6.5 / 10.3		5.3 / 10.5	7.2 / 10.6	7.3 / 10.3
Ca	2.1																			
Cr	0.08																			
Mg	0.6																			
Mn	0.06																			
Ni	0.10																			
Sn	3.7			4.0 / 10.8	3.7 / 10.6	4.1 / 10.7	4.0 / 10.9	3.9 / 10.7	4.1 / 10.5	4.2 / 10.6	4.1 / 11.1	4.4 / 10.5	4.2 / 10.0	3.9 / 10.4	3.9 / 10.7	3.9 / 10.3	3.0 / 10.7	3.5 / 10.5	4.3 / 10.6	4.0 ./ 10.3
Sr	0.02																			
W																				

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Soil preparation factor applied: 100x
Reason Code: bl

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 17, 18

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Quals.
Ba		0.80		
Fe		5.0		
Mg		2.0		
Mn		0.90		
Sr		0.20		

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 6-9, 11-14, 16

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Quals.
Mn		0.50		

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 1-5

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Quals.
Ba		0.60		
Mn		0.30		

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 1-9, 11-16

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Quals.
Sr		0.10		

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 15

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Quals.
Mn		0.40		

LDC #: 22234E4
SDG #: See Cover
METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES
Soil preparation factor applied: 100x
Reason Code: bl

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 1-9, 11-17

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/l)	Action Limit	No Quals.
Tl		0.011		

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 18

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/l)	Action Limit	No Quals.
Tl		0.008		
W		0.113		

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 7-9, 11-17

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/l)	Action Limit	No Quals.
W		0.097		

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 1-6

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/l)	Action Limit	No Quals.
W		0.055		

Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC #: 22234E4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 1 of 1
Reviewer: VR
2nd Reviewer:

METHOD: Trace Metals (EPA SW846 6010B/7000)

Y N N/A Were field blanks identified in this SDG?
Y N N/A Were target analytes detected in the field blanks? Reason Code: be

Blank units: ug/L **Associated sample units:** mg/Kg
Sampling date: 10/8/09 Soil factor applied 100x
Field blank type: (circle one) Field Blank / Rinsate / Other: EB Associated Samples: 11-18

Analyte	Blank ID	Sample Identification										
	10	Action Level	No Qualifiers									
Al	3.4											
Ba	3.9											
Ca	131	131										
Cr	0.7											
Fe	28.3	28.3										
Pb	0.067	0.067										
Mg	28.1	28.1										
Mn	11.2	11.2										
K	83											
Na	57.3											
Sr	1.6											
Tl	0.005											
W	0.03											
Zn	0.7											

LDC #: 22234E4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: CR
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW846 6010B/7000)

Y N N/A 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 Reason Code: bf

Sampling date: 8/3/09 Soil factor applied 100x

Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: 1-9

Analyte	Blank ID	Sample Identification										
	FB080309-SO (SDG# R0904279)	Action Level	No Qualifiers									
Al	18.6											
Ba	0.8											
Ca	113	113										
Fe	136	136										
Pb	0.042	0.042										
Mg	33.6	33.6										
Mn	7.5	7.5										
Na	66.0											
Sr	1.0											
Ti	1.5											
W	0.04											
Zn	0.8											

LDC #: 22234E4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: QR
2nd Reviewer:

METHOD: Trace Metals (EPA SW846 6010B/7000)

Y N N/A Were field blanks identified in this SDG?
Y N N/A Were target analytes detected in the field blanks? Reason Code: bf

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: Associated Samples: 11-18

Analyte	Blank ID	Sample Identification										
	FB082809-SO (SDG#: R0904894)	Action Level	No Qualifiers									
Al	3.3											
Ca	17											
Pb	0.006											
Mg	5.0											
Mn	0.2											
Na	39.2											
Sr	0.1											
Zn	1.0											

LDC #: 22234E4
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Page: 1 of 1
Reviewer: QR
2nd Reviewer: LA

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".

(Y) N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

(Y) N N/A Was a post digestion spike analyzed for ICP elements that did not meet the required criteria for matrix spike recovery?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
	19	SW	Sb	54.4	1-9	J-/UJ/A
			W	73.0	↓	↓

Comments:

LDC 22234E4
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer: LC

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg) 2	Concentration (mg/Kg) 3	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Aluminum	8750	9600	9			
Antimony	1.2	0.9		0.3	(≤2.1)	
Arsenic	2.21	2.33		0.12	(≤0.53)	
Barium	184	176	4			
Beryllium	0.423	0.422	0			
Boron	9.3	9.4		0.1	(≤10.7)	
Calcium	30000	30700	2			
Chromium	7.15	7.48	5			
Cobalt	8.0	8.3		0.3	(≤2.1)	
Copper	19.3	20.9	8			
Iron	16100	17900	11			
Lead	8.1	9.3		1.2	(≤2.1)	
Magnesium	11000	11400	4			
Manganese	371	373	1			
Mercury	0.012	0.013		0.001	(≤0.018)	
Molybdenum	0.83	0.75		0.08	(≤0.32)	
Nickel	16.2	17.9	10			
Platinum	0.007	0.007		0	(≤0.11)	
Potassium	2480	2670	7			

LDC#: 22234E4
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer:

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg) 2	Concentration (mg/Kg) 3	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Sodium	616	712	14			
Strontium	241	229	5			
Thallium	0.144	0.112	25			
Tin	3.7	4.1		0.4	(≤10.7)	
Titanium	844	993	16			
Tungsten	0.24	0.21		0.03	(≤0.11)	
Uranium	0.983	0.957	3			
Vanadium	49.1	56.5	14			
Zinc	34.4	38.7	12			

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 9 through October 12, 2009

LDC Report Date: January 8, 2010

Matrix: Soil/Water

Parameters: Metals

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905829

Sample Identification

SA39-0.5B	SA39-25BDUP
SA39-10B	
SA39-25B	
SA39-41B	
SA137-0.5B	
SA137-15B	
SA137-31B	
EB101209-SO1A3	
RSAR7-0.5B	
RSAR7-9B	
RSAR7009-9B	
RSAR7-20B	
RSAR7-34B	
RSAO7-9B	
RSAO7-19B	
RSAO7-29B	
RSAO7-47B	
SA39-0.5BMS	
SA39-0.5BDUP	
SA39-25BMS	

Introduction

This data review covers 20 soil samples and one water sample 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)	Thallium Tungsten	0.005 ug/L 0.02 ug/L	All water samples in SDG R0905829
ICB/CCB	Antimony Barium Boron Copper Lead Molybdenum Manganese Strontium Silver Sodium Thallium Tungsten Uranium	0.026 ug/L 1.5 ug/L 8.6 ug/L 2.3 ug/L 0.006 ug/L 0.7 ug/L 0.2 ug/L 0.2 ug/L 0.7 ug/L 60 ug/L 0.009 ug/L 0.03 ug/L 0.004 ug/L	All water samples in SDG R0905829
PB (prep blank)	Calcium Chromium Magnesium Tin Tungsten	2.9 mg/Kg 0.07 mg/Kg 0.5 mg/Kg 4.1 mg/Kg 0.055 mg/Kg	All soil samples in SDG R0905829

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Boron Manganese	2.0 ug/L 0.90 ug/L	All soil samples in SDG R0905829
ICB/CCB	Platinum	0.011 ug/L	SA39-25B SA137-0.5B SA137-15B RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B
ICB/CCB	Aluminum Magnesium	2.0 ug/L 4.0 ug/L	SA39-41B SA137-0.5B SA137-15B SA137-31B RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B
ICB/CCB	Barium Strontium Titanium	2.00 ug/L 0.10 ug/L 0.40 ug/L	RSAO7-19B RSAO7-29B RSAO7-47B
ICB/CCB	Barium	0.90 ug/L	SA39-41B SA137-0.5B SA137-15B SA137-31B RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B
ICB/CCB	Barium Magnesium	0.80 ug/L 2.0 ug/L	SA39-0.5B SA39-10B SA39-25B

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Iron Strontium	5.0 ug/L 0.20 ug/L	SA39-0.5B SA39-10B SA39-25B SA39-41B SA137-0.5B SA137-15B SA137-31B RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B
ICB/CCB	Beryllium Thallium Tungsten	0.008 ug/L 0.015 ug/L 0.090 ug/L	RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B
ICB/CCB	Thallium	0.011 ug/L	SA39-25B SA137-0.5B SA137-15B RSAR7-0.5B RSAR7-9B RSAR7009-9B
ICB/CCB	Thallium	0.008 ug/L	SA39-0.5B
ICB/CCB	Tungsten	0.113 ug/L	SA39-0.5B SA39-25B SA137-0.5B SA137-15B RSAR7-0.5B RSAR7-9B RSAR7009-9B
ICB/CCB	Manganese Thallium Tungsten	0.40 ug/L 0.007 ug/L 0.063 ug/L	SA39-10B SA39-41B SA137-31B

Sample concentrations were compared to concentrations detected in the method blanks as required by the QAPP. No sample data was qualified with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
EB101209-SO1A3	Barium Sodium Uranium	0.7 ug/L 27.9 ug/L 0.003 ug/L	5.0U ug/L 300U ug/L 0.020U ug/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA39-0.5B	Tin	4.9 mg/Kg	10.3U mg/Kg
SA39-10B	Boron Tin	6.2 mg/Kg 3.8 mg/Kg	10.4U mg/Kg 10.4U mg/Kg
SA39-25B	Boron Platinum Tin	8.7 mg/Kg 0.007 mg/Kg 3.8 mg/Kg	10.4U mg/Kg 0.10U mg/Kg 10.4U mg/Kg
SA39-41B	Tin	4.2 mg/Kg	10.6U mg/Kg
SA137-0.5B	Platinum Tin	0.049 mg/Kg 7.2 mg/Kg	0.10U mg/Kg 10.0U mg/Kg
SA137-15B	Boron Platinum Tin	8.7 mg/Kg 0.011 mg/Kg 4.0 mg/Kg	10.7U mg/Kg 0.11U mg/Kg 10.7U mg/Kg
SA137-31B	Tin Tungsten	4.7 mg/Kg 0.29 mg/Kg	11.1U mg/Kg 0.45U mg/Kg
RSAR7-0.5B	Tin	3.9 mg/Kg	10.5U mg/Kg
RSAR7-9B	Platinum Tin	0.054 mg/Kg 4.5 mg/Kg	0.11U mg/Kg 10.7U mg/Kg
RSAR7009-9B	Platinum Tin	0.025 mg/Kg 3.9 mg/Kg	0.11U mg/Kg 10.6U mg/Kg
RSAR7-20B	Platinum Tin	0.006 mg/Kg 3.7 mg/Kg	0.11U mg/Kg 10.6U mg/Kg
RSAR7-34B	Platinum Tin	0.012 mg/Kg 4.7 mg/Kg	0.11U mg/Kg 11.2U mg/Kg
RSAO7-9B	Boron Platinum Tin	4.5 mg/Kg 0.007 mg/Kg 3.9 mg/Kg	10.5U mg/Kg 0.10U mg/Kg 10.5U mg/Kg
RSAO7-19B	Boron Platinum Tin	5.5 mg/Kg 0.007 mg/Kg 4.1 mg/Kg	10.5U mg/Kg 0.10U mg/Kg 10.5U mg/Kg
RSAO7-29B	Boron Platinum Tin	6.8 mg/Kg 0.009 mg/Kg 3.9 mg/Kg	10.6U mg/Kg 0.11U mg/Kg 10.6U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
RSAO7-47B	Platinum Tin	0.011 mg/Kg 4.3 mg/Kg	0.11U mg/Kg 11.1U mg/Kg

Sample EB101209-SO1A3 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
EB101209-SO1A3	10/12/09	Aluminum Antimony Calcium Chromium Iron Lead Magnesium Manganese Sodium Strontium Uranium	5.8 ug/L 0.7 ug/L 95 ug/L 0.6 ug/L 26.0 ug/L 0.107 ug/L 20.1 ug/L 5.8 ug/L 27.9 ug/L 1.1 ug/L 0.003 ug/L	RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B

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
RSAO7-29B	Antimony	1.0 mg/Kg	2.1U mg/Kg
RSAO7-47B	Antimony	0.7 mg/Kg	2.2U 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 soil samples in SDG R0905829

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
SA39-0.5BMS (All soil samples in SDG R0905829)	Antimony Arsenic Selenium	55.9 (75-125) 65.0 (75-125) 58.2 (75-125)	J- (all detects) UJ (all non-detects)	A
SA39-0.5BMS (All soil samples in SDG R0905829)	Copper Vanadium	159.1 (75-125) 145.5 (75-125)	J+ (all detects) J+ (all detects)	A

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
SA39-0.5BL	Magnesium Nickel	12.4 (≤10) 10.8 (≤10)	All soil samples in SDG R0905829	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A
SA39-10BL	Beryllium Chromium	27 (≤10) 16 (≤10)	All soil samples in SDG R0905829	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A

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 R0905829	All analytes 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

Samples RSAR7-9B and RSAR7009-9B were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAR7-9B	RSAR7009-9B				
Aluminum	9560	8840	8 (≤50)	-	-	-
Arsenic	2.96	2.83	4 (≤50)	-	-	-
Barium	236	192	21 (≤50)	-	-	-
Beryllium	0.571	0.452	23 (≤50)	-	-	-
Boron	20.4	18.2	-	2.2 (≤10.7)	-	-

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAR7-9B	RSAR7009-9B				
Calcium	23300	21700	7 (≤50)	-	-	-
Chromium	13.4	11.4	16 (≤50)	-	-	-
Cobalt	11.1	8.2	30 (≤50)	-	-	-
Copper	27.7	20.8	28 (≤50)	-	-	-
Iron	18500	16600	11 (≤50)	-	-	-
Lead	9.7	10.6	-	0.9 (≤2.1)	-	-
Magnesium	10200	9420	8 (≤50)	-	-	-
Manganese	739	495	40 (≤50)	-	-	-
Mercury	0.014	0.011	-	0.003 (≤0.018)	-	-
Molybdenum	0.62	0.55	-	0.07 (≤0.32)	-	-
Nickel	17.8	15.9	11 (≤50)	-	-	-
Platinum	0.054	0.025	-	0.029 (≤0.11)	-	-
Potassium	4030	3900	3 (≤50)	-	-	-
Silver	4	1.1	-	2.9 (≤0.5)	J (all detects)	A
Sodium	2810	2760	2 (≤50)	-	-	-
Strontium	152	142	-	10 (≤42.6)	-	-
Thallium	0.106	0.098	-	0.008 (≤0.021)	-	-
Tin	4.5	3.9	-	0.6 (≤10.7)	-	-
Titanium	927	804	14 (≤50)	-	-	-
Tungsten	0.36	0.27	-	0.09 (≤0.11)	-	-

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAR7-9B	RSAR7009-9B				
Uranium	1.15	1.05	9 (≤50)	-	-	-
Vanadium	59.1	52.4	12 (≤50)	-	-	-
Zinc	40.8	35.4	14 (≤50)	-	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Data Qualification Summary - SDG R0905829

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0905829	SA39-0.5B SA39-10B SA39-25B SA39-41B SA137-0.5B SA137-15B SA137-31B RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B	Antimony Arsenic Selenium	J- (all detects) UJ (all non-detects)	A	Matrix spike analysis (%R) (m)
R0905829	SA39-0.5B SA39-10B SA39-25B SA39-41B SA137-0.5B SA137-15B SA137-31B RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B	Copper Vanadium	J+ (all detects) J+ (all detects)	A	Matrix spike analysis (%R) (m)
R0905829	SA39-0.5B SA39-10B SA39-25B SA39-41B SA137-0.5B SA137-15B SA137-31B RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B	Magnesium Nickel Beryllium Chromium	J (all detects) UJ (all non-detects)	A	ICP serial dilution (%D) (sd)

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0905829	SA39-0.5B SA39-10B SA39-25B SA39-41B SA137-0.5B SA137-15B SA137-31B EB101209-SO1A3 RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)
R0905829	RSAR7-9B RSAR7009-9B	Silver	J (all detects)	A	Field duplicates (Difference) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Laboratory Blank Data Qualification Summary - SDG R0905829

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905829	EB101209-SO1A3	Barium Sodium Uranium	5.0U ug/L 300U ug/L 0.020U ug/L	A	bl
R0905829	SA39-0.5B	Tin	10.3U mg/Kg	A	bl
R0905829	SA39-10B	Boron Tin	10.4U mg/Kg 10.4U mg/Kg	A	bl
R0905829	SA39-25B	Boron Platinum Tin	10.4U mg/Kg 0.10U mg/Kg 10.4U mg/Kg	A	bl
R0905829	SA39-41B	Tin	10.6U mg/Kg	A	bl
R0905829	SA137-0.5B	Platinum Tin	0.10U mg/Kg 10.0U mg/Kg	A	bl
R0905829	SA137-15B	Boron Platinum Tin	10.7U mg/Kg 0.11U mg/Kg 10.7U mg/Kg	A	bl

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905829	SA137-31B	Tin Tungsten	11.1U mg/Kg 0.45U mg/Kg	A	bl
R0905829	RSAR7-0.5B	Tin	10.5U mg/Kg	A	bl
R0905829	RSAR7-9B	Platinum Tin	0.11U mg/Kg 10.7U mg/Kg	A	bl
R0905829	RSAR7009-9B	Platinum Tin	0.11U mg/Kg 10.6U mg/Kg	A	bl
R0905829	RSAR7-20B	Platinum Tin	0.11U mg/Kg 10.6U mg/Kg	A	bl
R0905829	RSAR7-34B	Platinum Tin	0.11U mg/Kg 11.2U mg/Kg	A	bl
R0905829	RSAO7-9B	Boron Platinum Tin	10.5U mg/Kg 0.10U mg/Kg 10.5U mg/Kg	A	bl
R0905829	RSAO7-19B	Boron Platinum Tin	10.5U mg/Kg 0.10U mg/Kg 10.5U mg/Kg	A	bl
R0905829	RSAO7-29B	Boron Platinum Tin	10.6U mg/Kg 0.11U mg/Kg 10.6U mg/Kg	A	bl
R0905829	RSAO7-47B	Platinum Tin	0.11U mg/Kg 11.1U mg/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Equipment Blank Data Qualification Summary - SDG R0905829

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905829	RSAO7-29B	Antimony	2.1U mg/Kg	A	be
R0905829	RSAO7-47B	Antimony	2.2U mg/Kg	A	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Field Blank Data Qualification Summary - SDG R0905829

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234F4
SDG #: R0905829
Laboratory: Columbia Analytical Services

Date: 1-4-10
Page: 1 of 1
Reviewer: CB
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
I.	Technical holding times	A	Sampling dates: 10/9/09 - 10/12/09
II.	ICP/MS Tune	A	
III.	Calibration	A	
IV.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	SW	MS
VII.	Duplicate Sample Analysis	A	Dup
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	N	Not reviewed
X.	Furnace Atomic Absorption QC	N	Not validated
XI.	ICP Serial Dilution	SW	
XII.	Sample Result Verification	N	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	SW	(10,11)
XV	Field Blanks	SW	EB=8, FB=FB082809-SO(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:
all soil except 8=water

1	SA39-0.5B	11	RSAR7009-9B	21	SA39-25BDUP	31	PBW
2	SA39-10B	12	RSAR7-20B	22		32	PBS
3	SA39-25B	13	RSAR7-34B	23		33	
4	SA39-41B	14	RSAO7-9B	24		34	
5	SA137-0.5B	15	RSAO7-19B	25		35	
6	SA137-15B	16	RSAO7-29B	26		36	
7	SA137-31B	17	RSAO7-47B	27		37	
8	EB101209-SO1A3	18	SA39-0.5BMS	28		38	
9	RSAR7-0.5B	19	SA39-0.5BDUP	29		39	
10	RSAR7-9B	20	SA39-25BMS	30		40	

Notes:

LDC #: 22234F4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Reviewer: CR
2nd reviewer: [illegible]

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-7,9-17	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
8	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
QC:18		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
19		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
20,21		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
Analysis Method		
ICP	S/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
ICP-MS	↓	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
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 #: 22234F4
SDG #: See Cover
METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)
Sample Concentration units, unless otherwise noted: ug/L

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES
Soil preparation factor applied: 100x
Associated Samples: All Water

Reason Code: bl

Reviewer: GR
2nd Reviewer: [illegible]

Analyte	Maximum PB[a] (ug/L)	Maximum ICB/CCB[a] (ug/L)	Action Limit	8										
Sb		0.026												
Ba		1.5		0.7 / 5.0										
B		8.6												
Cu		2.3												
Pb		0.006												
Mo		0.7												
Mn		0.2												
Sr		0.2												
Ag		0.7												
Na		60		27.9 / 300										
Tl	0.005	0.009												
W	0.02	0.03												
U		0.004		0.003 / 0.020										

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: All Soil

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	1	2	3	4	5	6	7	9	10	11	12	13	14	15	16	17
B		2.0			6.2 / 10.4	8.7 / 10.4			8.7 / 10.7							4.5 / 10.5	5.5 / 10.5	6.8 / 10.6	
Ca	2.9																		
Cr	0.07																		
Mg	0.5																		
Mn		0.90																	
Sn	4.1			4.9 / 10.3	3.8 / 10.4	3.8 / 10.4	4.2 / 10.6	7.2 / 10.0	4.0 / 10.7	4.7 / 11.1	3.9 / 10.5	4.5 / 10.7	3.9 / 10.6	3.7 / 10.6	4.7 / 11.2	3.9 / 10.5	4.1 / 10.5	3.9 / 10.6	4.3 / 11.1
W	0.055									0.29 / 0.45									

LDC #: 22234F4
SDG #: See Cover
METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Soil preparation factor applied: 100x
Reason Code: bl

Reviewer: CC
2nd Reviewer: [illegible]

Sample Concentration units, unless otherwise noted: mg/Kg
Associated Samples: 3, 5, 6, 9-17

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	3	5	6	10	11	12	13	14	15	16	17
Pt		0.011		0.007 / 0.10	0.049 / 0.10	0.011 / 0.11	0.054 / 0.11	0.025 / 0.11	0.006 / 0.11	0.012 / 0.11	0.007 / 0.10	0.007 / 0.10	0.009 / 0.11	0.011 / 0.11

Sample Concentration units, unless otherwise noted: mg/Kg
Associated Samples: 4-7, 9-17

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Al		2.0												
Mg		4.0												

Sample Concentration units, unless otherwise noted: mg/Kg
Associated Samples: 15-17

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Ba		2.00												
Sr		0.10												
Ti		0.40												

Sample Concentration units, unless otherwise noted: mg/Kg
Associated Samples: 4-7, 9-14

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Ba		0.90												

LDC #: 22234F4
SDG #: See Cover
METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Soil preparation factor applied: 100x
Reason Code: bl
Reviewer: CR
2nd Reviewer: [illegible]

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 1-3

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers
Ba		0.80		
Mg		2.0		

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 1-7, 9-14

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers
Fe		5.0		
Sr		0.20		

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 12-17

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers
Be		0.008		
Tl		0.015		
W		0.090		

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 3, 5, 6, 9-11

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers
Tl		0.011		

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES
Soil preparation factor applied: 100x
Associated Samples: 1

Reason Code: bl

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Tl		0.008												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 1, 3, 5, 6, 9-11

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
W		0.113												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 2, 4, 7

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	7										
Mn		0.40												
Tl		0.007												
W		0.063		See PB										

Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC #: 22234F4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: CR
2nd Reviewer:

METHOD: Trace Metals (EPA SW846 6010B/7000)

Y N N/A Were field blanks identified in this SDG?
Y N N/A Were target analytes detected in the field blanks?

Reason Code: be

Blank units: ug/L **Associated sample units:** mg/Kg
Sampling date: 10/12/09 Soil factor applied 100x
Field blank type: (circle one) Field Blank / Rinsate / Other: EB Associated Samples: 9-17

Analyte	Blank ID	Sample Identification										
	8	Action Level	16	17								
Al	5.8											
Sb	0.7		1.0 / 2.1	0.7 / 2.2								
Ca	95	95										
Cr	0.6											
Fe	26.0	26.0										
Pb	0.107	0.107										
Mg	20.1	20.1										
Mn	5.8	5.8										
Na	27.9											
Sr	1.1											
U	0.003											

LDC #: 22234F4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: QR
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW846 6010B/7000)

Y N N/A Were field blanks identified in this SDG?
Y N N/A Were target analytes detected in the field blanks?

Reason Code: bf

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: Associated Samples: All Soil

Analyte	Blank ID	Sample Identification										
	FB082809-SO (SDG#: R0904894)	Action Level	No Qualifiers									
Al	3.3											
Ca	17											
Pb	0.006											
Mg	5.0											
Mn	0.2											
Na	39.2											
Sr	0.1											
Zn	1.0											

LDC #: 22234F4
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Reviewer: CR
2nd Reviewer: [signature]

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".

Y N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

(Y) N N/A Was a post digestion spike analyzed for ICP elements that did not meet the required criteria for matrix spike recovery?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
	18	Soil	Sb	55.9	All Soil	J-/UJ/A (m)
			As	65.0		
			Se	58.2		J+de+/A
			Cu	159.1		
			V	145.5		

Comments:

LDC #: 22234F4
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
ICP Serial Dilution

Reviewer: CS
2nd Reviewer: [illegible]

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".

Y N N/A If analyte concentrations were > 50X the IDL, was an ICP serial dilution analyzed?
Y N N/A Were ICP serial dilution percent differences (%D) ≤10%?
Y (N) N/A Is there evidence of negative interference? If yes, professional judgement will be used to qualify the data.

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Diluted Sample ID	Matrix	Analyte	%D	Associated Samples	Qualifications
	1	Soil	Mg	12.4	All Soil	J (all Det) A (sd)
			Ni	10.8	↓	↓
	2	Soil	Be	27	↓	↓
			Cr	16	↓	↓

Comments: [illegible]

LDC 22234F4
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer: [illegible]

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg) 10	Concentration (mg/Kg) 11	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Aluminum	9560	8840	8			
Arsenic	2.96	2.83	4			
Barium	236	192	21			
Beryllium	0.571	0.452	23			
Boron	20.4	18.2		2.2	(≤10.7)	
Calcium	23300	21700	7			
Chromium	13.4	11.4	16			
Cobalt	11.1	8.2	30			
Copper	27.7	20.8	28			
Iron	18500	16600	11			
Lead	9.7	10.6		0.9	(≤2.1)	
Magnesium	10200	9420	8			
Manganese	739	495	40			
Mercury	0.014	0.011		0.003	(≤0.018)	
Molybdenum	0.62	0.55		0.07	(≤0.32)	
Nickel	17.8	15.9	11			
Platinum	0.054	0.025		0.029	(≤0.11)	
Potassium	4030	3900	3			
Silver	4.0	1.1		2.9	(≤0.5)	Jdet/A (fd)

LDC#: 22234F4
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer: [illegible]

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg) 10	Concentration (mg/Kg) 11	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Sodium	2810	2760	2			
Strontium	152	142		10	(≤42.6)	
Thallium	0.106	0.098		0.008	(≤0.021)	
Tin	4.5	3.9		0.6	(≤10.7)	
Titanium	927	804	14			
Tungsten	0.36	0.27		0.09	(≤0.11)	
Uranium	1.15	1.05	9			
Vanadium	59.1	52.4	12			
Zinc	40.8	35.4	14			

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 13 through October 15, 2009

LDC Report Date: January 6, 2010

Matrix: Soil/Water

Parameters: Metals

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905882

Sample Identification

RSAN8-0.5B
RSAN8-10B
RSAN8-20B
RSAN8-28B
SA160-0.5B
SA160-10B
SA160-20B
SA160-34B
SA178-0.5B
SA178-10B
SA178-17B
SA178-25B
SA178-43B
SA141-14B
SA141009-14B
SA141-24B
SA141-30B
SA143-24B
SA143-34B
SA143-50B
SA143009-50B
EB101409-SO1A3
RSAN8-0.5BMS
RSAN8-0.5BDUP
EB101409-SO1A3MS
EB101409-SO1A3DUP
SA160-10BMS
SA160-10BDUP

Introduction

This data review covers 25 soil samples and 3 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, 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)	Thallium Tungsten	0.005 ug/L 0.02 ug/L	All water samples in SDG R0905882
ICB/CCB	Antimony Barium Boron Copper Lead Manganese Molybdenum Strontium Silver Sodium Thallium Tungsten Uranium	0.026 ug/L 1.5 ug/L 8.6 ug/L 2.3 ug/L 0.006 ug/L 0.2 ug/L 0.7 ug/L 0.2 ug/L 0.7 ug/L 60 ug/L 0.009 ug/L 0.03 ug/L 0.004 ug/L	All water samples in SDG R0905882

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Aluminum Calcium Chromium Iron Magnesium Manganese Nickel Strontium Tin	1.2 mg/Kg 5.3 mg/Kg 0.09 mg/Kg 2.6 mg/Kg 1.2 mg/Kg 0.14 mg/Kg 0.14 mg/Kg 0.02 mg/Kg 3.7 mg/Kg	RSAN8-0.5B RSAN8-10B RSAN8-20B RSAN8-28B SA160-0.5B SA160-10B SA160-20B SA160-34B SA178-0.5B SA178-10B SA178-17B SA178-25B SA178-43B SA141-14B SA141009-14B SA141-24B SA141-30B SA143-24B SA143-34B SA143-50B
ICB/CCB	Barium Boron Manganese Strontium	2.00 ug/L 2.0 ug/L 0.80 ug/L 0.20 ug/L	RSAN8-0.5B RSAN8-10B RSAN8-20B RSAN8-28B SA160-0.5B SA160-10B SA160-20B SA160-34B SA178-0.5B SA178-10B SA178-17B SA178-25B SA178-43B SA141-14B SA141009-14B SA141-24B SA141-30B SA143-24B SA143-34B SA143-50B
PB (prep blank)	Aluminum Chromium Iron Manganese Tin	0.4 mg/Kg 0.09 mg/Kg 1.8 mg/Kg 0.04 mg/Kg 4.0 mg/Kg	SA143009-50B
ICB/CCB	Barium Beryllium Boron Iron Manganese Molybdenum Platinum Strontium Thallium Tungsten	0.50 ug/L 0.008 ug/L 6.0 ug/L 6.0 ug/L 0.10 ug/L 0.40 ug/L 0.011 ug/L 0.10 ug/L 0.013 ug/L 0.035 ug/L	SA143009-50B

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Platinum Thallium	0.022 ug/L 0.025 ug/L	RSAN8-28B SA160-0.5B SA160-10B SA160-20B SA160-34B SA178-0.5B SA178-10B SA178-17B SA178-25B SA178-43B SA141-14B SA141009-14B SA141-24B SA141-30B SA143-24B SA143-34B SA143-50B
ICB/CCB	Beryllium Tungsten Uranium	0.021 ug/L 0.052 ug/L 0.027 ug/L	SA141-14B SA141009-14B SA141-24B SA141-30B SA143-24B SA143-34B SA143-50B
ICB/CCB	Beryllium Tungsten Uranium	0.017 ug/L 0.049 ug/L 0.024 ug/L	RSAN8-28B SA160-0.5B SA160-10B SA160-20B SA160-34B SA178-0.5B SA178-10B SA178-17B SA178-25B SA178-43B
ICB/CCB	Platinum Beryllium Thallium Uranium	0.014 ug/L 0.011 ug/L 0.017 ug/L 0.046 ug/L	RSAN8-0.5B RSAN8-10B RSAN8-20B

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Aluminum Iron Lead Magnesium	5.0 ug/L 4.0 ug/L 2.0 ug/L 5.0 ug/L	RSAN8-20B RSAN8-28B SA160-0.5B SA160-10B SA160-20B SA160-34B SA178-0.5B SA178-10B SA178-17B SA178-25B SA178-43B SA141-14B SA141009-14B SA141-24B SA141-30B SA143-24B SA143-34B SA143-50B
ICB/CCB	Aluminum Magnesium	2.0 ug/L 4.0 ug/L	RSAN8-0.5B RSAN8-10B
ICB/CCB	Titanium	0.4 ug/L	RSAN8-0.5B RSAN8-10B RSAN8-20B RSAN8-28B SA160-0.5B SA160-10B SA160-20B SA160-34B SA178-0.5B SA178-10B SA178-17B SA178-25B

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
EB101409-SO1A3	Barium Copper Strontium Sodium Uranium	0.5 ug/L 1.2 ug/L 1.2 ug/L 22.9 ug/L 0.004 ug/L	5.0U ug/L 10.0U ug/L 10.0U ug/L 300U ug/L 0.020U ug/L
RSAN8-0.5B	Boron Platinum Tin	9.7 mg/Kg 0.016 mg/Kg 3.7 mg/Kg	9.9U mg/Kg 0.10U mg/Kg 9.9U mg/Kg
RSAN8-10B	Boron Platinum Tin	8.7 mg/Kg 0.010 mg/Kg 4.1 mg/Kg	11.0U mg/Kg 0.11U mg/Kg 11.0U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
RSAN8-20B	Boron Platinum Tin	7.7 mg/Kg 0.010 mg/Kg 4.2 mg/Kg	11.0U mg/Kg 0.11U mg/Kg 11.0U mg/Kg
RSAN8-28B	Boron Platinum Tin	9.6 mg/Kg 0.006 mg/Kg 4.5 mg/Kg	11.3U mg/Kg 0.11U mg/Kg 11.3U mg/Kg
SA160-0.5B	Platinum Tin	0.018 mg/Kg 4.2 mg/Kg	0.10U mg/Kg 10.2U mg/Kg
SA160-10B	Boron Platinum Tin	9.9 mg/Kg 0.009 mg/Kg 4.1 mg/Kg	10.6U mg/Kg 0.10U mg/Kg 10.6U mg/Kg
SA160-20B	Boron Platinum Tin	7.1 mg/Kg 0.008 mg/Kg 4.0 mg/Kg	10.5U mg/Kg 0.11U mg/Kg 10.5U mg/Kg
SA160-34B	Platinum Tin	0.006 mg/Kg 4.5 mg/Kg	0.12U mg/Kg 12.1U mg/Kg
SA178-0.5B	Boron Platinum Tin	5.8 mg/Kg 0.004 mg/Kg 4.3 mg/Kg	10.8U mg/Kg 0.11U mg/Kg 10.8U mg/Kg
SA178-10B	Boron Platinum Tin	6.0 mg/Kg 0.007 mg/Kg 3.9 mg/Kg	11.1U mg/Kg 0.11U mg/Kg 11.1U mg/Kg
SA178-17B	Boron Platinum Tin	6.8 mg/Kg 0.011 mg/Kg 4.4 mg/Kg	10.9U mg/Kg 0.11U mg/Kg 10.9U mg/Kg
SA178-25B	Boron Platinum Tin	6.9 mg/Kg 0.008 mg/Kg 4.1 mg/Kg	10.9U mg/Kg 0.11U mg/Kg 10.9U mg/Kg
SA178-43B	Platinum Tin	0.013 mg/Kg 4.9 mg/Kg	0.12U mg/Kg 11.5U mg/Kg
SA141-14B	Boron Platinum Tin	6.1 mg/Kg 0.010 mg/Kg 4.1 mg/Kg	10.7U mg/Kg 0.11U mg/Kg 10.7U mg/Kg
SA141009-14B	Boron Platinum Tin	6.4 mg/Kg 0.008 mg/Kg 4.0 mg/Kg	10.6U mg/Kg 0.11U mg/Kg 10.6U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA141-24B	Boron Platinum Tin	9.3 mg/Kg 0.010 mg/Kg 4.1 mg/Kg	10.7U mg/Kg 0.11U mg/Kg 10.7U mg/Kg
SA141-30B	Boron Platinum Tin	9.1 mg/Kg 0.007 mg/Kg 4.0 mg/Kg	10.8U mg/Kg 0.11U mg/Kg 10.8U mg/Kg
SA143-24B	Boron Platinum Tin	5.9 mg/Kg 0.008 mg/Kg 3.9 mg/Kg	10.9U mg/Kg 0.11U mg/Kg 10.9U mg/Kg
SA143-34B	Boron Platinum Tin	6.8 mg/Kg 0.006 mg/Kg 3.9 mg/Kg	10.6U mg/Kg 0.11U mg/Kg 10.6U mg/Kg
SA143-50B	Platinum Tin	0.011 mg/Kg 3.9 mg/Kg	0.12U mg/Kg 11.5U mg/Kg
SA143009-50B	Platinum Tin	0.011 mg/Kg 3.7 mg/Kg	0.096U mg/Kg 9.6U mg/Kg

Sample EB101409-SO1A3 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
EB101409-SO1A3	10/14/09	Aluminum Barium Calcium Copper Iron Lead Magnesium Manganese Sodium Strontium Uranium Zinc	8.0 ug/L 0.5 ug/L 289 ug/L 1.2 ug/L 34.3 ug/L 0.067 ug/L 24.5 ug/L 8.0 ug/L 22.9 ug/L 1.2 ug/L 0.004 ug/L 1.0 ug/L	SA160-0.5B SA160-10B SA160-20B SA160-34B SA178-0.5B SA178-10B SA178-17B SA178-25B SA178-43B

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 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 soil samples in SDG R0905882

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
RSAN8-0.5BMS (All soil samples in SDG R0905882)	Antimony Tungsten	58.0 (75-125) 74.4 (75-125)	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	A

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (Limits)	Difference (Limits)	Flag	A or P
RSAN8-0.5BDUP (All soil samples in SDG R0905882)	Barium	20.8 (≤20)	-	J (all detects) UJ (all non-detects)	A
	Calcium	42.5 (≤20)	-		
	Cobalt	29.5 (≤20)	-		
	Copper	24.6 (≤20)	-		
	Iron	21.2 (≤20)	-		
	Lead	32.5 (≤20)	-		
	Manganese	37.9 (≤20)	-		
	Molybdenum	-	1.44 mg/Kg (≤0.30)		
	Thallium	26.5 (≤20)	-		
	Tungsten	25.6 (≤20)	-		
	Vanadium	24.0 (≤20)	-		

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
RSAN8-0.5BL	Beryllium	14 (≤10)	All soil samples in SDG R0905882	J (all detects) UJ (all non-detects)	A
	Nickel	10.4 (≤10)		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 R0905882	All analytes 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

Samples SA141-14B and SA141009-14B and samples SA143-50B and SA143009-50B were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA141-14B	SA141009-14B				
Aluminum	10300	10700	4 (≤50)	-	-	-
Antimony	0.7	0.5U	-	0.2 (≤2.1)	-	-
Arsenic	1.81	1.57	-	0.24 (≤0.53)	-	-
Barium	188	200	6 (≤50)	-	-	-
Beryllium	0.485	0.435	11 (≤50)	-	-	-
Boron	6.1	6.4	-	0.3 (≤10.6)	-	-
Calcium	51300	15000	110 (≤50)	-	J (all detects)	A
Chromium	7.53	6.63	13 (≤50)	-	-	-
Cobalt	7.4	8.4	-	1 (≤2.1)	-	-
Copper	18.3	19.7	7 (≤50)	-	-	-
Iron	15300	16800	9 (≤50)	-	-	-
Lead	9.2	10.6	-	1.4 (≤2.1)	-	-
Magnesium	9680	9630	1 (≤50)	-	-	-
Manganese	404	461	13 (≤50)	-	-	-
Mercury	0.024	0.032	-	0.008 (≤0.018)	-	-

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA141-14B	SA141009-14B				
Molybdenum	1.05	0.95	-	0.1 (≤0.32)	-	-
Nickel	14.4	15.9	10 (≤50)	-	-	-
Platinum	0.01	0.008	-	0.002 (≤0.11)	-	-
Potassium	5500	6120	11 (≤50)	-	-	-
Sodium	864	946	9 (≤50)	-	-	-
Strontium	167	138	-	29 (≤42.2)	-	-
Thallium	0.177	0.17	4 (≤50)	-	-	-
Tin	4.1	4	-	0.1 (≤10.6)	-	-
Titanium	853	881	3 (≤50)	-	-	-
Tungsten	0.81	0.81	0 (≤50)	-	-	-
Uranium	0.958	0.829	14 (≤50)	-	-	-
Vanadium	43.9	49	11 (≤50)	-	-	-
Zinc	35.1	39.2	11 (≤50)	-	-	-

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA143-50B	SA143009-50B				
Aluminum	9250	8440	9 (≤50)	-	-	-
Antimony	0.6	1	-	0.4 (≤2.3)	-	-
Arsenic	15	15.1	-	0.1 (≤0.58)	-	-
Barium	206	205	0 (≤50)	-	-	-
Beryllium	0.4	0.427	7 (≤50)	-	-	-

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA143-50B	SA143009-50B				
Boron	12.2	14.5	-	2.3 (≤11.5)	-	-
Cadmium	0.05U	0.23	-	0.18 (≤0.11)	J (all detects) UJ (all non-detects)	A
Calcium	8770	6860	24 (≤50)	-	-	-
Chromium	7.89	8.74	10 (≤50)	-	-	-
Cobalt	19.4	20.6	6 (≤50)	-	-	-
Copper	23.2	18.2	24 (≤50)	-	-	-
Iron	14700	12500	16 (≤50)	-	-	-
Lead	12.6	8.5	-	4.1 (≤2.3)	-	-
Magnesium	13500	14400	6 (≤50)	-	-	-
Manganese	687	434	45 (≤50)	-	-	-
Mercury	0.009	0.051	-	0.042 (≤0.019)	-	-
Molybdenum	0.55	0.64	-	0.09 (≤0.34)	-	-
Nickel	16.9	16.8	1 (≤50)	-	-	-
Platinum	0.011	0.011	-	0 (≤0.12)	-	-
Potassium	2300	2230	3 (≤50)	-	-	-
Sodium	962	843	13 (≤50)	-	-	-
Strontium	301	392	26 (≤50)	-	-	-
Thallium	0.145	0.106	31 (≤50)	-	-	-
Tin	3.9	3.7	-	0.2 (≤11.5)	-	-
Titanium	819	623	27 (≤50)	-	-	-

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA143-50B	SA143009-50B				
Tungsten	2.27	1.63	33 (≤50)	-	-	-
Uranium	4.8	4.61	4 (≤50)	-	-	-
Vanadium	65.7	51.3	25 (≤50)	-	-	-
Zinc	35.3	30.9	13 (≤50)	-	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Data Qualification Summary - SDG R0905882

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0905882	RSAN8-0.5B RSAN8-10B RSAN8-20B RSAN8-28B SA160-0.5B SA160-10B SA160-20B SA160-34B SA178-0.5B SA178-10B SA178-17B SA178-25B SA178-43B SA141-14B SA141009-14B SA141-24B SA141-30B SA143-24B SA143-34B SA143-50B SA143009-50B	Antimony Tungsten	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	A	Matrix spike analysis (%R) (m)
R0905882	RSAN8-0.5B RSAN8-10B RSAN8-20B RSAN8-28B SA160-0.5B SA160-10B SA160-20B SA160-34B SA178-0.5B SA178-10B SA178-17B SA178-25B SA178-43B SA141-14B SA141009-14B SA141-24B SA141-30B SA143-24B SA143-34B SA143-50B SA143009-50B	Barium Calcium Cobalt Copper Iron Lead Manganese Thallium Tungsten Vanadium	J (all detects) UJ (all non-detects)	A	Duplicate sample analysis (RPD) (Id)

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0905882	RSAN8-0.5B RSAN8-10B RSAN8-20B RSAN8-28B SA160-0.5B SA160-10B SA160-20B SA160-34B SA178-0.5B SA178-10B SA178-17B SA178-25B SA178-43B SA141-14B SA141009-14B SA141-24B SA141-30B SA143-24B SA143-34B SA143-50B SA143009-50B	Molybdenum	J (all detects) UJ (all non-detects)	A	Duplicate sample analysis (Difference) (Id)
R0905882	RSAN8-0.5B RSAN8-10B RSAN8-20B RSAN8-28B SA160-0.5B SA160-10B SA160-20B SA160-34B SA178-0.5B SA178-10B SA178-17B SA178-25B SA178-43B SA141-14B SA141009-14B SA141-24B SA141-30B SA143-24B SA143-34B SA143-50B SA143009-50B	Beryllium Nickel	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	ICP serial dilution (%D) (sd)

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0905882	RSAN8-0.5B RSAN8-10B RSAN8-20B RSAN8-28B SA160-0.5B SA160-10B SA160-20B SA160-34B SA178-0.5B SA178-10B SA178-17B SA178-25B SA178-43B SA141-14B SA141009-14B SA141-24B SA141-30B SA143-24B SA143-34B SA143-50B SA143009-50B EB101409-SO1A3	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)
R0905882	SA141-14B SA141009-14B	Calcium	J (all detects)	A	Field duplicates (RPD) (fd)
R0905882	SA143-50B SA143009-50B	Cadmium	J (all detects) UJ (all non-detects)	A	Field duplicates (Difference) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Laboratory Blank Data Qualification Summary - SDG R0905882

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905882	EB101409-SO1A3	Barium Copper Strontium Sodium Uranium	5.0U ug/L 10.0U ug/L 10.0U ug/L 300U ug/L 0.020U ug/L	A	bl
R0905882	RSAN8-0.5B	Boron Platinum Tin	9.9U mg/Kg 0.10U mg/Kg 9.9U mg/Kg	A	bl
R0905882	RSAN8-10B	Boron Platinum Tin	11.0U mg/Kg 0.11U mg/Kg 11.0U mg/Kg	A	bl
R0905882	RSAN8-20B	Boron Platinum Tin	11.0U mg/Kg 0.11U mg/Kg 11.0U mg/Kg	A	bl

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905882	RSAN8-28B	Boron Platinum Tin	11.3U mg/Kg 0.11U mg/Kg 11.3U mg/Kg	A	bl
R0905882	SA160-0.5B	Platinum Tin	0.10U mg/Kg 10.2U mg/Kg	A	bl
R0905882	SA160-10B	Boron Platinum Tin	10.6U mg/Kg 0.10U mg/Kg 10.6U mg/Kg	A	bl
R0905882	SA160-20B	Boron Platinum Tin	10.5U mg/Kg 0.11U mg/Kg 10.5U mg/Kg	A	bl
R0905882	SA160-34B	Platinum Tin	0.12U mg/Kg 12.1U mg/Kg	A	bl
R0905882	SA178-0.5B	Boron Platinum Tin	10.8U mg/Kg 0.11U mg/Kg 10.8U mg/Kg	A	bl
R0905882	SA178-10B	Boron Platinum Tin	11.1U mg/Kg 0.11U mg/Kg 11.1U mg/Kg	A	bl
R0905882	SA178-17B	Boron Platinum Tin	10.9U mg/Kg 0.11U mg/Kg 10.9U mg/Kg	A	bl
R0905882	SA178-25B	Boron Platinum Tin	10.9U mg/Kg 0.11U mg/Kg 10.9U mg/Kg	A	bl
R0905882	SA178-43B	Platinum Tin	0.12U mg/Kg 11.5U mg/Kg	A	bl
R0905882	SA141-14B	Boron Platinum Tin	10.7U mg/Kg 0.11U mg/Kg 10.7U mg/Kg	A	bl
R0905882	SA141009-14B	Boron Platinum Tin	10.6U mg/Kg 0.11U mg/Kg 10.6U mg/Kg	A	bl
R0905882	SA141-24B	Boron Platinum Tin	10.7U mg/Kg 0.11U mg/Kg 10.7U mg/Kg	A	bl

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905882	SA141-30B	Boron Platinum Tin	10.8U mg/Kg 0.11U mg/Kg 10.8U mg/Kg	A	bl
R0905882	SA143-24B	Boron Platinum Tin	10.9U mg/Kg 0.11U mg/Kg 10.9U mg/Kg	A	bl
R0905882	SA143-34B	Boron Platinum Tin	10.6U mg/Kg 0.11U mg/Kg 10.6U mg/Kg	A	bl
R0905882	SA143-50B	Platinum Tin	0.12U mg/Kg 11.5U mg/Kg	A	bl
R0905882	SA143009-50B	Platinum Tin	0.096U mg/Kg 9.6U mg/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Equipment Blank Data Qualification Summary - SDG R0905882

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Field Blank Data Qualification Summary - SDG R0905882

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234G4
SDG #: R0905882
Laboratory: Columbia Analytical Services

Date: 12-30-09
Page: 1 of 1
Reviewer: CR
2nd Reviewer: VV

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
I.	Technical holding times	A	Sampling dates: 10/13/09 → 10/15/09
II.	ICP/MS Tune	A	
III.	Calibration	A	
IV.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	SW	MS
VII.	Duplicate Sample Analysis	SW	DUP
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	N	Not reviewed
X.	Furnace Atomic Absorption QC	N	Not utilized
XI.	ICP Serial Dilution	SW	
XII.	Sample Result Verification	N	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	SW	(14,15),(20,21)
XV	Field Blanks	SW	EB=22 FB= FB082809-SO (SDG# R0901894)

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: soil/water

1	RSAN8-0.5B	S	11	SA178-17B	S	21	SA143009-50B	S	31	PBW
2	RSAN8-10B		12	SA178-25B		22	EB101409-SO1A3	W	32	PBS1 (1-20)
3	RSAN8-20B		13	SA178-43B		23	RSAN8-0.5BMS	S	33	PBS2 (21)
4	RSAN8-28B		14	SA141-14B		24	RSAN8-0.5BDUP	↓	34	
5	SA160-0.5B		15	SA141009-14B		25	EB101409-SO1A3MS	W	35	
6	SA160-10B		16	SA141-24B		26	EB101409-SO1A3DUP	↓	36	
7	SA160-20B		17	SA141-30B		27	SA160-10BMS	S	37	
8	SA160-34B		18	SA143-24B		28	SA160-10BDUP	↓	38	
9	SA178-0.5B		19	SA143-34B		29			39	
10	SA178-10B	↓	20	SA143-50B	↓	30			40	

Notes: _____

LDC #: 222364
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Reviewer: CR
2nd reviewer: ✓

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-21	Soil	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
22	Water	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:23		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
24		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
25		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
26		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
27		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
28		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
Analysis Method		
ICP	S/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
ICP-MS	↓	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
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 #: 22234G4
SDG #: See Cover
METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)
Sample Concentration units, unless otherwise noted: ug/L

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES
Soil preparation factor applied: 100x Reason Code: bl
Associated Samples: All Water

Analyte	Maximum PB[a] (ug/L)	Maximum ICB/CCB[a] (ug/L)	Action Limit	22										
Sb		0.026												
Ba		1.5		0.5 / 5.0										
B		8.6												
Cu		2.3		1.2 / 10.0										
Pb		0.006												
Mn		0.2												
Mo		0.7												
Sr		0.2		1.2 / 10.0										
Ag		0.7												
Na		60		22.9 / 300										
Tl	0.005	0.009												
W	0.02	0.03												
U		0.004		0.004 / 0.020										

LDC #: 22234G4
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
Soil preparation factor applied: 100x
Associated Samples: 1-20
Reason Code: bl

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/l)	Action Limit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Al	1.2																						
Ba		2.00																					
B		2.0		9.7 / 9.9	8.7 / 11.0	7.7 / 11.0	9.6 / 11.3		9.9 / 10.6	7.1 / 10.5		5.8 / 10.8	6.0 / 11.1	6.8 / 10.9	6.9 / 10.9		6.1 / 10.7	6.4 / 10.6	9.3 / 10.7	9.1 / 10.8	5.9 / 10.9	6.8 / 10.6	
Ca	5.3																						
Cr	0.09																						
Fe	2.6																						
Mg	1.2																						
Mn	0.14	0.80																					
Ni	0.14																						
Sr	0.02	0.20																					
Sn	3.7			3.7 / 9.9	4.1 / 11.0	4.2 / 11.0	4.5 / 11.3	4.2 / 10.2	4.1 / 10.6	4.0 / 10.5	4.5 / 12.1	4.3 / 10.8	3.9 / 11.1	4.4 / 10.9	4.1 / 10.9	4.9 / 11.5	4.1 / 10.7	4.0 / 10.6	4.1 / 10.7	4.0 / 10.8	3.9 / 10.9	3.9 / 10.6	3.9 / 11.5

LDC #: 22234G4
SDG #: See Cover
METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Soil preparation factor applied: 100x Reason Code: bl

Reviewer: [illegible]
2nd Reviewer: [illegible]

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 21

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	21										
Al	0.4													
Ba		0.50												
Be		0.008												
B		6.0												
Cr	0.09													
Fe	1.8	6.0												
Mn	0.04	0.10												
Mo		0.40												
Pt		0.011		0.011 / 0.096										
Sr		0.10												
Sn	4.0			3.7 / 9.6										
Tl		0.013												
W		0.035												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 4-20

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Pt		0.022		0.006 / 0.11	0.018 / 0.10	0.009 / 0.10	0.008 / 0.11	0.006 / 0.12	0.004 / 0.11	0.007 / 0.11	0.011 / 0.11	0.008 / 0.11	0.013 / 0.12	0.010 / 0.11	0.008 / 0.11	0.010 / 0.11	0.007 / 0.11	0.008 / 0.11	0.006 / 0.11	0.011 / 0.12
Tl		0.025																		

LDC #: 22234G4
SDG #: See Cover
METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES
Soil preparation factor applied: 100x Reason Code: bl

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 14-20

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/l)	Action Limit	NoQuals									
Be		0.021											
W		0.052											
U		0.027											

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 4-13

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/l)	Action Limit	NoQuals									
Be		0.017											
W		0.049											
U		0.024											

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 1-3

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/l)	Action Limit	1	2	3							
Pt		0.014		0.016 / 0.10	0.010 / 0.11	0.010 / 0.11							
Be		0.011											
Tl		0.017											
W		0.046											

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 3-20

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/l)	Action Limit	NoQuals									
Al		5.0											
Fe		4.0											
Pb		2.0											
Mg		5.0											

LDC #: 22234G4
SDG #: See Cover
METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES
Soil preparation factor applied: 100x

Reason Code: bl

Reviewer: CR
2nd Reviewer: K

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 1, 2

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Quals									
Al		2.0											
Mg		4.0											

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 1-12

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Quals									
Ti		0.4											

Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC #: 22234G4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: CR
2nd Reviewer:

METHOD: Trace Metals (EPA SW846 6010B/7000)

(Y) N N/A 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 Reason Code: be

Sampling date: 10/14/09 Soil factor applied 100x

Field blank type: (circle one) Field Blank / Rinsate / Other: (EB) Associated Samples: 5-13

Analyte	Blank ID	Sample Identification										
	22	Action Level	No Qualifiers									
Al	8.0											
Ba	0.5											
Ca	289	289										
Cu	1.2											
Fe	34.3	34.3										
Pb	0.067	0.067										
Mg	24.5	24.5										
Mn	8.0	8.0										
Na	22.9											
Sr	1.2											
U	0.004											
Zn	1.0											

LDC #: 22234G4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: CR
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW846 6010B/7000)

Y N N/A Were field blanks identified in this SDG?
Y N N/A Were target analytes detected in the field blanks?

Reason Code: bf

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: _____ Associated Samples: All Soil

Analyte	Blank ID	Sample Identification										
	FB082809-SO (SDG#: R0904894)	Action Level	No Qualifiers									
Al	3.3											
Ca	17											
Pb	0.006											
Mg	5.0											
Mn	0.2											
Na	39.2											
Sr	0.1											
Zn	1.0											

LDC #: 22234G4
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Page: 1 of 1
Reviewer: CR
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".

Y N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y N N/A Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

Y N N/A Was a post digestion spike analyzed for ICP elements that did not meet the required criteria for matrix spike recovery?

LEVEL IV ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
1	23	Soil	Sb	58.0	All Soil	J-/UJ/A(m)
			W	74.4	↓	↓
2	SA138-0.5B	Soil	Sb	58.0	None (different	NO Qual
	(SDG# R0905693)		Mn	29.3	↓ site)	↓

Comments:

MS.4S2

LDC #: 22234G4
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Duplicate Analysis

Reviewer: CR
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".

(Y) N N/A Was a duplicate sample analyzed for each matrix in this SDG?

Y (N) N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤ 35% for soil samples? If no, see qualifications below. A control limit of ±R.L. (±2X R.L for soil) was used for sample values that were <5X the R.L., including the case when only one of the duplicate sample values was <5X R.L.. If field blanks were used for laboratory duplicates, note in the Overall Assessment.

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Duplicate ID	Matrix	Analyte	RPD (Limits)	Difference (Limits)	Associated Samples	Qualifications
	24	Soil	Ba	20.8 (≤20)		All	J/UJ/A (1d)
			Ca	42.5			
			Co	29.5			
			Cu	24.6			
			Fe	21.2			
			Pb	32.5			
			Mn	37.9			
			Mo		1.44 (≤ 0.30)		
			Tl	26.5 (≤20)			
			W	25.6			
			V	24.0			

Comments:

LDC #: 22234G4
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
ICP Serial Dilution

Reviewer: ER
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".

(Y) N N/A If analyte concentrations were > 50X the IDL, was an ICP serial dilution analyzed?
Y (N) N/A Were ICP serial dilution percent differences (%D) ≤10%?
Y (N) N/A Is there evidence of negative interference? If yes, professional judgement will be used to qualify the data.

LEVEL IV ONLY:
Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Diluted Sample ID	Matrix	Analyte	%D	Associated Samples	Qualifications
	1	Soil	Be	14	All	J/UJ/A (sd)
			Ni	~~202~~ 10.4	↓	↓

Comments:

LDC 22234G4
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: AR
2nd Reviewer: IN

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg) 14	Concentration (mg/Kg) 15	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Aluminum	10300	10700	4			
Antimony	0.7	0.5U		0.2	(≤2.1)	
Arsenic	1.81	1.57		0.24	(≤0.53)	
Barium	188	200	6			
Beryllium	0.485	0.435	11			
Boron	6.1	6.4		0.3	(≤10.6)	
Calcium	51300	15000	110			Jdet/A (fd)
Chromium	7.53	6.63	13			
Cobalt	7.4	8.4		1	(≤2.1)	
Copper	18.3	19.7	7			
Iron	15300	16800	9			
Lead	9.2	10.6		1.4	(≤2.1)	
Magnesium	9680	9630	1			
Manganese	404	461	13			
Mercury	0.024	0.032		0.008	(≤0.018)	
Molybdenum	1.05	0.95		0.1	(≤0.32)	
Nickel	14.4	15.9	10			
Platinum	0.010	0.008		0.002	(≤0.11)	
Potassium	5500	6120	11			

LDC#: 22234G4__
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

METHOD: Metals (EPA Method 6020/6010/7000)

(Y) N NA Were field duplicate pairs identified in this SDG?
Y (N) NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg) 14	Concentration (mg/Kg) 15	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Sodium	864	946	9			
Strontium	167	138		29	(≤42.2)	
Thallium	0.177	0.170	4			
Tin	4.1	4.0		0.1	(≤10.6)	
Titanium	853	881	3			
Tungsten	0.81	0.81	0			
Uranium	0.958	0.829	14			
Vanadium	43.9	49.0	11			
Zinc	35.1	39.2	11			

LDC#: 22234G4__
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: ar
2nd Reviewer: W

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg)		(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
	20	21				
Aluminum	9250	8440	9			
Antimony	0.6	1.0		0.4	(≤2.3)	
Arsenic	15.0	15.1		0.1	(≤0.58)	
Barium	206	205	0			
Beryllium	0.400	0.427	7			
Boron	12.2	14.5		2.3	(≤11.5)	
Cadmium	0.05U	0.23		0.18	(≤0.11)	J/UJ/A (fd)
Calcium	8770	6860	24			
Chromium	7.89	8.74	10			
Cobalt	19.4	20.6	6			
Copper	23.2	18.2	24			
Iron	14700	12500	16			
Lead	12.6	8.5		4.1	(≤2.3)	
Magnesium	13500	14400	6			
Manganese	687	434	45			
Mercury	0.009	0.051		0.042	(≤0.019)	
Molybdenum	0.55	0.64		0.09	(≤0.34)	
Nickel	16.9	16.8	1			
Platinum	0.011	0.011		0	(≤0.12)	

LDC#: 22234G4__
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer: W

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg) 20	Concentration (mg/Kg) 21	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Potassium	2300	2230	3			
Sodium	962	843	13			
Strontium	301	392	26			
Thallium	0.145	0.106	31			
Tin	3.9	3.7		0.2	(≤11.5)	
Titanium	819	623	27			
Tungsten	2.270	1.630	33			
Uranium	4.800	4.610	4			
Vanadium	65.7	51.3	25			
Zinc	35.3	30.9	13			

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 13, 2009

LDC Report Date: January 4, 2010

Matrix: Soil

Parameters: Metals

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905885/K0910208

Sample Identification

RSAN8-10BSPLP2
RSAN8-10BSPLP3
RSAN8-10BSPLP2MS
RSAN8-10BSPLP2DUP
RSAN8-10BSPLP3MS
RSAN8-10BSPLP3DUP

Samples in this SDG underwent SPLP extraction

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 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)	Barium Boron Strontium Zinc	0.052 mg/L 0.03 mg/L 0.0005 mg/L 0.034 mg/L	RSAN8-10BSPLP2
ICB/CCB	Barium Strontium	0.025 mg/L 0.0007 mg/L	RSAN8-10BSPLP3

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
RSAN8-10BSPLP2	Barium Boron	0.096 mg/L 0.12 mg/L	0.096J+ mg/L 0.12J+ mg/L
RSAN8-10BSPLP3	Barium	0.175 mg/L	0.175J+ 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

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 R0905885/K0910208	All analytes 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
Metals - Data Qualification Summary - SDG R0905885/K0910208

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0905885/ K0910208	RSAN8-10BSPLP2 RSAN8-10BSPLP3	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 R0905885/K0910208

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905885/ K0910208	RSAN8-10BSPLP2	Barium Boron	0.096J+ mg/L 0.12J+ mg/L	A	bl
R0905885/ K0910208	RSAN8-10BSPLP3	Barium	0.175J+ mg/L	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Field Blank Data Qualification Summary - SDG R0905885/K0910208

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234H4
SDG #: R0905885/K0910208
Laboratory: Columbia Analytical Services

Date: 12-30-09
Page: 1 of 1
Reviewer: CR
2nd Reviewer: [signature]

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
I.	Technical holding times	A	Sampling dates: 10/13/09
II.	ICP/MS Tune	A	
III.	Calibration	A	
IV.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	A	MS
VII.	Duplicate Sample Analysis	A	Dup
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	N	Not reviewed
X.	Furnace Atomic Absorption QC	N	Not utilized
XI.	ICP Serial Dilution	A	
XII.	Sample Result Verification	N	
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:

5 Soil

1	RAN8-10BSPLP2	11	PBW1	21		31	
2	RAN8-10BSPLP3	12	PBW2	22		32	
3	RAN8-10BSPLP2MS	13		23		33	
4	RAN8-10BSPLP2DUP	14		24		34	
5	RAN8-10BSPLP3MS	15		25		35	
6	RAN8-10BSPLP3DUP	16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes: _____

LDC #: 22234A
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: QR
2nd reviewer: W

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1,2	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:3-6		[✓ 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]
~~4~~		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
~~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
~~6~~		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
Analysis Method		
ICP	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]
ICP-MS	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
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 #: 22234H4
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

Reason Code: bl

Analyte	Extraction Blank[a] (mg/L)	Maximum PB[a] (mg/L)	Maximum ICB/CCB[a] (ug/L)	Action Limit	1									
Ba	0.052			0.52	0.096 J+									
B	0.03			0.3	0.12 J+									
Sr	0.0005			0.005										
Zn	0.034			0.34										

Sample Concentration units, unless otherwise noted: mg/L Associated Samples: 2

Analyte	Extraction Blank[a] (mg/L)	Maximum PB[a] (mg/L)	Maximum ICB/CCB[a] (ug/L)	Action Limit	2									
Ba	0.025			0.25	0.175 J+									
Sr	0.0007			0.007										

Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 16 through October 19, 2009

LDC Report Date: January 6, 2010

Matrix: Soil/Water

Parameters: Metals

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905963

Sample Identification

SA108-20B
SA108-30B
SA108-45B
SA142-20.5B
SA142009-20.5B
SA142-30.5B
SA142-51B
EB101909-SO1A3
SA157-10B
SA157-25B
SA157-44B
SA171-5B
SA171-15B
SA171-30B
SA171-41B
SA108-20BMS
SA108-20BDUP

Introduction

This data review covers 16 soil samples and one water sample 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)	Thallium Tungsten	0.005 ug/L 0.02 ug/L	All water samples in SDG R0905963
ICB/CCB	Antimony Barium Boron Lead Manganese Molybdenum Strontium Silver Sodium Thallium Tungsten Uranium	0.026 ug/L 1.5 ug/L 8.6 ug/L 0.006 ug/L 0.2 ug/L 0.7 ug/L 0.1 ug/L 0.7 ug/L 60 ug/L 0.009 ug/L 0.03 ug/L 0.004 ug/L	All water samples in SDG R0905963
PB (prep blank)	Antimony Chromium Manganese Tin	0.6 mg/Kg 0.05 mg/Kg 0.02 mg/Kg 3.7 mg/Kg	All soil samples in SDG R0905963

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Antimony Silver Manganese Molybdenum Strontium Thallium Tungsten	0.026 ug/L 0.7 ug/L 0.2 ug/L 0.7 ug/L 0.2 ug/L 0.007 ug/L 0.03 ug/L	All soil samples in SDG R0905963
ICB/CCB	Barium Iron Uranium	1.8 ug/L 3.5 ug/L 0.004 ug/L	SA142-30.5B SA142-51B SA157-10B SA157-25B SA157-44B SA171-5B SA171-15B SA171-30B SA171-41B
ICB/CCB	Barium	1.2 ug/L	SA108-20B SA108-30B SA108-45B SA142-20.5B SA142009-20.5B
ICB/CCB	Lead	0.006 ug/L	SA157-44B SA171-15B SA171-30B SA171-41B

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
EB101909-SO1A3	Barium Boron Strontium Sodium Uranium	1.1 ug/L 2.7 ug/L 1.5 ug/L 53.3 ug/L 0.006 ug/L	5.0U ug/L 50.0U ug/L 10.0U ug/L 300U ug/L 0.020U ug/L
SA108-20B	Antimony Tin	1.5 mg/Kg 4.5 mg/Kg	2.1U mg/Kg 10.6U mg/Kg
SA108-30B	Antimony Tin	1.4 mg/Kg 4.3 mg/Kg	2.1U mg/Kg 10.6U mg/Kg
SA108-45B	Antimony Tin	1.4 mg/Kg 4.9 mg/Kg	2.4U mg/Kg 11.9U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA142-20.5B	Antimony Tin	1.1 mg/Kg 4.2 mg/Kg	2.1U mg/Kg 10.7U mg/Kg
SA142009-20.5B	Tin	4.2 mg/Kg	10.7U mg/Kg
SA142-30.5B	Antimony Tin	1.4 mg/Kg 4.1 mg/Kg	2.2U mg/Kg 10.8U mg/Kg
SA142-51B	Antimony Tin	1.4 mg/Kg 4.4 mg/Kg	2.1U mg/Kg 10.7U mg/Kg
SA157-10B	Antimony Tin	1.2 mg/Kg 3.9 mg/Kg	2.1U mg/Kg 10.7U mg/Kg
SA157-25B	Antimony Tin	1.4 mg/Kg 4.2 mg/Kg	2.1U mg/Kg 10.7U mg/Kg
SA157-44B	Antimony Tin Tungsten	1.3 mg/Kg 4.1 mg/Kg 0.10 mg/Kg	1.9U mg/Kg 9.3U mg/Kg 0.19U mg/Kg
SA171-5B	Antimony Tin	1.0 mg/Kg 4.0 mg/Kg	2.1U mg/Kg 10.6U mg/Kg
SA171-15B	Antimony Tin	0.9 mg/Kg 4.4 mg/Kg	2.2U mg/Kg 10.9U mg/Kg
SA171-30B	Antimony Molybdenum Tin	1.0 mg/Kg 0.31 mg/Kg 4.1 mg/Kg	2.2U mg/Kg 0.33U mg/Kg 11.0U mg/Kg

Sample EB101909-SO1A3 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
EB101909-SO1A3	10/19/09	Aluminum Barium Boron Chromium Calcium Iron Lead Magnesium Manganese Potassium Sodium Strontium Uranium Zinc	10.5 ug/L 1.1 ug/L 2.7 ug/L 0.7 ug/L 186 ug/L 28.1 ug/L 0.447 ug/L 26.7 ug/L 17.9 ug/L 61 ug/L 53.3 ug/L 1.5 ug/L 0.006 ug/L 2.8 ug/L	SA157-10B SA157-25B SA157-44B SA171-5B SA171-15B SA171-30B SA171-41B

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
SA157-10B	Boron	6.9 mg/Kg	10.7U mg/Kg
SA157-25B	Boron	9.1 mg/Kg	10.7U mg/Kg
SA171-5B	Boron	8.4 mg/Kg	10.6U mg/Kg
SA171-15B	Boron	9.7 mg/Kg	10.9U mg/Kg
SA171-30B	Boron	8.3 mg/Kg	11.0U 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 soil samples in SDG R0905963

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
SA108-20BMS (All soil samples in SDG R0905963)	Antimony Selenium Tungsten	46.6 (75-125) 72.7 (75-125) 65.2 (75-125)	J- (all detects) UJ (all non-detects)	A

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (Limits)	Difference (Limits)	Flag	A or P
SA108-20BDUP (All soil samples in SDG R0905963)	Chromium Copper Manganese Thallium Tungsten	22 (≤20) 38.7 (≤20) 31.6 (≤20) 46 (≤20) -	- - - - 0.18 mg/Kg (≤0.11)	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.

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
SA108-20B	Beryllium	14 (≤10)	All soil samples in SDG R0905963	J (all detects) UJ (all non-detects)	A

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 R0905963	All analytes 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

Samples SA142-20.5B and SA142009-20.5B were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA142-20.5B	SA142009-20.5B				
Aluminum	9600	9450	2 (≤50)	-	-	-
Antimony	1.1	0.5U	-	0.6 (≤2.1)	-	-
Arsenic	124	223	57 (≤50)	-	J (all detects)	A
Barium	227	208	9 (≤50)	-	-	-
Beryllium	0.438	0.413	6 (≤50)	-	-	-
Boron	7.4	7.2	-	0.2 (≤10.7)	-	-

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA142-20.5B	SA142009-20.5B				
Cadmium	0.21	0.26	-	0.05 (≤0.11)	-	-
Calcium	21000	19400	8 (≤50)	-	-	-
Chromium	6.41	6.22	3 (≤50)	-	-	-
Cobalt	9.8	8.8	-	1 (≤2.1)	-	-
Copper	39.5	47.8	19 (≤50)	-	-	-
Iron	16800	15300	9 (≤50)	-	-	-
Lead	1990	3280	49 (≤50)	-	-	-
Magnesium	9590	9610	0 (≤50)	-	-	-
Manganese	7420	9760	27 (≤50)	-	-	-
Mercury	0.021	0.026	-	0.005 (≤0.016)	-	-
Molybdenum	5.59	9.15	48 (≤50)	-	-	-
Nickel	18.2	17.6	3 (≤50)	-	-	-
Platinum	0.008	0.006	-	0.002 (≤0.11)	-	-
Potassium	3440	3360	2 (≤50)	-	-	-
Sodium	407	382	6 (≤50)	-	-	-
Strontium	650	1130	54 (≤50)	-	J (all detects)	A
Thallium	0.918	1.05	13 (≤50)	-	-	-
Tin	4.2	4.2	-	0 (≤10.7)	-	-
Titanium	978	893	9 (≤50)	-	-	-
Tungsten	3.02	1.22	85 (≤50)	-	J (all detects)	A

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA142-20.5B	SA142009-20.5B				
Uranium	0.868	0.883	2 (≤50)	-	-	-
Vanadium	49.6	45.7	8 (≤50)	-	-	-
Zinc	64.5	83.2	25 (≤50)	-	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Data Qualification Summary - SDG R0905963

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0905963	SA108-20B SA108-30B SA108-45B SA142-20.5B SA142009-20.5B SA142-30.5B SA142-51B SA157-10B SA157-25B SA157-44B SA171-5B SA171-15B SA171-30B SA171-41B	Antimony Selenium Tungsten	J- (all detects) UJ (all non-detects)	A	Matrix spike analysis (%R) (m)
R0905963	SA108-20B SA108-30B SA108-45B SA142-20.5B SA142009-20.5B SA142-30.5B SA142-51B SA157-10B SA157-25B SA157-44B SA171-5B SA171-15B SA171-30B SA171-41B	Chromium Copper Manganese Thallium	J (all detects) UJ (all non-detects)	A	Duplicate sample analysis (RPD) (ld)
R0905963	SA108-20B SA108-30B SA108-45B SA142-20.5B SA142009-20.5B SA142-30.5B SA142-51B SA157-10B SA157-25B SA157-44B SA171-5B SA171-15B SA171-30B SA171-41B	Tungsten	J (all detects) UJ (all non-detects)	A	Duplicate sample analysis (Difference) (ld)

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0905963	SA108-20B SA108-30B SA108-45B SA142-20.5B SA142009-20.5B SA142-30.5B SA142-51B SA157-10B SA157-25B SA157-44B SA171-5B SA171-15B SA171-30B SA171-41B	Beryllium	J (all detects) UJ (all non-detects)	A	ICP serial dilution (%D) (sd)
R0905963	SA108-20B SA108-30B SA108-45B SA142-20.5B SA142009-20.5B SA142-30.5B SA142-51B EB101909-SO1A3 SA157-10B SA157-25B SA157-44B SA171-5B SA171-15B SA171-30B SA171-41B	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)
R0905963	SA142-20.5B SA142009-20.5B	Arsenic Strontium Tungsten	J (all detects) J (all detects) J (all detects)	A	Field duplicates (RPD) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Laboratory Blank Data Qualification Summary - SDG R0905963

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905963	EB101909-SO1A3	Barium Boron Strontium Sodium Uranium	5.0U ug/L 50.0U ug/L 10.0U ug/L 300U ug/L 0.020U ug/L	A	bl
R0905963	SA108-20B	Antimony Tin	2.1U mg/Kg 10.6U mg/Kg	A	bl
R0905963	SA108-30B	Antimony Tin	2.1U mg/Kg 10.6U mg/Kg	A	bl

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905963	SA108-45B	Antimony Tin	2.4U mg/Kg 11.9U mg/Kg	A	bl
R0905963	SA142-20.5B	Antimony Tin	2.1U mg/Kg 10.7U mg/Kg	A	bl
R0905963	SA142009-20.5B	Tin	10.7U mg/Kg	A	bl
R0905963	SA142-30.5B	Antimony Tin	2.2U mg/Kg 10.8U mg/Kg	A	bl
R0905963	SA142-51B	Antimony Tin	2.1U mg/Kg 10.7U mg/Kg	A	bl
R0905963	SA157-10B	Antimony Tin	2.1U mg/Kg 10.7U mg/Kg	A	bl
R0905963	SA157-25B	Antimony Tin	2.1U mg/Kg 10.7U mg/Kg	A	bl
R0905963	SA157-44B	Antimony Tin Tungsten	1.9U mg/Kg 9.3U mg/Kg 0.19U mg/Kg	A	bl
R0905963	SA171-5B	Antimony Tin	2.1U mg/Kg 10.6U mg/Kg	A	bl
R0905963	SA171-15B	Antimony Tin	2.2U mg/Kg 10.9U mg/Kg	A	bl
R0905963	SA171-30B	Antimony Molybdenum Tin	2.2U mg/Kg 0.33U mg/Kg 11.0U mg/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Equipment Blank Data Qualification Summary - SDG R0905963

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905963	SA157-10B	Boron	10.7U mg/Kg	A	be
R0905963	SA157-25B	Boron	10.7U mg/Kg	A	be
R0905963	SA171-5B	Boron	10.6U mg/Kg	A	be

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905963	SA171-15B	Boron	10.9U mg/Kg	A	be
R0905963	SA171-30B	Boron	11.0U mg/Kg	A	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Field Blank Data Qualification Summary - SDG R0905963

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234I4
SDG #: R0905963
Laboratory: Columbia Analytical Services

Date: 12-30-09
Page: 1 of 1
Reviewer: CR
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
I.	Technical holding times	A	Sampling dates: 10/16/09 - 10/19/09
II.	ICP/MS Tune	A	
III.	Calibration	A	
IV.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	SW	MS
VII.	Duplicate Sample Analysis	SW	Dup
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	N	Not reviewed
X.	Furnace Atomic Absorption QC	N	Not utilized
XI.	ICP Serial Dilution	SW	
XII.	Sample Result Verification	N	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	SW	(4,5)
XV	Field Blanks	SW	EB=8. FB=FB082809-SO (SDG# R0901894)

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: all soil except 8 = water

1	SA108-20B	11	SA157-44B	21		31	PBS
2	SA108-30B	12	SA171-5B	22		32	PBW
3	SA108-45B	13	SA171-15B	23		33	
4	SA142-20.5B	14	SA171-30B	24		34	
5	SA142009-20.5B	15	SA171-41B	25		35	
6	SA142-30.5B	16	SA108-20BMS	26		36	
7	SA142-51B	17	SA108-20BDUP	27		37	
8	EB101909-SO1A3	18		28		38	
9	SA157-10B	19		29		39	
10	SA157-25B	20		30		40	

Notes: _____

LDC #: 22234I4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer:
2nd reviewer:

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-7,9-15	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]
8	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
QC:16		[✓ 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]
↓ 17		[✓ 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
		Analysis Method
ICP	S|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]
ICP-MS	↓	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
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 #: 22234I4
SDG #: See Cover
METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)
Sample Concentration units, unless otherwise noted: ug/L

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES
Soil preparation factor applied: 100x Reason Code: bl
Associated Samples: All Water

Analyte	Maximum PB[a] (ug/L)	Maximum ICB/CCB[a] (ug/L)	Action Limit	8										
Sb		0.026												
Ba		1.5		1.1 / 5.0										
B		8.6		2.7 / 50.0										
Pb		0.006												
Mn		0.2												
Mo		0.7												
Sr		0.1		1.5 / 10.0										
Ag		0.7												
Na		60		53.3 / 300										
Tl	0.005	0.009												
W	0.02	0.03												
U		0.004		0.006 / 0.020										

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: All Soil

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	1	2	3	4	5	6	7	9	10	11	12	13	14
Sb	0.6	0.026		1.5 / 2.1	1.4 / 2.1	1.4 / 2.4	1.1 / 2.1		1.4 / 2.2	1.4 / 2.1	1.2 / 2.1	1.4 / 2.1	1.3 / 1.9	1.0 / 2.1	0.9 / 2.2	1.0 / 2.2
Cr	0.05															
Ag		0.7														
Mn	0.02	0.2														
Mo		0.7														0.31 / 0.33
Sr		0.2														
Tl		0.007														
Sn	3.7			4.5 / 10.6	4.3 / 10.6	4.9 / 11.9	4.2 / 10.7	4.2 / 10.7	4.1 / 10.8	4.4 / 10.7	3.9 / 10.7	4.2 / 10.7	4.1 / 9.3	4.0 / 10.6	4.4 / 10.9	4.1 / 11.0
W		0.03											0.10 / 0.19			

LDC #: 22234I4
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
Soil preparation factor applied: 100x
Associated Samples: 6, 7, 9-15

Reason Code: bl

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Ba		1.8												
Fe		3.5												
U		0.004												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 1-5

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Ba		1.2												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 11, 13-15

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Pb		0.006												

Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC #: 22234I4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: CR
2nd Reviewer:

METHOD: Trace Metals (EPA SW846 6010B/7000)

Y N N/A 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 Reason Code: be

Sampling date: 10/19/09 Soil factor applied 100x

Field blank type: (circle one) Field Blank / Rinsate / Other: (EB) Associated Samples: 9-15

Analyte	Blank ID	Sample Identification										
	8	Action Level	9	10	12	13	14					
Al	10.5											
Ba	1.1											
B	2.7		6.9 / 10.7	9.1 / 10.7	8.4 / 10.6	9.7 / 10.9	8.3 / 11.0					
Cr	0.7											
Ca	186	186										
Fe	28.1	28.1										
Pb	0.447	0.447										
Mg	26.7	26.7										
Mn	17.9	17.9										
K	61											
Na	53.3											
Sr	1.5											
U	0.006											
Zn	2.8											

LDC #: 22234I4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: VR
2nd Reviewer: VR

METHOD: Trace Metals (EPA SW846 6010B/7000)

Y N N/A Were field blanks identified in this SDG?
Y N N/A Were target analytes detected in the field blanks? Reason Code: bf

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: Associated Samples: All Soil

Analyte	Blank ID	Sample Identification										
	FB082809-SO (SDG#: R0904894)	Action Level	No Qualifiers									
Al	3.3											
Ca	17											
Pb	0.006											
Mg	5.0											
Mn	0.2											
Na	39.2											
Sr	0.1											
Zn	1.0											

LDC #: 22234I4
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Page: 1 of 1
Reviewer: CR
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".

(Y) N N/A Was a matrix spike analyzed for each matrix in this SDG?

(Y) N N/A Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

(Y) N N/A Was a post digestion spike analyzed for ICP elements that did not meet the required criteria for matrix spike recovery?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
	16	Soil	Sb	46.6	All Soil	J-/UJ/A (m)
			Se	72.7	↓	↓
			W	65.2	↓	↓

Comments: _____

MS.4S2

LDC #: 22234I4
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Duplicate Analysis

Reviewer: CR
2nd Reviewer: [illegible]

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".

Y N N/A Was a duplicate sample analyzed for each matrix in this SDG?

Y N N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤ 35% for soil samples? If no, see qualifications below. A control limit of ±R.L. (±2X R.L for soil) was used for sample values that were <5X the R.L., including the case when only one of the duplicate sample values was <5X R.L.. If field blanks were used for laboratory duplicates, note in the Overall Assessment.

LEVEL IV ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Duplicate ID	Matrix	Analyte	RPD (Limits)	Difference (Limits)	Associated Samples	Qualifications
	17	Soil	Cr	22 (≤20)		All Soil	J/UJ/A (Rd)
			Cu	38.7			
			Mn	31.6			
			Ti	46			
			W		0.18 (≤0.11)		

Comments:

LDC #: 22234I4
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
ICP Serial Dilution

Reviewer: CR
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".

(Y) N N/A If analyte concentrations were > 50X the IDL, was an ICP serial dilution analyzed?
Y (N) N/A Were ICP serial dilution percent differences (%D) ≤10%?
Y (N) N/A Is there evidence of negative interference? If yes, professional judgement will be used to qualify the data.

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Diluted Sample ID	Matrix	Analyte	%D	Associated Samples	Qualifications
	1	Soil	Be	14	All Soil	J UJ A (59)

Comments:

LDC 222314
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg) 4	Concentration (mg/Kg) 5	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Aluminum	9600	9450	2			
Antimony	1.1	0.5U		0.6	(≤2.1)	
Arsenic	124	223	57			Jdet/A (fd)
Barium	227	208	9			
Beryllium	0.438	0.413	6			
Boron	7.4	7.2		0.2	(≤10.7)	
Cadmium	0.21	0.26		0.05	(≤0.11)	
Calcium	21000	19400	8			
Chromium	6.41	6.22	3			
Cobalt	9.8	8.8		1	(≤2.1)	
Copper	39.5	47.8	19			
Iron	16800	15300	9			
Lead	1990	3280	49			
Magnesium	9590	9610	0			
Manganese	7420	9760	27			
Mercury	0.021	0.026		0.005	(≤0.016)	
Molybdenum	5.59	9.15	48			
Nickel	18.2	17.6	3			
Platinum	0.008	0.006		0.002	(≤0.11)	

LDC#: 22234I4__
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer: VV

METHOD: Metals (EPA Method 6020/6010/7000)

(Y) N NA Were field duplicate pairs identified in this SDG?
Y/N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg) 4	Concentration (mg/Kg) 5	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Potassium	3440	3360	2			
Sodium	407	382	6			
Strontium	650	1130	54			Jdet/A (fd)
Thallium	0.918	1.050	13			
Tin	4.2	4.2		0	(≤10.7)	
Titanium	978	893	9			
Tungsten	3.020	1.220	85			Jdet/A (fd)
Uranium	0.868	0.883	2			
Vanadium	49.6	45.7	8			
Zinc	64.5	83.2	25			

Equipment Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
EB101909-SO1A3	10/19/09	Aluminum Barium Boron Chromium Calcium Iron Lead Magnesium Manganese Potassium Sodium Strontium Uranium Zinc	10.5 ug/L 1.1 ug/L 2.7 ug/L 0.7 ug/L 186 ug/L 28.1 ug/L 0.447 ug/L 26.7 ug/L 17.9 ug/L 61 ug/L 53.3 ug/L 1.5 ug/L 0.006 ug/L 2.8 ug/L	SA157-10B SA157-25B SA157-44B SA171-5B SA171-15B SA171-30B SA171-41B

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
SA157-10B	Boron	6.9 mg/Kg	10.7U mg/Kg
SA157-25B	Boron	9.1 mg/Kg	10.7U mg/Kg
SA171-5B	Boron	8.4 mg/Kg	10.6U mg/Kg
SA171-15B	Boron	9.7 mg/Kg	10.9U mg/Kg
SA171-30B	Boron	8.3 mg/Kg	11.0U 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 0.02 ug/L 39.2 ug/L 0.1 ug/L 1.0 ug/L	All soil samples in SDG R0905963

Sample concentrations were compared to concentrations detected in the field blanks as required by the QAPP. No sample data was qualified.

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 20 through October 21, 2009

LDC Report Date: January 6, 2010

Matrix: Soil

Parameters: Metals

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906024

Sample Identification

SA33-0.5B
SA33009-0.5B
SA33-10B
SA33-20B
SA33-33B
SA156-0.5B
SA156-10B
SA156-30B
SA156-35B
SA156-45B
SA157-0.5B
SA157009-0.5B
SA52-15B
SA52-28B
SA52-43B
SA149-22B
SA149-32B
SA149-45B
SA149009-45B
SA33-0.5BMS
SA33-0.5BDUP
SA33-10BMS
SA33-10BDUP

Introduction

This data review covers 23 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)	Aluminum Chromium Magnesium Selenium Tin	0.6 mg/Kg 0.08 mg/Kg 0.06 mg/Kg 1.0 mg/Kg 4.0 mg/Kg	All samples in SDG R0906024
ICB/CCB	Boron Manganese Strontium	6.0 ug/L 0.10 ug/L 0.10 ug/L	All samples in SDG R0906024
ICB/CCB	Aluminum Barium Iron Selenium	3.0 ug/L 1.00 ug/L 5.0 ug/L 4.0 ug/L	SA149-45B SA149009-45B

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Barium	0.80 ug/L	SA156-30B SA156-35B SA156-45B SA157-0.5B SA157009-0.5B SA52-15B SA52-28B SA52-43B SA149-22B SA149-32B
ICB/CCB	Barium Selenium	0.40 ug/L 5.0 ug/L	SA33-0.5B SA33009-0.5B SA33-10B SA33-20B SA33-33B SA156-0.5B SA156-10B
ICB/CCB	Thallium Tungsten	0.012 ug/L 0.043 ug/L	SA33-0.5B SA33009-0.5B SA33-10B SA33-20B SA156-0.5B
ICB/CCB	Thallium	0.014 ug/L	SA156-45B SA157-0.5B SA157009-0.5B SA52-15B SA52-28B SA149-22B SA149-32B
ICB/CCB	Thallium	0.010 ug/L	SA33-33B SA156-10B SA156-30B SA156-35B SA52-43B SA149-45B SA149009-45B
ICB/CCB	Tungsten	0.074 ug/L	SA33-33B SA156-10B SA156-30B SA156-35B SA156-45B SA157-0.5B SA157009-0.5B SA52-15B SA52-28B SA52-43B SA149-22B SA149-32B SA149-45B SA149009-45B

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
SA33-0.5B	Tin	3.9 mg/Kg	10.1U mg/Kg
SA33009-0.5B	Boron Tin	9.2 mg/Kg 4.6 mg/Kg	10.0U mg/Kg 10.0U mg/Kg
SA33-10B	Boron Selenium Tin	7.0 mg/Kg 1.1 mg/Kg 4.5 mg/Kg	10.7U mg/Kg 4.3U mg/Kg 10.7U mg/Kg
SA33-20B	Boron Selenium Tin	10.4 mg/Kg 0.8 mg/Kg 4.6 mg/Kg	11.1U mg/Kg 4.4U mg/Kg 11.1U mg/Kg
SA33-33B	Tin	4.5 mg/Kg	11.2U mg/Kg
SA156-0.5B	Tin	7.0 mg/Kg	10.1U mg/Kg
SA156-10B	Boron Selenium Tin	9.4 mg/Kg 1.5 mg/Kg 4.4 mg/Kg	10.5U mg/Kg 4.2U mg/Kg 10.5U mg/Kg
SA156-30B	Selenium Tin	1.5 mg/Kg 3.1 mg/Kg	4.1U mg/Kg 10.2U mg/Kg
SA156-35B	Selenium Tin	1.1 mg/Kg 4.2 mg/Kg	4.2U mg/Kg 10.5U mg/Kg
SA156-45B	Selenium Tin	1.1 mg/Kg 4.7 mg/Kg	4.6U mg/Kg 11.5U mg/Kg
SA157-0.5B	Boron Tin	4.4 mg/Kg 4.5 mg/Kg	10.8U mg/Kg 10.8U mg/Kg
SA157009-0.5B	Boron Selenium Tin	3.7 mg/Kg 1.3 mg/Kg 4.1 mg/Kg	10.7U mg/Kg 4.3U mg/Kg 10.7U mg/Kg
SA52-15B	Tin	4.5 mg/Kg	10.9U mg/Kg
SA52-28B	Selenium Tin	1.4 mg/Kg 4.6 mg/Kg	4.4U mg/Kg 11.0U mg/Kg
SA52-43B	Tin	4.2 mg/Kg	10.8U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA149-22B	Boron Selenium Tin	3.5 mg/Kg 1.0 mg/Kg 4.7 mg/Kg	10.9U mg/Kg 4.4U mg/Kg 10.9U mg/Kg
SA149-32B	Boron Selenium Tin	3.0 mg/Kg 0.8 mg/Kg 4.3 mg/Kg	10.9U mg/Kg 4.4U mg/Kg 10.9U mg/Kg
SA149-45B	Selenium Tin	1.7 mg/Kg 3.9 mg/Kg	3.6U mg/Kg 9.0U mg/Kg
SA149009-45B	Selenium Tin	1.0 mg/Kg 3.8 mg/Kg	3.6U mg/Kg 9.0U mg/Kg

Samples FB082809-SO (from SDG R0904894) and FB080309-SO (From SDG R0904279) were identified as field blanks. No metal contaminants were found in these blanks 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	SA33-0.5B SA33009-0.5B SA33-10B SA33-20B SA33-33B SA157-0.5B SA157009-0.5B SA52-15B SA52-28B SA52-43B SA149-22B SA149-32B SA149-45B SA149009-45B
FB080309-SO	8/3/09	Aluminum Barium Calcium Iron Lead Magnesium Manganese Sodium Strontium Titanium Tungsten Zinc	18.6 ug/L 0.8 ug/L 113 ug/L 136 ug/L 0.042 ug/L 33.6 ug/L 7.5 ug/L 66.0 ug/L 1.0 ug/L 1.5 ug/L 0.04 ug/L 0.8 ug/L	SA156-0.5B SA156-10B SA156-30B SA156-35B SA156-45B

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
SA33-0.5BMS (SA33-0.5B SA33009-0.5B SA33-10B SA33-20B SA33-33B SA157-0.5B SA157009-0.5B SA52-15B SA52-28B SA52-43B SA149-22B SA149-32B SA149-45B SA149009-45B)	Antimony Selenium Tungsten	47.5 (75-125) 74.5 (75-125) 74.8 (75-125)	J- (all detects) UJ (all non-detects)	A

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (Limits)	Difference (Limits)	Flag	A or P
SA33-0.5BDUP (SA33-0.5B SA33009-0.5B SA33-10B SA33-20B SA33-33B SA157-0.5B SA157009-0.5B SA52-15B SA52-28B SA52-43B SA149-22B SA149-32B SA149-45B SA149009-45B)	Calcium Chromium Manganese Thallium	28.7 (≤20) 67.5 (≤20) 34.0 (≤20) 49.4 (≤20)	- - - -	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.

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
SA33-0.5BL	Beryllium	11 (≤10)	SA33-0.5B SA33009-0.5B SA33-10B SA33-20B SA33-33B SA157-0.5B SA157009-0.5B SA52-15B SA52-28B SA52-43B SA149-22B SA149-32B SA149-45B SA149009-45B	J (all detects) UJ (all non-detects)	A

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 R0906024	All analytes 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

Samples SA33-0.5B and SA33009-0.5B, samples SA157-0.5B and SA157009-0.5B, and samples SA149-45B and SA149009-45B were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA33-0.5B	SA33009-0.5B				
Aluminum	5710	5060	12 (≤50)	-	-	-
Antimony	0.6	2.8	-	2.2 (≤2.0)	J (all detects)	A
Arsenic	7.42	7.52	1 (≤50)	-	-	-
Barium	163	146	11 (≤50)	-	-	-
Beryllium	0.374	0.371	1 (≤50)	-	-	-
Boron	11.1	9.2	-	1.9 (≤10.1)	-	-
Cadmium	0.63	0.48	27 (≤50)	-	-	-
Calcium	28300	30700	8 (≤50)	-	-	-
Chromium	10.7	11.3	5 (≤50)	-	-	-
Cobalt	10	8.1	-	1.9 (≤2.0)	-	-
Copper	31.4	153	132 (≤50)	-	J (all detects)	A
Iron	8820	6910	24 (≤50)	-	-	-
Lead	36.1	23.4	43 (≤50)	-	-	-
Magnesium	7960	7650	4 (≤50)	-	-	-
Manganese	2320	1520	42 (≤50)	-	-	-
Mercury	0.708	0.804	-	0.096 (≤0.018)	-	-
Molybdenum	0.89	0.8	-	0.09 (≤0.30)	-	-

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA33-0.5B	SA33009-0.5B				
Nickel	11.7	10	16 (≤50)	-	-	-
Platinum	0.026	0.031	-	0.005 (≤0.10)	-	-
Potassium	1640	1520	8 (≤50)	-	-	-
Sodium	622	729	16 (≤50)	-	-	-
Strontium	133	127	-	6 (≤40.3)	-	-
Thallium	0.424	0.36	16 (≤50)	-	-	-
Tin	3.9	4.6	-	0.7 (≤10.1)	-	-
Titanium	409	310	28 (≤50)	-	-	-
Tungsten	0.66	0.77	15 (≤50)	-	-	-
Uranium	0.936	0.968	3 (≤50)	-	-	-
Vanadium	23.4	17.7	28 (≤50)	-	-	-
Zinc	43.2	39.7	8 (≤50)	-	-	-

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA157-0.5B	SA157009-0.5B				
Aluminum	6940	6870	1 (≤50)	-	-	-
Antimony	1	0.7	-	0.3 (≤2.2)	-	-
Arsenic	2.05	2.15	5 (≤50)	-	-	-
Barium	151	135	11 (≤50)	-	-	-
Beryllium	0.434	0.439	1 (≤50)	-	-	-
Boron	4.4	3.7	-	0.7 (≤10.8)	-	-

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA157-0.5B	SA157009-0.5B				
Cadmium	0.04U	0.04	-	0 (≤0.11)	-	-
Calcium	21000	23800	13 (≤50)	-	-	-
Chromium	7.23	7.33	1 (≤50)	-	-	-
Cobalt	8.3	7.4	-	0.9 (≤2.2)	-	-
Copper	14.7	16.7	13 (≤50)	-	-	-
Iron	9580	11000	14 (≤50)	-	-	-
Lead	8.5	9.2	-	0.7 (≤2.2)	-	-
Magnesium	7770	8990	15 (≤50)	-	-	-
Manganese	1550	508	101 (≤50)	-	J (all detects)	A
Mercury	0.018	0.018	-	0 (≤0.016)	-	-
Molybdenum	0.32	0.34	-	0.02 (≤0.32)	-	-
Nickel	13.1	13.9	6 (≤50)	-	-	-
Platinum	0.009	0.011	-	0.002 (≤0.11)	-	-
Potassium	2140	2140	0 (≤50)	-	-	-
Selenium	0.8U	1.3	-	0.5 (≤4.3)	-	-
Sodium	575	502	14 (≤50)	-	-	-
Strontium	155	134	-	21 (≤43.2)	-	-
Thallium	0.127	0.121	5 (≤50)	-	-	-
Tin	4.5	4.1	-	0.4 (≤10.8)	-	-
Titanium	421	448	6 (≤50)	-	-	-

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA157-0.5B	SA157009-0.5B				
Tungsten	0.26	0.23	-	0.03 (≤0.11)	-	-
Uranium	0.926	0.925	0 (≤50)	-	-	-
Vanadium	24.4	27.9	13 (≤50)	-	-	-
Zinc	27.7	31.5	13 (≤50)	-	-	-

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA149-45B	SA149009-45B				
Aluminum	6760	6810	1 (≤50)	-	-	-
Antimony	1.1	1.1	-	0 (≤1.8)	-	-
Arsenic	25	21.1	17 (≤50)	-	-	-
Barium	173	89.3	64 (≤50)	-	J (all detects)	A
Beryllium	0.333	0.363	9 (≤50)	-	-	-
Boron	12.9	11.9	-	1 (≤9.0)	-	-
Calcium	23300	34000	37 (≤50)	-	-	-
Chromium	20.1	15.2	28 (≤50)	-	-	-
Cobalt	7.4	4.6	-	2.8 (≤1.8)	J (all detects)	A
Copper	12	11.2	7 (≤50)	-	-	-
Iron	8310	7960	4 (≤50)	-	-	-
Lead	6.2	4.6	-	1.6 (≤1.8)	-	-
Magnesium	19200	17500	9 (≤50)	-	-	-
Manganese	189	147	25 (≤50)	-	-	-

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA149-45B	SA149009-45B				
Mercury	0.012	0.012	-	0 (≤0.017)	-	-
Molybdenum	0.36	0.27	-	0.09 (≤0.27)	-	-
Nickel	9.59	9.01	6 (≤50)	-	-	-
Platinum	0.01	0.008	-	0.002 (≤0.21)	-	-
Potassium	1900	1830	4 (≤50)	-	-	-
Selenium	1.7	1	-	0.7 (≤3.6)	-	-
Sodium	611	587	4 (≤50)	-	-	-
Strontium	219	238	8 (≤50)	-	-	-
Thallium	0.112	0.108	-	0.004 (≤0.042)	-	-
Tin	3.9	3.8	-	0.1 (≤10.7)	-	-
Titanium	370	336	10 (≤50)	-	-	-
Tungsten	0.45	0.41	-	0.04 (≤0.21)	-	-
Uranium	3.86	3.49	10 (≤50)	-	-	-
Vanadium	54	43.8	21 (≤50)	-	-	-
Zinc	20.9	20.6	1 (≤50)	-	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Data Qualification Summary - SDG R0906024

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0906024	SA33-0.5B SA33009-0.5B SA33-10B SA33-20B SA33-33B SA157-0.5B SA157009-0.5B SA52-15B SA52-28B SA52-43B SA149-22B SA149-32B SA149-45B SA149009-45B	Antimony Selenium Tungsten	J- (all detects) UJ (all non-detects)	A	Matrix spike analysis (%R) (m)
R0906024	SA33-0.5B SA33009-0.5B SA33-10B SA33-20B SA33-33B SA157-0.5B SA157009-0.5B SA52-15B SA52-28B SA52-43B SA149-22B SA149-32B SA149-45B SA149009-45B	Calcium Chromium Manganese Thallium	J (all detects) UJ (all non-detects)	A	Duplicate sample analysis (RPD) (ld)
R0906024	SA33-0.5B SA33009-0.5B SA33-10B SA33-20B SA33-33B SA157-0.5B SA157009-0.5B SA52-15B SA52-28B SA52-43B SA149-22B SA149-32B SA149-45B SA149009-45B	Beryllium	J (all detects) UJ (all non-detects)	A	ICP serial dilution (%D) (sd)

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0906024	SA33-0.5B SA33009-0.5B SA33-10B SA33-20B SA33-33B SA156-0.5B SA156-10B SA156-30B SA156-35B SA156-45B SA157-0.5B SA157009-0.5B SA52-15B SA52-28B SA52-43B SA149-22B SA149-32B SA149-45B SA149009-45B	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)
R0906024	SA33-0.5B SA33009-0.5B	Copper	J (all detects)	A	Field duplicates (RPD) (fd)
R0906024	SA33-0.5B SA33009-0.5B	Antimony	J (all detects)	A	Field duplicates (Difference) (fd)
R0906024	SA157-0.5B SA157009-0.5B	Manganese	J (all detects)	A	Field duplicates (RPD) (fd)
R0906024	SA149-45B SA149009-45B	Barium	J (all detects)	A	Field duplicates (RPD) (fd)
R0906024	SA149-45B SA149009-45B	Cobalt	J (all detects)	A	Field duplicates (Difference) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Laboratory Blank Data Qualification Summary - SDG R0906024

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906024	SA33-0.5B	Tin	10.1U mg/Kg	A	bl
R0906024	SA33009-0.5B	Boron Tin	10.0U mg/Kg 10.0U mg/Kg	A	bl
R0906024	SA33-10B	Boron Selenium Tin	10.7U mg/Kg 4.3U mg/Kg 10.7U mg/Kg	A	bl

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906024	SA33-20B	Boron Selenium Tin	11.1U mg/Kg 4.4U mg/Kg 11.1U mg/Kg	A	bl
R0906024	SA33-33B	Tin	11.2U mg/Kg	A	bl
R0906024	SA156-0.5B	Tin	10.1U mg/Kg	A	bl
R0906024	SA156-10B	Boron Selenium Tin	10.5U mg/Kg 4.2U mg/Kg 10.5U mg/Kg	A	bl
R0906024	SA156-30B	Selenium Tin	4.1U mg/Kg 10.2U mg/Kg	A	bl
R0906024	SA156-35B	Selenium Tin	4.2U mg/Kg 10.5U mg/Kg	A	bl
R0906024	SA156-45B	Selenium Tin	4.6U mg/Kg 11.5U mg/Kg	A	bl
R0906024	SA157-0.5B	Boron Tin	10.8U mg/Kg 10.8U mg/Kg	A	bl
R0906024	SA157009-0.5B	Boron Selenium Tin	10.7U mg/Kg 4.3U mg/Kg 10.7U mg/Kg	A	bl
R0906024	SA52-15B	Tin	10.9U mg/Kg	A	bl
R0906024	SA52-28B	Selenium Tin	4.4U mg/Kg 11.0U mg/Kg	A	bl
R0906024	SA52-43B	Tin	10.8U mg/Kg	A	bl
R0906024	SA149-22B	Boron Selenium Tin	10.9U mg/Kg 4.4U mg/Kg 10.9U mg/Kg	A	bl
R0906024	SA149-32B	Boron Selenium Tin	10.9U mg/Kg 4.4U mg/Kg 10.9U mg/Kg	A	bl
R0906024	SA149-45B	Selenium Tin	3.6U mg/Kg 9.0U mg/Kg	A	bl

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906024	SA149009-45B	Selenium Tin	3.6U mg/Kg 9.0U mg/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Field Blank Data Qualification Summary - SDG R0906024

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234J4
SDG #: R0906024
Laboratory: Columbia Analytical Services

Date: 12-30-09
Page: 1 of
Reviewer: R
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
I.	Technical holding times	A	Sampling dates: 10/20/09 - 10/21/09
II.	ICP/MS Tune	A	
III.	Calibration	A	
IV.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	SW	MS
VII.	Duplicate Sample Analysis	SW	DUP
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	N	Not reviewed
X.	Furnace Atomic Absorption QC	N	Not utilized
XI.	ICP Serial Dilution	SW	
XII.	Sample Result Verification	N	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	SW	(1,2), (11,12), (18,19)
XV	Field Blanks	SW	FB= FB082809-SO, FB080309-SO (SDG#: (R0904894), (R0904279))

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	SA33-0.5B	11	SA157-0.5B	21	SA33-0.5BDUP	31	PBS
2	SA33009-0.5B	12	SA157009-0.5B	22	SA33-10BMS	32	
3	SA33-10B	13	SA52-15B	23	SA33-10BDUP	33	
4	SA33-20B	14	SA52-28B	24		34	
5	SA33-33B	15	SA52-43B	25		35	
6	SA156-0.5B	16	SA149-22B	26		36	
7	SA156-10B	17	SA149-32B	27		37	
8	SA156-30B	18	SA149-45B	28		38	
9	SA156-35B	19	SA149009-45B	29		39	
10	SA156-45B	20	SA33-0.5BMS	30		40	

Notes:

LDC #: 22234J4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer:
2nd reviewer:

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-19	Soil	[✓ 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:20		[✓ 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]
21		[✓ 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]
22		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
23		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
Analysis Method		
ICP	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]
ICP-MS	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
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 #: 22234J4
SDG #: See Cover
METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Soil preparation factor applied: 100x Reason Code: bl

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: All Soil

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/l)	Action Limit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Al	0.6																					
B		6.0			9.2 / 10.0	7.0 / 10.7	10.4 / 11.1			9.4 / 10.5				4.4 / 10.8	3.7 / 10.7				3.5 / 10.9	3.0 / 10.9		
Cr	0.08																					
Ag																						
Mg	0.06																					
Mn		0.10																				
Se	1.0					1.1 / 4.3	0.8 / 4.4			1.5 / 4.2	1.5 / 4.1	1.1 / 4.2	1.1 / 4.6		1.3 / 4.3		1.4 / 4.4		1.0 / 4.4	0.8 / 4.4	1.7 / 3.6	1.0 ./ 3.6
Sr		0.10																				
Sn	4.0			3.9 / 10.1	4.6 / 10.0	4.5 / 10.7	4.6 / 11.1	4.5 / 11.2	7.0 / 10.1	4.4 / 10.5	3.1 / 10.2	4.2 / 10.5	4.7 / 11.5	4.5 / 10.8	4.1 / 10.7	4.5 / 10.9	4.6 / 11.0	4.2 / 10.8	4.7 / 10.9	4.3 / 10.9	3.9 / 9.0	3.8 / 9.0
W																						

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 18, 19

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/l)	Action Limit	18	19											
Al		3.0														
Ba		1.00														
Fe		5.0														
Se		4.0		See PB	See PB											

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 8-17

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/l)	Action Limit	No Qualifiers												
Ba		0.80														

LDC #: 22234J4
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
Soil preparation factor applied: 100x
Reason Code: bl
Associated Samples: 1-7

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	3	4	7								
Ba		0.40												
Se		5.0		See PB	See PB	See PB								

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 1-4, 6

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Tl		0.012												
W		0.043												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 10-14, 16, 17

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Tl		0.014												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 5, 7-9, 15, 18, 19

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Tl		0.010												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 5, 7-19

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
W		0.074												

Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC #: 22234J4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: QR
2nd Reviewer: LM

METHOD: Trace Metals (EPA SW846 6010B/7000)
Y N N/A Were field blanks identified in this SDG?
Y N N/A Were target analytes detected in the field blanks? Reason Code: bf
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: _____ Associated Samples: 1-5, 11-19

Analyte	Blank ID	Sample Identification										
	FB082809-SO (SDG#: R0904894)	Action Level	No Qualifiers									
Al	3.3											
Ca	17											
Pb	0.006											
Mg	5.0											
Mn	0.2											
Na	39.2											
Sr	0.1											
Zn	1.0											

LDC #: 22234J4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 1 of 1
Reviewer: CP
2nd Reviewer:

METHOD: Trace Metals (EPA SW846 6010B/7000)

Y N N/A 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 Reason Code: bf

Sampling date: 8/3/09 Soil factor applied 100x

Field blank type: (circle one) Field Blank / Rinsate / Other: Associated Samples: 6-10

Analyte	Blank ID	Sample Identification										
	FB080309-SO (SDG# R0904279)	Action Level	No Qualifiers									
Al	18.6											
Ba	0.8											
Ca	113	113										
Fe	136	136										
Pb	0.042	0.042										
Mg	33.6	33.6										
Mn	7.5	7.5										
Na	66.0											
Sr	1.0											
Ti	1.5											
W	0.04											
Zn	0.8											

LDC #: 22234J4
SDG #: Seecave2

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Reviewer: CR
2nd Reviewer: [illegible]

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".

Y N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

(Y) N N/A Was a post digestion spike analyzed for ICP elements that did not meet the required criteria for matrix spike recovery?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
	20	Soil	Sb	47.5	~~ED~~ 1-5, 11-19	J-/UJ/A (m)
			Se	74.5	↓	↓
			W	74.8		

Comments: _____

MS,4S2

LDC #: 22234J4
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Duplicate Analysis

Reviewer: CC
2nd Reviewer: [illegible]

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".

(Y) N N/A Was a duplicate sample analyzed for each matrix in this SDG?

Y (N) N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤ 35% for soil samples? If no, see qualifications below. A control limit of ±R.L. (±2X R.L. for soil) was used for sample values that were <5X the R.L., including the case when only one of the duplicate sample values was <5X R.L.. If field blanks were used for laboratory duplicates, note in the Overall Assessment.

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Duplicate ID	Matrix	Analyte	RPD (Limits)	Difference (Limits)	Associated Samples	Qualifications
	1	soil	Ca	28.7 (≤20)		~~1-5~~, 1-5, 11-19	J/UJ/A (d)
			Cr	67.5			
			Mn	34.0			
			Tl	49.4			

Comments: _____

LDC #: 22234J4
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
ICP Serial Dilution

Page: 1 of 1
Reviewer: SR
2nd Reviewer: LA

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".

Y N N/A If analyte concentrations were > 50X the IDL, was an ICP serial dilution analyzed?
Y N N/A Were ICP serial dilution percent differences (%D) ≤10%?
Y N N/A Is there evidence of negative interference? If yes, professional judgement will be used to qualify the data.

LEVEL IV ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Diluted Sample ID	Matrix	Analyte	%D	Associated Samples	Qualifications
	1	Soil	Be	11	1-5, 9-11	J/UJ/A (sd)

Comments:

LDC 22234J4
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer: VC

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg) 1	Concentration (mg/Kg) 2	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Aluminum	5710	5060	12			
Antimony	0.6	2.8		2.2	(≤2.0)	J UT/A (fd)
Arsenic	7.42	7.52	1			
Barium	163	146	11			
Beryllium	0.374	0.371	1			
Boron	11.1	9.2		1.9	(≤10.1)	
Cadmium	0.63	0.48	27			
Calcium	28300	30700	8			
Chromium	10.7	11.3	5			
Cobalt	10.0	8.1		1.9	(≤2.0)	
Copper	31.4	153	132			Jdet/A (fd)
Iron	8820	6910	24			
Lead	36.1	23.4	43			
Magnesium	7960	7650	4			
Manganese	2320	1520	42			
Mercury	0.708	0.804		0.096	(≤0.018)	
Molybdenum	0.89	0.80		0.09	(≤0.30)	
Nickel	11.7	10.0	16			
Platinum	0.026	0.031		0.005	(≤0.10)	

LDC#: 22234J4__
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer:

METHOD: Metals (EPA Method 6020/6010/7000)

(Y)N NA Were field duplicate pairs identified in this SDG?
(Y)N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg) 1	Concentration (mg/Kg) 2	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Potassium	1640	1520	8			
Sodium	622	729	16			
Strontium	133	127		6	(≤40.3)	
Thallium	0.424	0.360	16			
Tin	3.9	4.6		0.7	(≤10.1)	
Titanium	409	310	28			
Tungsten	0.66	0.77	15			
Uranium	0.936	0.968	3			
Vanadium	23.4	17.7	28			
Zinc	43.2	39.7	8			

LDC#: 22234J4__
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg) 11	Concentration (mg/Kg) 12	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Aluminum	6940	6870	1			
Antimony	1.0	0.7		0.3	(≤2.2)	
Arsenic	2.05	2.15	5			
Barium	151	135	11			
Beryllium	0.434	0.439	1			
Boron	4.4	3.7		0.7	(≤10.8)	
Cadmium	0.04U	0.04		0	(≤0.11)	
Calcium	21000	23800	13			
Chromium	7.23	7.33	1			
Cobalt	8.3	7.4		0.9	(≤2.2)	
Copper	14.7	16.7	13			
Iron	9580	11000	14			
Lead	8.5	9.2		0.7	(≤2.2)	
Magnesium	7770	8990	15			
Manganese	1550	508	101			Jdet/A (fd)
Mercury	0.018	0.018		0	(≤0.016)	
Molybdenum	0.32	0.34		0.02	(≤0.32)	
Nickel	13.1	13.9	6			
Platinum	0.009	0.011		0.002	(≤0.11)	

LDC#: 22234J4__
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer:

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg) 11	Concentration (mg/Kg) 12	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Potassium	2140	2140	0			
Selenium	0.8U	1.3		0.5	(≤4.3)	
Sodium	575	502	14			
Strontium	155	134		21	(≤43.2)	
Thallium	0.127	0.121	5			
Tin	4.5	4.1		0.4	(≤10.8)	
Titanium	421	448	6			
Tungsten	0.26	0.23		0.03	(≤0.11)	
Uranium	0.926	0.925	0			
Vanadium	24.4	27.9	13			
Zinc	27.7	31.5	13			

LDC#: 22234J4__
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CE
2nd Reviewer: W

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg) 18	Concentration (mg/Kg) 19	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Aluminum	6760	6810	1			
Antimony	1.1	1.1		0	(≤1.8)	
Arsenic	25.0	21.1	17			
Barium	173	89.3	64			Jdet/A (fd)
Beryllium	0.333	0.363	9			
Boron	12.9	11.9		1	(≤9.0)	
Calcium	23300	34000	37			
Chromium	20.1	15.2	28			
Cobalt	7.4	4.6		2.8	(≤1.8)	J+/A (fd)
Copper	12.0	11.2	7			
Iron	8310	7960	4			
Lead	6.2	4.6		1.6	(≤1.8)	
Magnesium	19200	17500	9			
Manganese	189	147	25			
Mercury	0.012	0.012		0	(≤0.017)	
Molybdenum	0.36	0.27		0.09	(≤0.27)	
Nickel	9.59	9.01	6			
Platinum	0.010	0.008		0.002	(≤0.21)	
Potassium	1900	1830	4			

LDC#: 22234J4__
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer: W

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg) 18	Concentration (mg/Kg) 19	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Selenium	1.7	1.0		0.7	(≤3.6)	
Sodium	611	587	4			
Strontium	219	238	8			
Thallium	0.112	0.108		0.004	(≤0.042)	
Tin	3.9	3.8		0.1	(≤10.7)	
Titanium	370	336	10			
Tungsten	0.45	0.41		0.04	(≤0.21)	
Uranium	3.860	3.490	10			
Vanadium	54.0	43.8	21			
Zinc	20.9	20.6	1			

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 6, 2010

Matrix: Soil/Water

Parameters: Metals

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
SA132-10B
SA132009-10B
SA132-20B
SA132-34B
RSAR8-0.5B
RSAR8-10B
RSAR8-20B
RSAR8-34B
RSAP8-0.5B
RSAP8-10B
RSAP8-25B
RSAP8-40B
SA112-0.5BMS
SA112-0.5BDUP
SA132-20BMS
SA132-20BDUP
RSAR8-34BMS
RSAR8-34BDUP

Introduction

This data review covers 28 soil samples and one water sample 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)	Mercury Thallium Tungsten	0.02 ug/L 0.005 ug/L 0.02 ug/L	All water samples in SDG R0906081
ICB/CCB	Antimony Barium Boron Copper Manganese Molybdenum Lead Silver Sodium Thallium Strontium Tungsten Uranium	0.026 ug/L 1.5 ug/L 8.6 ug/L 2.3 ug/L 0.2 ug/L 0.7 ug/L 0.006 ug/L 0.7 ug/L 60 ug/L 0.009 ug/L 0.2 ug/L 0.03 ug/L 0.004 ug/L	All water samples in SDG R0906081

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Antimony Calcium Chromium Magnesium Manganese Nickel Selenium Strontium Tin	0.9 mg/Kg 2.0 mg/Kg 0.08 mg/Kg 0.5 mg/Kg 0.06 mg/Kg 0.08 mg/Kg 0.8 mg/Kg 0.02 mg/Kg 3.8 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 SA132009-10B
PB (prep blank)	Antimony Calcium Chromium Lead Magnesium Manganese Strontium Tin	0.8 mg/Kg 2.3 mg/Kg 0.08 mg/Kg 0.4 mg/Kg 0.5 mg/Kg 0.08 mg/Kg 0.02 mg/Kg 3.7 mg/Kg	SA132-20B SA132-34B RSAR8-0.5B RSAR8-10B RSAR8-20B RSAR8-34B RSAP8-0.5B RSAP8-10B RSAP8-25B RSAP8-40B
ICB/CCB	Boron Calcium	3.0 ug/L 10.0 ug/L	All soil samples in SDG R0906081
ICB/CCB	Platinum Thallium Tungsten	0.011 ug/L 0.015 ug/L 0.074 ug/L	SA112-20B SA112-34B RSAQ8-31B RSAQ8-34B SA132-0.5B SA132-10B SA132009-10B
ICB/CCB	Platinum Thallium Tungsten	0.009 ug/L 0.012 ug/L 0.056 ug/L	SA112-0.5B SA112-10B RSAQ8-0.5B RSAQ8-10B RSAQ8-22B
ICB/CCB	Antimony	3.0 ug/L	RSAQ8-34B SA132-0.5B SA132-10B SA132009-10B SA132-20B SA132-34B RSAR8-0.5B RSAR8-10B RSAR8-20B RSAR8-34B RSAP8-0.5B RSAP8-10B RSAP8-25B RSAP8-40B

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Barium Manganese	1.00 ug/L 0.10 ug/L	RSAP8-0.5B RSAP8-10B RSAP8-25B RSAP8-40B
ICB/CCB	Barium	0.8 ug/L	SA132-34B RSAR8-0.5B RSAR8-10B RSAR8-20B RSAR8-34B
ICB/CCB	Barium	0.60 ug/L	SA112-0.5B SA112-10B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-10B RSAQ8-22B RSAQ8-31B
ICB/CCB	Barium	0.50 ug/L	RSAQ8-34B SA132-0.5B SA132-10B SA132009-10B SA132-20B
ICB/CCB	Magnesium	3.0 ug/L	RSAQ8-34B SA132-0.5B SA132-10B SA132009-10B SA132-20B SA132-34B RSAR8-0.5B RSAR8-10B RSAR8-20B RSAR8-34B
ICB/CCB	Manganese	0.30 ug/L	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 SA132009-10B SA132-20B SA132-34B RSAR8-0.5B RSAR8-10B RSAR8-20B RSAR8-34B

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Nickel	0.60 ug/L	SA112-10B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-10B RSAQ8-22B RSAQ8-31B RSAQ8-34B SA132-0.5B SA132-10B SA132009-10B SA132-20B
ICB/CCB	Nickel	0.40 ug/L	SA132-34B RSAR8-0.5B RSAR8-10B RSAR8-20B RSAR8-34B RSAP8-0.5B RSAP8-10B RSAP8-25B RSAP8-40B
ICB/CCB	Strontium	0.10 ug/L	SA112-0.5B SA112-10B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-10B RSAQ8-22B RSAQ8-31B RSAP8-0.5B RSAP8-10B RSAP8-25B RSAP8-40B
ICB/CCB	Beryllium	0.010 ug/L	SA112-10B SA112-20B SA112-34B RSAQ8-0.5B RSAQ8-10B RSAQ8-22B RSAQ8-31B RSAQ8-34B SA132-0.5B SA132-10B SA132009-10B
ICB/CCB	Beryllium	0.008 ug/L	SA112-0.5B
ICB/CCB	Thallium	0.011 ug/L	RSAR8-10B RSAR8-20B RSAR8-34B RSAP8-0.5B RSAP8-10B RSAP8-25B

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Thallium	0.009 ug/L	SA132-20B SA132-34B RSAR8-0.5B
ICB/CCB	Tungsten	0.043 ug/L	SA132-20B SA132-34B RSAR8-0.5B RSAR8-10B RSAR8-20B RSAR8-34B RSAP8-0.5B RSAP8-10B RSAP8-25B
ICB/CCB	Thallium Tungsten	0.010 ug/L 0.074 ug/L	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	Analyte	Reported Concentration	Modified Final Concentration
EB102209-SO1A3	Barium Boron Molybdenum Sodium Strontium Tungsten Uranium	0.6 ug/L 2.3 ug/L 0.7 ug/L 68.8 ug/L 1.5 ug/L 0.01 ug/L 0.009 ug/L	5.0U ug/L 50.0U ug/L 2.0U ug/L 300U ug/L 10.0U ug/L 0.10U ug/L 0.020U ug/L
SA112-0.5B	Antimony Boron Tin Platinum	1.4 mg/Kg 9.1 mg/Kg 3.5 mg/Kg 0.017 mg/Kg	2.0U mg/Kg 10.0U mg/Kg 10.0U mg/Kg 0.10U mg/Kg
SA112-10B	Antimony Boron Tin Platinum	1.4 mg/Kg 7.9 mg/Kg 4.0 mg/Kg 0.006 mg/Kg	2.2U mg/Kg 10.9U mg/Kg 10.9U mg/Kg 0.11U mg/Kg
SA112-20B	Antimony Tin Tungsten	1.2 mg/Kg 3.9 mg/Kg 0.26 mg/Kg	2.1U mg/Kg 10.5U mg/Kg 0.53U mg/Kg
SA112-34B	Antimony Tin	1.8 mg/Kg 4.2 mg/Kg	2.2U mg/Kg 10.8U mg/Kg
RSAQ8-0.5B	Tin Platinum	3.1 mg/Kg 0.09 mg/Kg	10.5U mg/Kg 0.10U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
RSAQ8-10B	Boron Tin Platinum	6.1 mg/Kg 3.6 mg/Kg 0.008 mg/Kg	10.7U mg/Kg 10.7U mg/Kg 0.11U mg/Kg
RSAQ8-22B	Antimony Boron Tin Platinum	1.1 mg/Kg 5.7 mg/Kg 4.0 mg/Kg 0.007 mg/Kg	2.2U mg/Kg 11.0U mg/Kg 11.0U mg/Kg 0.11U mg/Kg
RSAQ8-31B	Antimony Tin Thallium Tungsten	0.7 mg/Kg 3.6 mg/Kg 0.117 mg/Kg 0.26 mg/Kg	2.0U mg/Kg 10.1U mg/Kg 0.203U mg/Kg 1.01U mg/Kg
RSAQ8-34B	Tin Tungsten	4.2 mg/Kg 0.39 mg/Kg	11.7U mg/Kg 0.46U mg/Kg
SA132-0.5B	Antimony Boron Tin Platinum	1.4 mg/Kg 7.4 mg/Kg 4.1 mg/Kg 0.008 mg/Kg	2.2U mg/Kg 10.9U mg/Kg 10.9U mg/Kg 0.11U mg/Kg
SA132-10B	Antimony Boron Selenium Tin Platinum	1.7 mg/Kg 8.3 mg/Kg 0.9 mg/Kg 4.1 mg/Kg 0.007 mg/Kg	2.2U mg/Kg 10.9U mg/Kg 4.4U mg/Kg 10.9U mg/Kg 0.11U mg/Kg
SA132009-10B	Antimony Boron Tin Platinum	1.8 mg/Kg 8.6 mg/Kg 4.2 mg/Kg 0.009 mg/Kg	2.2U mg/Kg 11.0U mg/Kg 11.0U mg/Kg 0.11U mg/Kg
SA132-20B	Antimony Boron Tin	2.1 mg/Kg 6.9 mg/Kg 3.8 mg/Kg	2.1U mg/Kg 10.7U mg/Kg 10.7U mg/Kg
SA132-34B	Antimony Tin	1.7 mg/Kg 4.1 mg/Kg	2.1U mg/Kg 10.6U mg/Kg
RSAR8-0.5B	Antimony Boron Tin	1.7 mg/Kg 7.7 mg/Kg 3.8 mg/Kg	2.1U mg/Kg 10.6U mg/Kg 10.6U mg/Kg
RSAR8-10B	Antimony Boron Tin	1.8 mg/Kg 7.2 mg/Kg 3.5 mg/Kg	2.1U mg/Kg 10.6U mg/Kg 10.6U mg/Kg
RSAR8-20B	Antimony Tin	0.8 mg/Kg 4.3 mg/Kg	2.2U mg/Kg 11.1U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
RSAR8-34B	Antimony Tin	1.5 mg/Kg 4.6 mg/Kg	2.3U mg/Kg 11.7U mg/Kg
RSAP8-0.5B	Antimony Boron Tin	1.5 mg/Kg 6.3 mg/Kg 4.0 mg/Kg	2.1U mg/Kg 10.5U mg/Kg 10.5U mg/Kg
RSAP8-10B	Antimony Boron Tin Tungsten	1.3 mg/Kg 5.4 mg/Kg 3.9 mg/Kg 0.098 mg/Kg	2.1U mg/Kg 10.6U mg/Kg 10.6U mg/Kg 0.11U mg/Kg
RSAP8-25B	Antimony Boron Tin	1.4 mg/Kg 8.4 mg/Kg 4.0 mg/Kg	2.2U mg/Kg 10.8U mg/Kg 10.8U mg/Kg
RSAP8-40B	Antimony Tin Tungsten	1.0 mg/Kg 4.3 mg/Kg 0.15 mg/Kg	2.3U mg/Kg 11.5U mg/Kg 0.57U mg/Kg

Sample EB102209-SO1A3 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
EB102209-SO1A3	10/22/09	Aluminum	11.4 ug/L	SA112-0.5B
		Antimony	0.6 ug/L	SA112-10B
		Boron	2.3 ug/L	SA112-20B
		Chromium	0.9 ug/L	SA112-34B
		Calcium	310 ug/L	RSAQ8-0.5B
		Iron	58.9 ug/L	RSAQ8-10B
		Lead	0.196 ug/L	RSAQ8-22B
		Magnesium	29.2 ug/L	RSAQ8-31B
		Manganese	12.1 ug/L	RSAQ8-34B
		Molybdenum	0.7 ug/L	
		Sodium	68.8 ug/L	
		Strontium	1.5 ug/L	
		Titanium	0.5 ug/L	
		Tungsten	0.01 ug/L	
		Uranium	0.009 ug/L	
		Zinc	1.3 ug/L	

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	Antimony Boron	1.4 mg/Kg 9.1 mg/Kg	2.0U mg/Kg 10.0U mg/Kg
SA112-10B	Antimony Boron	1.4 mg/Kg 7.9 mg/Kg	2.2U mg/Kg 10.9U mg/Kg
SA112-20B	Antimony Tungsten	1.2 mg/Kg 0.26 mg/Kg	2.1U mg/Kg 0.53U mg/Kg
SA112-34B	Antimony	1.8 mg/Kg	2.2U mg/Kg
RSAQ8-10B	Boron	6.1 mg/Kg	10.7U mg/Kg
RSAQ8-22B	Antimony Boron	1.1 mg/Kg 5.7 mg/Kg	2.2U mg/Kg 11.0U mg/Kg
RSAQ8-31B	Antimony Tungsten	0.7 mg/Kg 0.26 mg/Kg	2.0U mg/Kg 1.01U mg/Kg
RSAQ8-34B	Tungsten	0.39 mg/Kg	0.46U 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 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.

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
SA112-0.5BMS (All soil samples in SDG R0906081)	Antimony	52.6 (75-125)	J- (all detects) UJ (all non-detects)	A
SA112-0.5BMS (All soil samples in SDG R0906081)	Copper	152.2 (75-125)	J+ (all detects)	A
SA132-20BMS (All soil samples in SDG R0906081)	Antimony	59.6 (75-125)	J- (all detects) UJ (all non-detects)	A
SA132-20BMS (All soil samples in SDG R0906081)	Manganese Platinum	176.5 (75-125) 147.3 (75-125)	J+ (all detects) J+ (all detects)	A

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (Limits)	Difference (Limits)	Flag	A or P
SA112-0.5BDUP (All soil samples in SDG R0906081)	Barium Cadmium Tungsten Uranium	30.4 (≤20) - 41.2 (≤20) 23.2 (≤20)	- 0.16 mg/Kg (≤0.10) - -	J (all detects) UJ (all non-detects)	A
SA132-20BDUP (All soil samples in SDG R0906081)	Calcium Strontium	33.0 (≤20) 20.2 (≤20)	- -	J (all detects) UJ (all non-detects) 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.

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
SA112-0.5BL	Beryllium	21 (≤10)	All soil samples in SDG R0906081	J (all detects) UJ (all non-detects)	A
SA132-20BL	Beryllium	11 (≤10)	All soil samples in SDG R0906081	J (all detects) UJ (all non-detects)	A

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 R0906081	All analytes 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

Samples SA132-10B and SA132009-10B were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA132-10B	SA132009-10B				
Aluminum	9100	9290	2 (≤50)	-	-	-
Antimony	1.7	1.8	-	0.1 (≤2.2)	-	-
Arsenic	3.1	3.1	0 (≤50)	-	-	-

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA132-10B	SA132009-10B				
Barium	183	179	2 (≤50)	-	-	-
Beryllium	0.483	0.495	2 (≤50)	-	-	-
Boron	8.3	8.6	-	0.3 (≤11.0)	-	-
Cadmium	0.17	0.15	-	0.02 (≤0.11)	-	-
Calcium	35300	33000	7 (≤50)	-	-	-
Chromium	8.37	8.64	3 (≤50)	-	-	-
Cobalt	7.2	7.3	-	0.1 (≤2.2)	-	-
Copper	19.5	18.4	6 (≤50)	-	-	-
Iron	16000	16500	3 (≤50)	-	-	-
Lead	8.4	7.4	-	1 (≤2.2)	-	-
Magnesium	11900	11800	1 (≤50)	-	-	-
Manganese	394	297	28 (≤50)	-	-	-
Mercury	0.006	0.007	-	0.001 (≤0.017)	-	-
Molybdenum	0.33	0.4	-	0.07 (≤0.33)	-	-
Nickel	16.9	16.2	4 (≤50)	-	-	-
Platinum	0.007	0.009	-	0.002 (≤0.11)	-	-
Potassium	1580	1590	1 (≤50)	-	-	-
Selenium	0.9	0.8U	-	0.1 (≤4.4)	-	-
Sodium	1330	1340	1 (≤50)	-	-	-
Strontium	271	301	10 (≤50)	-	-	-

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA132-10B	SA132009-10B				
Thallium	0.098	0.087	-	0.011 (≤0.022)	-	-
Tin	4.1	4.2	-	0.1 (≤11.0)	-	-
Titanium	805	839	4 (≤50)	-	-	-
Tungsten	0.15	0.14	-	0.01 (≤0.11)	-	-
Uranium	1.66	1.7	2 (≤50)	-	-	-
Vanadium	50.3	51.3	2 (≤50)	-	-	-
Zinc	32.1	31.6	2 (≤50)	-	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Data Qualification Summary - SDG R0906081

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0906081	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 SA132009-10B SA132-20B SA132-34B RSAR8-0.5B RSAR8-10B RSAR8-20B RSAR8-34B RSAP8-0.5B RSAP8-10B RSAP8-25B RSAP8-40B	Antimony	J- (all detects) UJ (all non-detects)	A	Matrix spike analysis (%R) (m)
R0906081	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 SA132009-10B SA132-20B SA132-34B RSAR8-0.5B RSAR8-10B RSAR8-20B RSAR8-34B RSAP8-0.5B RSAP8-10B RSAP8-25B RSAP8-40B	Copper Manganese Platinum	J+ (all detects) J+ (all detects) J+ (all detects)	A	Matrix spike analysis (%R) (m)

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0906081	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 SA132009-10B SA132-20B SA132-34B RSAR8-0.5B RSAR8-10B RSAR8-20B RSAR8-34B RSAP8-0.5B RSAP8-10B RSAP8-25B RSAP8-40B	Barium Tungsten Uranium Calcium Strontium	J (all detects) UJ (all non-detects)	A	Duplicate sample analysis (RPD) (Id)
R0906081	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 SA132009-10B SA132-20B SA132-34B RSAR8-0.5B RSAR8-10B RSAR8-20B RSAR8-34B RSAP8-0.5B RSAP8-10B RSAP8-25B RSAP8-40B	Cadmium	J (all detects) UJ (all non-detects)	A	Duplicate sample analysis (Difference) (Id)

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0906081	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 SA132009-10B SA132-20B SA132-34B RSAR8-0.5B RSAR8-10B RSAR8-20B RSAR8-34B RSAP8-0.5B RSAP8-10B RSAP8-25B RSAP8-40B	Beryllium	J (all detects) UJ (all non-detects)	A	ICP serial dilution (%D) (sd)
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 SA132009-10B SA132-20B SA132-34B RSAR8-0.5B RSAR8-10B RSAR8-20B RSAR8-34B RSAP8-0.5B RSAP8-10B RSAP8-25B RSAP8-40B	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 R0906081

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906081	EB102209-SO1A3	Barium Boron Molybdenum Sodium Strontium Tungsten Uranium	5.0U ug/L 50.0U ug/L 2.0U ug/L 300U ug/L 10.0U ug/L 0.10U ug/L 0.020U ug/L	A	bl
R0906081	SA112-0.5B	Antimony Boron Tin Platinum	2.0U mg/Kg 10.0U mg/Kg 10.0U mg/Kg 0.10U mg/Kg	A	bl
R0906081	SA112-10B	Antimony Boron Tin Platinum	2.2U mg/Kg 10.9U mg/Kg 10.9U mg/Kg 0.11U mg/Kg	A	bl
R0906081	SA112-20B	Antimony Tin Tungsten	2.1U mg/Kg 10.5U mg/Kg 0.53U mg/Kg	A	bl
R0906081	SA112-34B	Antimony Tin	2.2U mg/Kg 10.8U mg/Kg	A	bl
R0906081	RSAQ8-0.5B	Tin Platinum	10.5U mg/Kg 0.10U mg/Kg	A	bl
R0906081	RSAQ8-10B	Boron Tin Platinum	10.7U mg/Kg 10.7U mg/Kg 0.11U mg/Kg	A	bl
R0906081	RSAQ8-22B	Antimony Boron Tin Platinum	2.2U mg/Kg 11.0U mg/Kg 11.0U mg/Kg 0.11U mg/Kg	A	bl
R0906081	RSAQ8-31B	Antimony Tin Thallium Tungsten	2.0U mg/Kg 10.1U mg/Kg 0.203U mg/Kg 1.01U mg/Kg	A	bl
R0906081	RSAQ8-34B	Tin Tungsten	11.7U mg/Kg 0.46U mg/Kg	A	bl

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906081	SA132-0.5B	Antimony Boron Tin Platinum	2.2U mg/Kg 10.9U mg/Kg 10.9U mg/Kg 0.11U mg/Kg	A	bl
R0906081	SA132-10B	Antimony Boron Selenium Tin Platinum	2.2U mg/Kg 10.9U mg/Kg 4.4U mg/Kg 10.9U mg/Kg 0.11U mg/Kg	A	bl
R0906081	SA132009-10B	Antimony Boron Tin Platinum	2.2U mg/Kg 11.0U mg/Kg 11.0U mg/Kg 0.11U mg/Kg	A	bl
R0906081	SA132-20B	Antimony Boron Tin	2.1U mg/Kg 10.7U mg/Kg 10.7U mg/Kg	A	bl
R0906081	SA132-34B	Antimony Tin	2.1U mg/Kg 10.6U mg/Kg	A	bl
R0906081	RSAR8-0.5B	Antimony Boron Tin	2.1U mg/Kg 10.6U mg/Kg 10.6U mg/Kg	A	bl
R0906081	RSAR8-10B	Antimony Boron Tin	2.1U mg/Kg 10.6U mg/Kg 10.6U mg/Kg	A	bl
R0906081	RSAR8-20B	Antimony Tin	2.2U mg/Kg 11.1U mg/Kg	A	bl
R0906081	RSAR8-34B	Antimony Tin	2.3U mg/Kg 11.7U mg/Kg	A	bl
R0906081	RSAP8-0.5B	Antimony Boron Tin	2.1U mg/Kg 10.5U mg/Kg 10.5U mg/Kg	A	bl
R0906081	RSAP8-10B	Antimony Boron Tin Tungsten	2.1U mg/Kg 10.6U mg/Kg 10.6U mg/Kg 0.11U mg/Kg	A	bl
R0906081	RSAP8-25B	Antimony Boron Tin	2.2U mg/Kg 10.8U mg/Kg 10.8U mg/Kg	A	bl

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906081	RSAP8-40B	Antimony Tin Tungsten	2.3U mg/Kg 11.5U mg/Kg 0.57U mg/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Equipment Blank Data Qualification Summary - SDG R0906081

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906081	SA112-0.5B	Antimony Boron	2.0U mg/Kg 10.0U mg/Kg	A	be
R0906081	SA112-10B	Antimony Boron	2.2U mg/Kg 10.9U mg/Kg	A	be
R0906081	SA112-20B	Antimony Tungsten	2.1U mg/Kg 0.53U mg/Kg	A	be
R0906081	SA112-34B	Antimony	2.2U mg/Kg	A	be
R0906081	RSAQ8-10B	Boron	10.7U mg/Kg	A	be
R0906081	RSAQ8-22B	Antimony Boron	2.2U mg/Kg 11.0U mg/Kg	A	be
R0906081	RSAQ8-31B	Antimony Tungsten	2.0U mg/Kg 1.01U mg/Kg	A	be
R0906081	RSAQ8-34B	Tungsten	0.46U mg/Kg	A	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Field Blank Data Qualification Summary - SDG R0906081

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234K4
SDG #: R0906081
Laboratory: Columbia Analytical Services

Date: 12-30-09
Page: 1 of 1
Reviewer: CR
2nd Reviewer: W

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
I.	Technical holding times	A	Sampling dates: 10/22/09 - 10/23/09
II.	ICP/MS Tune	A	
III.	Calibration	A	
IV.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	SW	MS
VII.	Duplicate Sample Analysis	SW	DUP
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	N	Not reviewed
X.	Furnace Atomic Absorption QC	N	Not utilized
XI.	ICP Serial Dilution	SW	
XII.	Sample Result Verification	N	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	SW	(12,13)
XV	Field Blanks	SW	EB=1. FB= FB082580C1-SO (SDG# 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: all soil except 1=water

1	EB102209-SO1A3	11	SA132-0.5B	21	RSAP8-10B	31	PBS
2	SA112-0.5B	12	SA132-10B	22	RSAP8-25B	32	PBW
3	SA112-10B	13	SA132009-10B	23	RSAP8-40B	33	
4	SA112-20B	14	SA132-20B	24	SA112-0.5BMS	34	
5	SA112-34B	15	SA132-34B	25	SA112-0.5BDUP	35	
6	RSAQ8-0.5B	16	RSAR8-0.5B	26	SA132-20BMS	36	
7	RSAQ8-10B	17	RSAR8-10B	27	SA132-20BDUP	37	
8	RSAQ8-22B	18	RSAR8-20B	28	RSAR8-34BMS	38	
9	RSAQ8-31B	19	RSAR8-34B	29	RSAR8-34BDUP	39	
10	RSAQ8-34B	20	RSAP8-0.5B	30		40	

Notes: _____

LDC #: 22234K4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer:
2nd reviewer:

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1	Wat.	[✓ 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]
2-23	Soil	[✓ 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:24		[✓ 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]
25		[✓ 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]
26		[✓ 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]
27		[✓ 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]
28		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
↓ 29		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
		Analysis Method
ICP	S/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]
ICP-MS	↓	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
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 #: 22234K4
SDG #: See Cover
METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)
Sample Concentration units, unless otherwise noted: ug/L

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES
Soil preparation factor applied: 100x Reason Code: bl
Associated Samples: All Water

Analyte	Maximum PB[a] (ug/L)	Maximum ICB/CCB[a] (ug/L)	Action Limit	1										
Sb		0.026												
Ba		1.5		0.6 / 5.0										
B		8.6		2.3 / 50.0										
Cu		2.3												
Hg	0.02													
Mn		0.2												
Mo		0.7		0.7 / 2.0										
Pb		0.006												
Ag		0.7												
Na		60		68.8 / 300										
Tl	0.005	0.009												
Sr		0.2		1.5 / 10.0										
W	0.02	0.03		0.01 / 0.10										
U		0.004		0.009 / 0.020										

LDC #: 22234K4
SDG #: See Cover
METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Soil preparation factor applied: 100x Reason Code: bl
Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 2-13

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	2	3	4	5	6	7	8	9	10	11	12	13
Sb	0.9			1.4 / 2.0	1.4 / 2.2	1.2 / 2.1	1.8 / 2.2			1.1 / 2.2	0.7 / 2.0		1.4 / 2.2	1.7 / 2.2	1.8 / 2.2
Ca	2.0														
Cr	0.08														
Mg	0.5														
Mn	0.06														
Ni	0.08														
Se	0.8													0.9 / 4.4	
Sr	0.02														
Sn	3.8			3.5 / 10.0	4.0 / 10.9	3.9 / 10.5	4.2 / 10.8	3.1 / 10.5	3.6 / 10.7	4.0 / 11.0	3.6 / 10.1	4.2 / 11.7	4.1 / 10.9	4.1 / 10.9	4.2 / 11.0

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 14-23

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	14	15	16	17	18	19	20	21	22	23	
Sb	0.8			2.1 / 2.1	1.7 / 2.1	1.7 / 2.1	1.8 / 2.1	0.8 / 2.2	1.5 / 2.3	1.5 / 2.1	1.3 / 2.1	1.4 / 2.2	1.0 / 2.3	
Ca	2.3													
Cr	0.08													
Pb	0.4													
Mg	0.5													
Mn	0.08													
Sr	0.02													
Sn	3.7			3.8 / 10.7	4.1 / 10.6	3.8 / 10.6	3.5 / 10.6	4.3 / 11.1	4.6 / 11.7	4.0 / 10.5	3.9 / 10.6	4.0 / 10.8	4.3 / 11.5	

LDC #: 22234K4
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
Soil preparation factor applied: 100x
Associated Samples: All Soil

Reason Code: bl

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	2	3	7	8	11	12	13	14	16	17	20	21	22	
B		3.0		9.1 / 10.0	7.9 / 10.9	6.1 / 10.7	5.7 / 11.0	7.4 / 10.9	8.3 / 10.9	8.6 / 11.0	6.9 / 10.7	7.7 / 10.6	7.2 / 10.6	6.3 / 10.5	5.4 / 10.6	8.4 / 10.8	
Ca		10.0															

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 4, 5, 9-13

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	4	5	9	10	11	12	13				
Pt		0.011						0.008 / 0.11	0.007 / 0.11	0.009 / 0.11				
Tl		0.015				0.117 / 0.203								
W		0.074		0.26 / 0.53		0.26 / 1.01	0.39 / 0.46							

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 2, 3, 6-8

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	2	3	6	7	8						
Pt		0.009		0.017 / 0.10	0.006 / 0.11	0.019 / 0.10	0.008 / 0.11	0.007 / 0.11						
Tl		0.012												
W		0.056												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 10-23

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	11	12	13	14	15	16	17	18	19	20	21	22	23
Sb		3.0		See PB	See PB	See PB	See PB	See PB	See PB	See PB	See PB	See PB	See PB	See PB	See PB	See PB

LDC #: 22234K4
SDG #: See Cover
METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Soil preparation factor applied: 100x Reason Code: bl

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 20-23

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Ba		1.00												
Mn		0.10												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 15-19

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Ba		0.8												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 2-9

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Ba		0.60												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 10-14

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Ba		0.50												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 10-19

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Mg		3.0												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 2-19

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Mn		0.30												

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Soil preparation factor applied: 100x Reason Code: bl

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 3-14

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Ni		0.60												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 15-23

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Ni		0.40												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 2-9, 20-23

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Sr		0.10												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 3-13

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Be		0.010												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 2

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Be		0.008												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 17-22

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Tl		0.011												

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES
Soil preparation factor applied: 100x Reason Code: bl
Associated Samples: 14-16

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Tl		0.009												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 14-22

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	21										
W		0.043		0.098 / 0.11										

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 23

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	23										
Tl		0.010												
W		0.074		0.15 / 0.57										

Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC #: 22234K4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: VR
2nd Reviewer:

METHOD: Trace Metals (EPA SW846 6010B/7000)

Y N N/A 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 Reason Code: be

Sampling date: 10/22/09 Soil factor applied ~~100x~~

Field blank type: (circle one) Field Blank / Rinsate / Other: EB Associated Samples: 2-10

Analyte	Blank ID	Sample Identification										
	1	Action Level	2	3	4	5	7	8	9	10		
Al	11.4											
Sb	0.6		1.4 / 2.0	1.4 / 2.2	1.2 / 2.1	1.8 / 2.2		1.1 / 2.2	0.7 / 2.0			
B	2.3		9.1 / 10.0	7.9 / 10.9			6.1 / 10.7	5.7 / 11.0				
Cr	0.9											
Ca	310	310										
Fe	58.9	58.9										
Pb	0.196	0.196										
Mg	29.2	29.2										
Mn	12.1	12.1										
Mo	0.7											
Na	68.8											
Sr	1.5											
Ti	0.5											
W	0.01				0.26 / 0.53				0.26 / 1.01	0.39 / 0.46		
U	0.009											
Zn	1.3											

LDC #: 22234K4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: CR
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW846 6010B/7000)

Y N N/A Were field blanks identified in this SDG?

Y N N/A Were target analytes detected in the field blanks? Reason Code: bf

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: _____ Associated Samples: All Soil

Analyte	Blank ID	Sample Identification										
	FB082809-SO (SDG#: R0904894)	Action Level	No Qualifiers									
Al	3.3											
Ca	17											
Pb	0.006											
Mg	5.0											
Mn	0.2											
Na	39.2											
Sr	0.1											
Zn	1.0											

LDC #: 22234K4
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Page: 1 of 1
Reviewer: CR
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".

Y N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y N N/A Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

Y N N/A Was a post digestion spike analyzed for ICP elements that did not meet the required criteria for matrix spike recovery?

LEVEL IV ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
	24	Soil	~~Sb~~	52.6	All Soil	J-/UJ/A (m)
			Cu	152.2	↓	J+det/A ↓
	26	Soil	Sb	59.6	All Soil	J-/UJ/A (m)
			Mn	176.5	↓	J+det/A ↓
			Pt	147.3	↓	↓

Comments:

LDC #: 22234R4
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Duplicate Analysis

Reviewer: CR
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".

Y N N/A Was a duplicate sample analyzed for each matrix in this SDG?

Y N N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤ 35% for soil samples? If no, see qualifications below. A control limit of ±R.L. (±2X R.L. for soil) was used for sample values that were <5X the R.L., including the case when only one of the duplicate sample values was <5X R.L.. If field blanks were used for laboratory duplicates, note in the Overall Assessment.

LEVEL IV ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Duplicate ID	Matrix	Analyte	RPD (Limits)	Difference (Limits)	Associated Samples	Qualifications
	25	Soil	Ba	30.4 (≤20)		All Soil	J/UJ/A(d)
			Cd		0.16 (≤0.10)		
			W	41.2 (≤20)			
			U	23.2 ↓			
	27	Soil	Ca	33.0 (≤20)			
			Sr	20.2 ↓			

Comments:

LDC #: 22234K4
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
ICP Serial Dilution

Reviewer: AR
2nd Reviewer: 1

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".

(Y) N N/A If analyte concentrations were > 50X the IDL, was an ICP serial dilution analyzed?
Y (N) N/A Were ICP serial dilution percent differences (%D) ≤10%?
Y (N) N/A Is there evidence of negative interference? If yes, professional judgement will be used to qualify the data.

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Diluted Sample ID	Matrix	Analyte	%D	Associated Samples	Qualifications
	2	Soil	Be	21	All Soil	J/UJ/A (sd)
	14	Soil	Be	11	All Soil	J/UJ/A (sd)

Comments:

LDC 22234K4
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer:

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg) 12	Concentration (mg/Kg) 13	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Aluminum	9100	9290	2			
Antimony	1.7	1.8		0.1	(≤2.2)	
Arsenic	3.10	3.10	0			
Barium	183	179	2			
Beryllium	0.483	0.495	2			
Boron	8.3	8.6		0.3	(≤11.0)	
Cadmium	0.17	0.15		0.02	(≤0.11)	
Calcium	35300	33000	7			
Chromium	8.37	8.64	3			
Cobalt	7.2	7.3		0.1	(≤2.2)	
Copper	19.5	18.4	6			
Iron	16000	16500	3			
Lead	8.4	7.4		1	(≤2.2)	
Magnesium	11900	11800	1			
Manganese	394	297	28			
Mercury	0.006	0.007		0.001	(≤0.017)	
Molybdenum	0.33	0.40		0.07	(≤0.33)	
Nickel	16.9	16.2	4			
Platinum	0.007	0.009		0.002	(≤0.11)	

LDC#: 22234K4__
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: ER
2nd Reviewer: [signature]

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg) 12	Concentration (mg/Kg) 13	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Potassium	1580	1590	1			
Selenium	0.9	0.8U		0.1	(≤4.4)	
Sodium	1330	1340	1			
Strontium	271	301	10			
Thallium	0.098	0.087		0.011	(≤0.022)	
Tin	4.1	4.2		0.1	(≤11.0)	
Titanium	805	839	4			
Tungsten	0.15	0.14		0.01	(≤0.11)	
Uranium	1.660	1.700	2			
Vanadium	50.3	51.3	2			
Zinc	32.1	31.6	2			

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 23 through October 30, 2009

LDC Report Date: December 29, 2009

Matrix: Water

Parameters: Metals

Validation Level: Stage 4

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906095

Sample Identification

M-141B
M-141009B
PB102309-A3
M-139B
M-145B
M-144B
M-146B
M-138B
M-138BDISS
M-138009B
M-138009BDISS
M-148B
M-137B
M-137BDISS
EB103009-GWA4
M-141BMS
M-141BDUP

Introduction

This data review covers 17 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.

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)	Mercury Thallium Tungsten	0.02 ug/L 0.005 ug/L 0.02 ug/L	All samples in SDG R0906095
ICB/CCB	Antimony Lead Molybdenum Manganese Tungsten Uranium	0.026 ug/L 0.006 ug/L 0.7 ug/L 0.2 ug/L 0.03 ug/L 0.004 ug/L	All samples in SDG R0906095
ICB/CCB	Boron Barium Copper Sodium Strontium	8.6 ug/L 1.5 ug/L 2.3 ug/L 60 ug/L 0.2 ug/L	M-141B

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Strontium	0.1 ug/L	M-141009B PB102309-A3 M-139B M-145B M-144B M-146B M-138B M-138BDISS M-138009B M-138009BDISS M-148B M-137B M-137BDISS EB103009-GWA4
ICB/CCB	Aluminum Barium Boron Copper Iron Sodium	2.1 ug/L 1.3 ug/L 5.7 ug/L 7.1 ug/L 4.6 ug/L 76 ug/L	M-141009B PB102309-A3 M-139B M-145B M-144B
ICB/CCB	Aluminum Barium Boron Copper Iron Sodium	2.3 ug/L 0.9 ug/L 8.7 ug/L 2.8 ug/L 3.6 ug/L 110 ug/L	M-146B M-138B M-138BDISS M-138009B M-138009BDISS M-148B M-137B M-137BDISS EB103009-GWA4
ICB/CCB	Thallium	0.007 ug/L	M-141B M-141009B PB102309-A3 M-139B
ICB/CCB	Thallium	0.008 ug/L	M-145B M-144B M-146B M-138B M-138BDISS M-138009B M-138009BDISS M-148B M-137B EB103009-GWA4
ICB/CCB	Thallium	0.009 ug/L	M-137BDISS

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-141B	Thallium Tungsten	0.158 ug/L 0.49 ug/L	0.200U ug/L 1.00U ug/L
M-141009B	Tungsten Aluminum	0.47 ug/L 34.4 ug/L	1.00U ug/L 50.0U ug/L
PB102309-A3	Manganese Thallium Tungsten Strontium Boron Copper Sodium	1.1 ug/L 0.005 ug/L 0.02 ug/L 0.5 ug/L 7.0 ug/L 1.3 ug/L 103 ug/L	5.0U ug/L 0.020U ug/L 0.10U ug/L 10.0U ug/L 50.0U ug/L 10.0U ug/L 300U ug/L
M-139B	Lead Thallium Tungsten	0.146 ug/L 0.109 ug/L 0.91 ug/L	0.200U ug/L 0.200U ug/L 1.00U ug/L
M-145B	Thallium	0.057 ug/L	0.200U ug/L
M-144B	Manganese Thallium	3.0 ug/L 0.049 ug/L	5.0U ug/L 0.200U ug/L
M-146B	Thallium	0.101 ug/L	0.200U ug/L
M-138B	Thallium Tungsten	0.057 ug/L 0.61 ug/L	0.200U ug/L 1.00U ug/L
M-138BDISS	Tungsten	0.45 ug/L	1.00U ug/L
M-138009B	Lead Thallium Tungsten	0.170 ug/L 0.045 ug/L 0.56 ug/L	0.200U ug/L 0.200U ug/L 1.00U ug/L
M-138009BDISS	Thallium Tungsten Iron	0.043 ug/L 0.50 ug/L 4.4 ug/L	0.200U ug/L 1.00U ug/L 20.0U ug/L
M-148B	Thallium	0.165 ug/L	0.200U ug/L
M-137B	Thallium Tungsten	0.063 ug/L 0.44 ug/L	0.200U ug/L 1.00U ug/L
M-137BDISS	Thallium Tungsten	0.076 ug/L 0.53 ug/L	0.200U ug/L 1.00U ug/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
EB103009-GWA4	Lead Manganese Uranium Strontium Sodium	0.017 ug/L 3.0 ug/L 0.005 ug/L 0.3 ug/L 184 ug/L	0.020U ug/L 5.0U ug/L 0.020U ug/L 10.0U ug/L 300U ug/L

Sample EB103009-GWA4 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
EB103009-GWA4	10/30/09	Aluminum Boron Calcium Lead Magnesium Manganese Potassium Sodium Strontium Uranium Zinc	3.2 ug/L 9.2 ug/L 66 ug/L 0.017 ug/L 2.8 ug/L 3.0 ug/L 55 ug/L 184 ug/L 0.3 ug/L 0.005 ug/L 2.1 ug/L	M-137B

Sample concentrations were compared to concentrations detected in the equipment blanks as required by the QAPP. No sample data was qualified.

Sample FB080409-GW (from SDG R0904290) 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
FB080409-GW	8/4/09	Boron Chromium Copper Tungsten	9.0 ug/L 0.9 ug/L 0.8 ug/L 0.01 ug/L	M-144B M-146B

Sample concentrations were compared to concentrations detected in the field blanks as required by the QAPP. No sample data was qualified.

Samples PB100209-A2 (from SDG R0905636) and PB102309-A3 were identified as pump blanks. No metal contaminants were found in these blanks with the following exceptions:

Pump Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
PB100209-A2	10/2/09	Aluminum Antimony Calcium Magnesium Manganese Molybdenum Strontium Titanium Tungsten Zinc	5.3 ug/L 0.03 ug/L 116 ug/L 2.3 ug/L 0.2 ug/L 1.7 ug/L 0.2 ug/L 0.7 ug/L 0.06 ug/L 2.2 ug/L	M-144B M-146B
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-141B M-141009B M-139B M-145B M-148B

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-144B	Manganese	3.0 ug/L	5.0U ug/L
M-141B	Thallium	0.158 ug/L	0.200U ug/L
M-141009B	Tungsten	0.47 ug/L	1.00U ug/L
M-139B	Thallium Tungsten	0.109 ug/L 0.91 ug/L	0.200U ug/L 1.00U ug/L
M-145B	Thallium	0.057 ug/L	0.200U ug/L
M-148B	Thallium	0.165 ug/L	0.200U ug/L

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-138BDISS M-138009BDISS M-137BDISS

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-138BDISS	Tungsten	0.45 ug/L	1.00U ug/L
M-138009BDISS	Tungsten	0.50 ug/L	1.00U ug/L
M-137BDISS	Tungsten Zinc	0.53 ug/L 5.5 ug/L	1.00U 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

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 R0906095	All analytes reported below the PQL.	J (all detects)	A

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-141B and M-141009B, samples M-138B and M-138009B, and samples M-138BDISS and M-138009BDISS were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-141B	M-141009B				
Aluminum	58.4	34.4	-	24 (≤50.0)	-	-
Barium	20.6	21.5	-	0.9 (≤5.0)	-	-
Beryllium	0.09U	0.1	-	0.01 (≤0.30)	-	-
Boron	18200	16800	8 (≤30)	-	-	-

Compound	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-141B	M-141009B				
Calcium	560000	566000	1 (≤30)	-	-	-
Chromium	11000	10700	3 (≤30)	-	-	-
Cobalt	1.1	1.5	-	0.4 (≤10.0)	-	-
Copper	18.7	31.4	-	12.7 (≤10.0)	-	-
Iron	56.0	37.5	-	18.5 (≤20.0)	-	-
Magnesium	243000	247000	2 (≤30)	-	-	-
Manganese	1840	1820	1 (≤30)	-	-	-
Mercury	0.04	0.04	-	0 (≤0.20)	-	-
Molybdenum	14.7	16.5	12 (≤30)	-	-	-
Nickel	1.7	6.5	-	4.8 (≤2.0)	J (all detects)	A
Platinum	0.21	0.17	-	0.04 (≤1.00)	-	-
Potassium	21200	19700	7 (≤30)	-	-	-
Sodium	1690000	1710000	1 (≤30)	-	-	-
Strontium	11000	11400	4 (≤30)	-	-	-
Thallium	0.158	0.265	-	0.107 (≤0.200)	-	-
Tungsten	0.49	0.47	-	0.02 (≤1.00)	-	-
Uranium	128	134	5 (≤30)	-	-	-
Vanadium	29.9	30.1	1 (≤30)	-	-	-
Zinc	28.7	36.6	-	7.9 (≤10.0)	-	-

Compound	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-138B	M-138009B				
Aluminum	386	344	12 (≤30)	-	-	-
Barium	27.9	27	3 (≤30)	-	-	-
Boron	5540	5510	1 (≤30)	-	-	-
Calcium	116000	115000	1 (≤30)	-	-	-
Chromium	53.5	54.7	2 (≤30)	-	-	-
Copper	15.2	18.4	-	3.2 (≤10.0)	-	-
Iron	295	267	10 (≤30)	-	-	-
Lead	0.216	0.17	-	0.046 (≤0.200)	-	-
Magnesium	105000	105000	0 (≤30)	-	-	-
Manganese	49.1	49.1	0 (≤30)	-	-	-
Molybdenum	33.4	32.4	3 (≤30)	-	-	-
Nickel	2.2	1.8	-	0.4 (≤2.0)	-	-
Potassium	11100	11000	1 (≤30)	-	-	-
Sodium	551000	549000	0 (≤30)	-	-	-
Strontium	3100	3080	1 (≤30)	-	-	-
Thallium	0.057	0.045	-	0.012 (≤0.200)	-	-
Titanium	14.4	12.9	-	1.5 (≤10.0)	-	-
Tungsten	0.61	0.56	-	0.05 (≤1.00)	-	-
Uranium	55.5	54.3	2 (≤30)	-	-	-
Vanadium	45.2	44.1	2 (≤30)	-	-	-

Compound	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-138B	M-138009B				
Zinc	14.4	15.5	-	1.1 (≤10.0)	-	-

Compound	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-138BDISS	M-138009BDISS				
Barium	24.5	25	-	0.5 (≤5.0)	-	-
Boron	5550	5620	1 (≤30)	-	-	-
Calcium	116000	118000	2 (≤30)	-	-	-
Chromium	53.3	55	3 (≤30)	-	-	-
Copper	14.9	17.2	-	2.3 (≤10.0)	-	-
Iron	3.0U	4.4	-	1.4 (≤20.0)	-	-
Magnesium	104000	107000	3 (≤30)	-	-	-
Manganese	43.1	44.3	3 (≤30)	-	-	-
Molybdenum	33.4	33.4	0 (≤30)	-	-	-
Nickel	1.6	2	-	0.4 (≤2.0)	-	-
Potassium	11200	11200	0 (≤30)	-	-	-
Sodium	558000	562000	1 (≤30)	-	-	-
Strontium	3110	3200	3 (≤30)	-	-	-
Thallium	0.040U	0.043	-	0.003 (≤0.200)	-	-
Tungsten	0.45	0.5	-	0.05 (≤1.00)	-	-
Uranium	53.8	53.6	0 (≤30)	-	-	-
Vanadium	44.3	45.5	3 (≤30)	-	-	-

Compound	Concentration (ug/L)		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-138BDISS	M-138009BDISS				
Zinc	17.9	17.6	-	0.3 (≤10.0)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Data Qualification Summary - SDG R0906095

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0906095	M-141B M-141009B PB102309-A3 M-139B M-145B M-144B M-146B M-138B M-138BDISS M-138009B M-138009BDISS M-148B M-137B M-137BDISS EB103009-GWA4	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)
R0906095	M-141B M-141009B	Nickel	J (all detects)	A	Field duplicates (Difference) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Laboratory Blank Data Qualification Summary - SDG R0906095

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906095	M-141B	Thallium Tungsten	0.200U ug/L 1.00U ug/L	A	bl
R0906095	M-141009B	Tungsten Aluminum	1.00U ug/L 50.0U ug/L	A	bl
R0906095	PB102309-A3	Manganese Thallium Tungsten Strontium Boron Copper Sodium	5.0U ug/L 0.020U ug/L 0.10U ug/L 10.0U ug/L 50.0U ug/L 10.0U ug/L 300U ug/L	A	bl
R0906095	M-139B	Lead Thallium Tungsten	0.200U ug/L 0.200U ug/L 1.00U ug/L	A	bl
R0906095	M-145B	Thallium	0.200U ug/L	A	bl
R0906095	M-144B	Manganese Thallium	5.0U ug/L 0.200U ug/L	A	bl

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906095	M-146B	Thallium	0.200U ug/L	A	bl
R0906095	M-138B	Thallium Tungsten	0.200U ug/L 1.00U ug/L	A	bl
R0906095	M-138BDISS	Tungsten	1.00U ug/L	A	bl
R0906095	M-138009B	Lead Thallium Tungsten	0.200U ug/L 0.200U ug/L 1.00U ug/L	A	bl
R0906095	M-138009BDISS	Thallium Tungsten Iron	0.200U ug/L 1.00U ug/L 20.0U ug/L	A	bl
R0906095	M-148B	Thallium	0.200U ug/L	A	bl
R0906095	M-137B	Thallium Tungsten	0.200U ug/L 1.00U ug/L	A	bl
R0906095	M-137BDISS	Thallium Tungsten	0.200U ug/L 1.00U ug/L	A	bl
R0906095	EB103009-GWA4	Lead Manganese Uranium Strontium Sodium	0.020U ug/L 5.0U ug/L 0.020U ug/L 10.0U ug/L 300U ug/L	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Equipment Blank Data Qualification Summary - SDG R0906095

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Field Blank Data Qualification Summary - SDG R0906095

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Pump Blank Data Qualification Summary - SDG R0906095

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906095	M-144B	Manganese	5.0U ug/L	A	bp
R0906095	M-141B	Thallium	0.200U ug/L	A	bp
R0906095	M-141009B	Tungsten	1.00U ug/L	A	bp
R0906095	M-139B	Thallium Tungsten	0.200U ug/L 1.00U ug/L	A	bp
R0906095	M-145B	Thallium	0.200U ug/L	A	bp
R0906095	M-148B	Thallium	0.200U ug/L	A	bp

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Filter Blank Data Qualification Summary - SDG R0906095

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906095	M-138BDISS	Tungsten	1.00U ug/L	A	br
R0906095	M-138009BDISS	Tungsten	1.00U ug/L	A	br
R0906095	M-137BDISS	Tungsten Zinc	1.00U ug/L 10.0U ug/L	A	br

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 4

LDC #: 22234L4
SDG #: R0906095
Laboratory: Columbia Analytical Services

Date: 12-29-09
Page: 1 of 1
Reviewer: AR
2nd Reviewer: W

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
I.	Technical holding times	A	Sampling dates: 10/23/09 - 10/30/09
II.	ICP/MS Tune	A	
III.	Calibration	A	
IV.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	A	MS
VII.	Duplicate Sample Analysis	A	Dup
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	A	
X.	Furnace Atomic Absorption QC	N	Not utilized
XI.	ICP Serial Dilution	A	
XII.	Sample Result Verification	A	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	SW	(1,2), (8,10), (9,11)
XV	Field Blanks	SW	EB=15, FilterBlank=FHBQ2509-A2, PumpBlank=3 (SDG# R0905462) (see below)

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-141B	11	M-138009BDISS	21		31	PBW
2	M-141009B	12	M-148B	22		32	
3	PB102309-A3	13	M-137B	23		33	
4	M-139B	14	M-137BDISS	24		34	
5	M-145B	15	EB103009-GWA4	25		35	
6	M-144B	16	M-141BMS	26		36	
7	M-146B	17	M-141BDUP	27		37	
8	M-138B	18		28		38	
9	M-138BDISS	19		29		39	
10	M-138009B	20		30		40	

Notes: FB= FB080409-GW (SDG# R0904290)
PumpBlank = PB100209-A2 (SDG# R0905636)

LDC #: 22234L4
SDG #: See cover

VALIDATION FINDINGS CHECKLIST

Reviewer: CR
2nd Reviewer: [illegible]

Method: Metals (EPA SW 846 Method 6010/7000/6020)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Calibration				
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. Blanks				
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				
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) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were ≤ 5X the RL, including when only one of the duplicate sample values were < 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?	✓			

LDC #: 222344
SDG #: secaer2

VALIDATION FINDINGS CHECKLIST

Reviewer: ER
2nd Reviewer: W

Validation Area	Yes	No	NA	Findings/Comments
VI. Furnace Atomic Absorption QC				
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?			✓	
VII. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the IDL?	✓			
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?	✓			
If the %Rs were outside the criteria, was a reanalysis performed?	✓			
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
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.	✓			
XII. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.	✓			
XIII. Field blanks				
Field blanks were identified in this SDG.	✓			
Target analytes were detected in the field blanks.	✓			

LDC #: 22234L4
SDG #: See Cover

Reviewer: CR
2nd reviewer: [illegible]

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-15	Water	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: 16		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
↓ 17		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
Analysis Method		
ICP	✓	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	✓	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
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 #: 22234L4
SDG #: See Cover
METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)
Sample Concentration units, unless otherwise noted: ug/L

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES
Soil preparation factor applied: NA
Associated Samples: All

Raise to RL unless otherwise noted
Reason Code: bl

Analyte	Maximum PB[a] (ug/L)	Maximum ICB/CCB[a] (ug/L)	Action Limit	RL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Sb		0.026																	
Pb		0.006		0.200				0.146						0.170					0.017 / 0.020
Mo		0.7																	
Mn		0.2		5.0			1.1			3.0									3.0
Hg	0.02																		
Tl	0.005			0.200	0.158		0.005 / 0.020	0.109	0.057	0.049	0.101	0.057		0.045	0.043	0.165	0.063	0.076	
W	0.02	0.03		1.00	0.49	0.47	0.02 / 0.10	0.91				0.61	0.45	0.56	0.50		0.44	0.53	
U		0.004		0.020															0.005

Sample Concentration units, unless otherwise noted: ug/L Associated Samples: 1

Analyte	Maximum PB[a] (ug/L)	Maximum ICB/CCB[a] (ug/L)	Action Limit	RL	No Qualifiers
B		8.6			
Ba		1.5			
Cu		2.3			
Na		60			
Sr		0.2			

Sample Concentration units, unless otherwise noted: ug/L Associated Samples: 2-15

Analyte	Maximum PB[a] (ug/L)	Maximum ICB/CCB[a] (ug/L)	Action Limit	RL	3	15
Sr		0.1		10.0	0.5	0.3

LDC #: 22234L4
SDG #: See Cover
METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)
Sample Concentration units, unless otherwise noted: ug/L

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES
Soil preparation factor applied: NA
Associated Samples: 2-6

Raise to RL unless otherwise noted
Reason Code: bl

Analyte	Maximum PB[a] (ug/l)	Maximum ICB/CCB[a] (ug/l)	Action Limit	RL	2	3	15							
Al		2.1		50.0	34.4		3.2							
Ba		1.3												
B		5.7		50.0		7.0	9.2							
Cu		7.1		10.0		1.3								
Fe		4.6												
Na		76		300		103								

Sample Concentration units, unless otherwise noted: ug/L Associated Samples: 7-15

Analyte	Maximum PB[a] (ug/l)	Maximum ICB/CCB[a] (ug/l)	Action Limit	RL	11	15								
Al		2.3												
Ba		0.9												
B		8.7												
Cu		2.8												
Fe		3.6		20.0	4.4									
Na		110		300		184								

Sample Concentration units, unless otherwise noted: ug/L Associated Samples: 1-4

Analyte	Maximum PB[a] (ug/l)	Maximum ICB/CCB[a] (ug/l)	Action Limit	RL	1	3	4							
Tl		0.007			See PB	See PB	See PB							

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES
Soil preparation factor applied: NA

Raise to RL unless otherwise noted
Reason Code: bl

Sample Concentration units, unless otherwise noted: ug/L Associated Samples: 5-13, 15

Analyte	Maximum PB[a] (ug/l)	Maximum ICB/CCB[a] (ug/l)	Action Limit	RL	5	6	7	8	9	10	11	12	13	
Tl		0.008			See PB	See PB	See PB	See PB	See PB	See PB	See PB	See PB	See PB	

Sample Concentration units, unless otherwise noted: ug/L Associated Samples: 14

Analyte	Maximum PB[a] (ug/l)	Maximum ICB/CCB[a] (ug/l)	Action Limit	RL	14									
Tl		0.009			See PB									

Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC #: 22234L4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 1 of 1
Reviewer: CR
2nd Reviewer:

METHOD: Trace Metals (EPA SW846 6010B/6020/7000)

Y N N/A Were field blanks identified in this SDG?
Y N N/A Were target analytes detected in the field blanks?

Reason Code: be

Blank units: ug/L **Associated sample units:** ug/L
Sampling date: 10/30/09 Soil factor applied NA
Field blank type: (circle one) Field Blank / Rinsate / Other: (Equipment Blank) Associated Samples: 13

Analyte	Blank ID	Sample Identification										
	15	Action Level	No Qualifiers									
Al	3.2											
B	9.2											
Ca	66	660										
Pb	0.017											
Mg	2.8											
Mn	3.0											
K	55											
Na	184											
Sr	0.3											
U	0.005											
Zn	2.1											

~~CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:~~
Samples with ~~analyte concentrations~~ within five times the associated field blank concentration ~~are~~ listed above, these sample results were qualified ~~as~~ not detected, "U". CR

LDC #: 22234L4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: CR
2nd Reviewer: L

METHOD: Trace Metals (EPA SW846 6010B/7000)

Y N N/A Were field blanks identified in this SDG?
Y N N/A Were target analytes detected in the field blanks? Reason Code: bf

Blank units: ug/L **Associated sample units:** ug/L
Sampling date: 8/4/09 Soil factor applied NA
Field blank type: (circle one) Field Blank / Rinsate / Other: Associated Samples: 6, 7

Analyte	Blank ID	Sample Identification										
	FB080409-GW (SDG#: R0904290)	Action Level	No Qualifiers									
B	9.0											
Cr	0.9											
Cu	0.8											
W	0.01											

LDC #: 22234L4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: CR
2nd Reviewer:

METHOD: Trace Metals (EPA SW846 6010B/6020/7000)

Y N N/A Were field blanks identified in this SDG?
Y N N/A Were target analytes detected in the field blanks?

Reason Code: bp

Blank units: ug/L **Associated sample units:** ug/L
Sampling date: 10/02/09 Soil factor applied NA
Field blank type: (circle one) Field Blank / Rinsate / Other: (Pump Blank) Associated Samples: 6, 7

Analyte	Blank ID	Sample Identification										
	PB100209-A2 (SDG#: R0905636)	Action Level	6									
Al	5.3											
Sb	0.03											
Ca	116	1160										
Mg	2.3											
Mn	0.2		3.0 / 5.0									
Mo	1.7											
Sr	0.2											
Ti	0.7											
W	0.06											
Zn	2.2											

LDC #: 22234L4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: CR
2nd Reviewer:

METHOD: Trace Metals (EPA SW846 6010B/6020/7000)

Y N N/A Were field blanks identified in this SDG?

Y N N/A Were target analytes detected in the field blanks? Reason Code: bp

Blank units: ug/L **Associated sample units:** ug/L

Sampling date: 10/23/09 Soil factor applied NA

Field blank type: (circle one) Field Blank / Rinsate / Other: Pump Blank Associated Samples: 1, 2, 4, 5, 12

Analyte	Blank ID	Sample Identification										
	3	Action Level	1	2	4	5	12					
B	7.0											
Ca	73	730										
Cr	0.6											
Cu	1.3											
Mg	4.8											
Mn	1.1											
Na	103											
Sr	0.5											
Tl	0.005		0.158 / 0.200		0.109 / 0.200	0.057 / 0.200	0.165 / 0.200					
W	0.02			0.47 / 1.00	0.91 / 1.00							
U	0.038	0.38										

LDC #: 22234L4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: CR
2nd Reviewer: br

METHOD: Trace Metals (EPA SW846 6010B/7000)
Y N N/A 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:** ug/L
Sampling date: 9/25/09 Soil factor applied NA
Field blank type: (circle one) Field Blank / Rinsate / Other: (Filter Blank) Associated Samples: 9, 11, 14

Analyte	Blank ID	Sample Identification											
	FiltB092509-A2 (SDG#: R0905462)	Action Level	9	11	14								
B	11.0												
Ca	34												
Pb	0.006												
Mg	3.8												
Mn	0.6												
Na	398	3980											
Sr	0.2												
W	0.02		0.45 / 1.00	0.50 / 1.00	0.53 / 1.00								
Zn	3.6				5.5 / 10.0								

~~CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:~~
~~Samples with analyte concentrations within five times the associated field blank concentration are listed above, these sample results were qualified as not detected, "U".~~

LDC 22234L4
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer: MV

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (ug/L)		(≤30) RPD	Difference	Limits	Qualifications (Parent Only)
	1	2				
Aluminum	58.4	34.4		24	(≤50.0)	
Barium	20.6	21.5		0.9	(≤5.0)	
Beryllium	0.09U	0.10		0.01	(≤0.30)	
Boron	18200	16800	8			
Calcium	560000	566000	1			
Chromium	11000	10700	3			
Cobalt	1.1	1.5		0.4	(≤10.0)	
Copper	18.7	31.4		12.7	(≤10.0)	
Iron	56.0	37.5		18.5	(≤20.0)	
Magnesium	243000	247000	2			
Manganese	1840	1820	1			
Mercury	0.04	0.04		0	(≤0.20)	
Molybdenum	14.7	16.5	12			
Nickel	1.7	6.5		4.8	(≤2.0)	Jdet/A (fd)
Platinum	0.21	0.17		0.04	(≤1.00)	
Potassium	21200	19700	7			
Sodium	1690000	1710000	1			
Strontium	11000	11400	4			
Thallium	0.158	0.265		0.107	(≤0.200)	

LDC 22234L4
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer: LW

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (ug/L) 1	Concentration (ug/L) 2	(≤30) RPD	Difference	Limits	Qualifications (Parent Only)
Tungsten	0.49	0.47		0.02	(≤1.00)	
Uranium	128.0	134.0	5			
Vanadium	29.9	30.1	1			
Zinc	28.7	36.6		7.9	(≤10.0)	

V:\FIELD DUPLICATES\FD_inorganic\22234L4.wpd

Compound	Concentration (ug/L) 8	Concentration (ug/L) 10	(≤30) RPD	Difference	Limits	Qualifications (Parent Only)
Aluminum	386	344	12			
Barium	27.9	27.0	3			
Boron	5540	5510	1			
Calcium	116000	115000	1			
Chromium	53.5	54.7	2			
Copper	15.2	18.4		3.2	(≤10.0)	
Iron	295	267	10			
Lead	0.216	0.170		0.046	(≤0.200)	
Magnesium	105000	105000	0			
Manganese	49.1	49.1	0			
Molybdenum	33.4	32.4	3			
Nickel	2.2	1.8		0.4	(≤2.0)	

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (ug/L)		(≤30) RPD	Difference	Limits	Qualifications (Parent Only)
	8	10				
Potassium	11100	11000	1			
Sodium	551000	549000	0			
Strontium	3100	3080	1			
Thallium	0.057	0.045		0.012	(≤0.200)	
Titanium	14.4	12.9		1.5	(≤10.0)	
Tungsten	0.61	0.56		0.05	(≤1.00)	
Uranium	55.5	54.3	2			
Vanadium	45.2	44.1	2			
Zinc	14.4	15.5		1.1	(≤10.0)	

Compound	Concentration (ug/L)		(≤30) RPD	Difference	Limits	Qualifications (Parent Only)
	9	11				
Barium	24.5	25.0		0.5	(≤5.0)	
Boron	5550	5620	1			
Calcium	116000	118000	2			
Chromium	53.3	55.0	3			
Copper	14.9	17.2		2.3	(≤10.0)	
Iron	3.0U	4.4		1.4	(≤20.0)	
Magnesium	104000	107000	3			
Manganese	43.1	44.3	3			

LDC#: 22234L4
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer:

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (ug/L)		(≤30) RPD	Difference	Limits	Qualifications (Parent Only)
	9	11				
Molybdenum	33.4	33.4	0			
Nickel	1.6	2.0		0.4	(≤2.0)	
Potassium	11200	11200	0			
Sodium	558000	562000	1			
Strontium	3110	3200	3			
Thallium	0.040U	0.043		0.003	(≤0.200)	
Tungsten	0.45	0.50		0.05	(≤1.00)	
Uranium	53.8	53.6	0			
Vanadium	44.3	45.5	3			
Zinc	17.9	17.6		0.3	(≤10.0)	

LDC #: 22234L4
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer: QR
2nd 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 x 100 / True

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

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalculated %R	Reported %R	Acceptable (Y/N)
ICV	ICP (Initial calibration)	Mo	2009	2000	100	100	Y
	GFAA (Initial calibration)						
ICV	CVAA (Initial calibration)	Hg	5.06	500	101	101	Y
CCV5	ICP (Continuing calibration)	Sr	267	250	107	107	Y
	GFAA (Continuing calibration)						
CCV2	CVAA (Continuing calibration)	Hg	4.92	500	98	98	Y
ICV	ICP/MS (Initial calibration)	Pb	25.8	250	103	103	Y
CCV5	ICP/MS (Continuing calibation)	Pb	24.7	25.0	99	99	Y

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.

LDC #: 22234-4
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: CR
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:

$$\%R = \frac{Found}{True} \times 100$$

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:

$$RPD = \frac{|S-D|}{(S+D)/2} \times 100$$

Where, S = Original sample concentration
D = Duplicate sample concentration

An ICP serial dilution percent difference (%D) was recalculated using the following formula:

$$\%D = \frac{|I-SDR|}{I} \times 100$$

Where, I = Initial Sample Result (mg/L)
SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	Recalculated %R / RPD / %D	Reported %R / RPD / %D	Acceptable (Y/N)
ICSAB	ICP interference check	Ag	966	1000	97	97	Y
LCS	Laboratory control sample	B	1010	1000	101.0	101.0	
16	Matrix spike	Sn	(SSR-SR) 5500	5000	110	110	
17	Duplicate	Cr	11000	10500	4.7	4.7	
1	ICP serial dilution	Sr	10960	11645	6.3	6.2	

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 #: 22234-L4
SDG #: seeaver

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: CR
2nd reviewer: V

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".

Y N N/A Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments and within the linear range of the ICP?
Y N N/A Are all detection limits below the CRDL?

Detected analyte results for V were recalculated and verified using the following equation:

Concentration = $\frac{(RD)(FV)(Dil)}{(In.\ Vol.)(\%S)}$

Recalculation:

Raw data: 0.0567 mg/L (1000) = 56.7 ug/L

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor
%S = Decimal percent solids

Sample ID	Analyte	Reported Concentration (ug/L)	Calculated Concentration (ug/L)	Acceptable (Y/N)
4	Al	327	327	Y
	Ba	25.0	25.0	
	B	3730	3730	
	Ca	202000	202000	
	Cr	93.5	93.5	
	Cu	13.9	13.9	
	Fe	235	235	
	Pb	0.146	0.146	
	Mg	11500	11500	
	Mn	18.3	18.3	
	Hg	0.02	0.02	
	Mo	25.7	25.7	
	K	13000	13000	
	Na	454000	45400	
	Sr	4940	4940	
	Tl	0.109	0.109	
	Ti	12.1	12.1	
	W	0.91	0.91	
	U	10.8	10.8	
	V	56.7	56.7	
	Zn	20.7	20.5	

LDC #: 22234L4
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 2 of 2
Reviewer: CR
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".

Y N N/A Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments and within the linear range of the ICP?
Y N N/A Are all detection limits below the CRDL?

Detected analyte results for Co were recalculated and verified using the following equation:

Concentration = $\frac{(RD)(FV)(Dil)}{(In.\ Vol.)(\%S)}$

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor
%S = Decimal percent solids

Recalculation:

Raw Data: 0.2719 mg/L (1000) = 272 ug/L

Sample ID	Analyte	Reported Concentration (ug/L)	Calculated Concentration ( )	Acceptable (Y/N)
5	Al	164	164	Y
	Ba	447	447	
	B	276	276	
	Cd	0.3	0.3	
	Ca	167000	167000	
	Cr	12.0	12.0	
	Co	272	272	
	Cu	70.7	70.7	
	Fe	129	129	
	Pb	1.940	1.940	
	Mg	53700	53700	
	Mn	166	166	
	Hg	0.02	0.02	
	Mo	7.0	7.0	
	Ni	101	101	
	K	5390	5390	
	Na	139000	13900	
	Sr	3820	3820	
	Tl	0.057	0.057	
	Ti	5.2	5.2	
	W	1.24	1.24	
	U	32.1	32.1	
	V	45.9	45.9	
	Zn	18.3	18.3	

RECALC.4S2

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 26 through October 27, 2009

LDC Report Date: January 6, 2010

Matrix: Soil/Water

Parameters: Metals

Validation Level: Stage 4

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906123

Sample Identification

SA34-0.5B	RSAP7-0.5BDUP
SA34-10B	
SA34-20B	
SA34-31B	
SA34-34B	
EB102709-SO1A3	
SA140-0.5B	
SA140-10B	
SA140009-10B	
SA140-20B	
SA140-30B	
SA140-40B	
RSAP7-0.5B	
RSAP7-14B	
RSAP7-25B	
RSAP7-41B	
RSAQ7-0.5B	
RSAQ7-10B	
RSAQ7-38B	
RSAP7-0.5BMS	

Introduction

This data review covers 20 soil samples and one water sample 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
PB (prep blank)	Mercury Thallium Tungsten	0.02 ug/L 0.005 ug/L 0.02 ug/L	All water samples in SDG R0906123
ICB/CCB	Antimony Barium Boron Copper Lead Manganese Molybdenum Silver Sodium Strontium Thallium Tungsten Uranium	0.026 ug/L 1.5 ug/L 8.6 ug/L 2.3 ug/L 0.006 ug/L 0.2 ug/L 0.7 ug/L 0.7 ug/L 60 ug/L 0.2 ug/L 0.009 ug/L 0.03 ug/L 0.004 ug/L	All water samples in SDG R0906123
PB (prep blank)	Antimony Chromium Iron Magnesium Manganese Tin Tungsten	0.6 mg/Kg 0.04 mg/Kg 0.8 mg/Kg 0.3 mg/Kg 0.02 mg/Kg 3.8 mg/Kg 0.013 mg/Kg	All soil samples in SDG R0906123

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Boron Calcium Manganese Nickel Strontium	3.0 ug/L 10.0 ug/L 0.10 ug/L 0.70 ug/L 0.10 ug/L	All soil samples in SDG R0906123
ICB/CCB	Aluminum Barium Lead	2.0 ug/L 2.00 ug/L 3.0 ug/L	SA140-40B RSAP7-0.5B RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-10B RSAQ7-38B
ICB/CCB	Barium	0.70 ug/L	SA34-0.5B SA34-10B SA34-20B SA34-31B SA34-34B SA140-0.5B SA140-10B SA140009-10B SA140-20B SA140-30B
ICB/CCB	Magnesium Titanium	3.0 ug/L 0.5 ug/L	RSAQ7-38B
ICB/CCB	Magnesium	2.0 ug/L	SA140-40B RSAP7-0.5B RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-10B
ICB/CCB	Platinum Thallium	0.011 ug/L 0.024 ug/L	SA34-0.5B SA140-0.5B SA140-10B SA140009-10B RSAP7-0.5B
ICB/CCB	Tungsten	0.090 ug/L	RSAP7-0.5B
ICB/CCB	Tungsten	0.087 ug/L	SA34-0.5B SA140-0.5B SA140-10B SA140009-10B

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Tungsten	0.079 ug/L	SA34-10B SA34-20B SA34-31B SA34-34B SA140-20B SA140-30B SA140-40B RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-10B RSAQ7-38B

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
EB102709-SO1A3	Molybdenum Strontium	1.0 ug/L 1.2 ug/L	2.0U ug/L 10.0U ug/L
SA34-0.5B	Antimony Tin Platinum	1.1 mg/Kg 3.8 mg/Kg 0.008 mg/Kg	2.1U mg/Kg 10.3U mg/Kg 0.10U mg/Kg
SA34-10B	Antimony Tin	0.9 mg/Kg 3.9 mg/Kg	2.1U mg/Kg 10.6U mg/Kg
SA34-20B	Antimony Tin Tungsten	1.4 mg/Kg 3.5 mg/Kg 0.10 mg/Kg	2.1U mg/Kg 10.5U mg/Kg 0.10U mg/Kg
SA34-31B	Antimony Tin	1.0 mg/Kg 4.2 mg/Kg	2.2U mg/Kg 10.9U mg/Kg
SA34-34B	Antimony Tin	1.8 mg/Kg 1.2 mg/Kg	2.2U mg/Kg 10.8U mg/Kg
SA140-0.5B	Antimony Boron Tin Platinum	0.6 mg/Kg 3.3 mg/Kg 4.2 mg/Kg 0.008 mg/Kg	2.2U mg/Kg 10.9U mg/Kg 10.9U mg/Kg 0.11U mg/Kg
SA140-10B	Antimony Boron Tin Platinum	0.9 mg/Kg 4.6 mg/Kg 4.1 mg/Kg 0.009 mg/Kg	2.1U mg/Kg 10.5U mg/Kg 10.5U mg/Kg 0.11U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA140009-10B	Antimony Boron Tin Platinum	0.5 mg/Kg 4.3 mg/Kg 4.0 mg/Kg 0.007 mg/Kg	2.0U mg/Kg 9.9U mg/Kg 9.9U mg/Kg 0.10U mg/Kg
SA140-20B	Antimony Boron Tin	1.6 mg/Kg 6.0 mg/Kg 4.2 mg/Kg	2.1U mg/Kg 10.3U mg/Kg 10.3U mg/Kg
SA140-30B	Antimony Boron Tin	1.7 mg/Kg 5.6 mg/Kg 3.9 mg/Kg	2.0U mg/Kg 10.0U mg/Kg 10.0U mg/Kg
SA140-40B	Antimony Tin	1.5 mg/Kg 4.5 mg/Kg	2.2U mg/Kg 11.1U mg/Kg
RSAP7-0.5B	Antimony Boron Tin Platinum	1.6 mg/Kg 6.7 mg/Kg 3.7 mg/Kg 0.032 mg/Kg	2.1U mg/Kg 10.5U mg/Kg 10.5U mg/Kg 0.10U mg/Kg
RSAP7-14B	Antimony Boron Tin	1.6 mg/Kg 9.1 mg/Kg 3.9 mg/Kg	2.2U mg/Kg 10.9U mg/Kg 10.9U mg/Kg
RSAP7-25B	Antimony Boron Tin	0.9 mg/Kg 6.1 mg/Kg 3.4 mg/Kg	2.0U mg/Kg 10.1U mg/Kg 10.1U mg/Kg
RSAP7-41B	Antimony Tin Tungsten	1.1 mg/Kg 4.5 mg/Kg 0.20 mg/Kg	2.2U mg/Kg 11.0U mg/Kg 0.21U mg/Kg
RSAQ7-0.5B	Antimony Boron Tin	1.2 mg/Kg 6.6 mg/Kg 3.6 mg/Kg	2.1U mg/Kg 10.6U mg/Kg 10.6U mg/Kg
RSAQ7-10B	Antimony Boron Tin	1.4 mg/Kg 5.3 mg/Kg 4.3 mg/Kg	2.1U mg/Kg 10.7U mg/Kg 10.7U mg/Kg
RSAQ7-38B	Antimony Tin	1.3 mg/Kg 4.8 mg/Kg	2.4U mg/Kg 12.2U mg/Kg

Sample EB102709-SO1A3 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
EB102709-SO1A3	10/27/09	Aluminum Chromium Calcium Iron Lead Magnesium Manganese Molybdenum Strontium Tin Titanium	10.9 ug/L 0.7 ug/L 114 ug/L 51.3 ug/L 0.027 ug/L 22.6 ug/L 5.4 ug/L 1.0 ug/L 1.2 ug/L 2.7 ug/L 0.8 ug/L	SA140-0.5B SA140-10B SA140009-10B SA140-20B SA140-30B SA140-40B RSAP7-0.5B RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-10B RSAQ7-38B

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
SA140-0.5B	Tin	4.2 mg/Kg	10.9U mg/Kg
SA140-10B	Tin	4.1 mg/Kg	10.5U mg/Kg
SA140009-10B	Tin	4.0 mg/Kg	9.9U mg/Kg
SA140-20B	Tin	4.2 mg/Kg	10.3U mg/Kg
SA140-30B	Tin	3.9 mg/Kg	10.0U mg/Kg
SA140-40B	Tin	4.5 mg/Kg	11.1U mg/Kg
RSAP7-0.5B	Tin	3.7 mg/Kg	10.5U mg/Kg
RSAP7-14B	Tin	3.9 mg/Kg	10.9U mg/Kg
RSAP7-25B	Tin	3.4 mg/Kg	10.1U mg/Kg
RSAP7-41B	Tin	4.5 mg/Kg	11.0U mg/Kg
RSAQ7-0.5B	Tin	3.6 mg/Kg	10.6U mg/Kg
RSAQ7-10B	Tin	4.3 mg/Kg	10.7U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
RSAQ7-38B	Tin	4.8 mg/Kg	12.2U 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 soil samples in SDG R0906123

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
RSAP7-0.5BMS (All soil samples in SDG R0906123)	Antimony Selenium Tungsten	54.1 (75-125) 74.7 (75-125) 71.7 (75-125)	J- (all detects) UJ (all non-detects)	A

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (Limits)	Difference (Limits)	Flag	A or P
RSAP7-0.5BDUP (All soil samples in SDG R0906123)	Barium	23.6 (≤20)	-	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.

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 with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
RSAP7-0.5BL	Beryllium Manganese Uranium	18 (≤10) 11.2 (≤10) 13 (≤10)	All soil samples in SDG R0906123	J (all detects) UJ (all non-detects)	A

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 R0906123	All analytes reported below the PQL.	J (all detects)	A

XIII. Overall Assessment of Data

Data flags are summarized at the end of this report if data has been qualified.

XIV. Field Duplicates

Samples SA140-10B and SA140009-10B were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA140-10B	SA140009-10B				
Aluminum	9120	9230	1 (≤50)	-	-	-
Antimony	0.9	0.5	-	0.4 (≤2.1)	-	-
Arsenic	1.98	1.84	-	0.14 (≤0.54)	-	-
Barium	191	164	15 (≤50)	-	-	-
Beryllium	0.433	0.404	7 (≤50)	-	-	-
Boron	4.6	4.3	-	0.3 (≤10.5)	-	-
Cadmium	0.13	0.08	-	0.05 (≤0.11)	-	-
Calcium	25500	20000	24 (≤50)	-	-	-
Chromium	6.67	6.16	8 (≤50)	-	-	-
Cobalt	7.8	7.8	-	0 (≤2.1)	-	-
Copper	20.3	19.9	2 (≤50)	-	-	-
Iron	15500	15100	3 (≤50)	-	-	-
Lead	9.5	8.7	-	0.8 (≤2.1)	-	-
Magnesium	9320	10200	9 (≤50)	-	-	-
Manganese	448	368	20 (≤50)	-	-	-
Mercury	0.014	0.013	-	0.001 (≤0.019)	-	-
Molybdenum	0.34	0.42	-	0.08 (≤0.32)	-	-
Nickel	17	16.3	4 (≤50)	-	-	-

Compound	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA140-10B	SA140009-10B				
Platinum	0.009	0.007	-	0.002 (≤0.11)	-	-
Potassium	1870	1800	4 (≤50)	-	-	-
Sodium	625	544	14 (≤50)	-	-	-
Strontium	190	158	-	32 (≤42.1)	-	-
Thallium	0.093	0.103	-	0.01 (≤0.021)	-	-
Tin	4.1	4	-	0.1 (≤10.5)	-	-
Titanium	710	725	2 (≤50)	-	-	-
Tungsten	0.17	0.15	-	0.02 (≤0.11)	-	-
Uranium	0.706	0.684	3 (≤50)	-	-	-
Vanadium	42.9	42.2	2 (≤50)	-	-	-
Zinc	33.3	33	1 (≤50)	-	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Data Qualification Summary - SDG R0906123

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0906123	SA34-0.5B SA34-10B SA34-20B SA34-31B SA34-34B SA140-0.5B SA140-10B SA140009-10B SA140-20B SA140-30B SA140-40B RSAP7-0.5B RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-10B RSAQ7-38B	Antimony Selenium Tungsten	J- (all detects) UJ (all non-detects)	A	Matrix spike analysis (%R) (m)
R0906123	SA34-0.5B SA34-10B SA34-20B SA34-31B SA34-34B SA140-0.5B SA140-10B SA140009-10B SA140-20B SA140-30B SA140-40B RSAP7-0.5B RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-10B RSAQ7-38B	Barium	J (all detects) UJ (all non-detects)	A	Duplicate sample analysis (RPD) (ld)
R0906123	SA34-0.5B SA34-10B SA34-20B SA34-31B SA34-34B SA140-0.5B SA140-10B SA140009-10B SA140-20B SA140-30B SA140-40B RSAP7-0.5B RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-10B RSAQ7-38B	Beryllium Manganese Uranium	J (all detects) UJ (all non-detects)	A	ICP serial dilution (%D) (sd)

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0906123	SA34-0.5B SA34-10B SA34-20B SA34-31B SA34-34B EB102709-SO1A3 SA140-0.5B SA140-10B SA140009-10B SA140-20B SA140-30B SA140-40B RSAP7-0.5B RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-10B RSAQ7-38B	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 R0906123

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906123	EB102709-SO1A3	Molybdenum Strontium	2.0U ug/L 10.0U ug/L	A	bl
R0906123	SA34-0.5B	Antimony Tin Platinum	2.1U mg/Kg 10.3U mg/Kg 0.10U mg/Kg	A	bl
R0906123	SA34-10B	Antimony Tin	2.1U mg/Kg 10.6U mg/Kg	A	bl
R0906123	SA34-20B	Antimony Tin Tungsten	2.1U mg/Kg 10.5U mg/Kg 0.10U mg/Kg	A	bl
R0906123	SA34-31B	Antimony Tin	2.2U mg/Kg 10.9U mg/Kg	A	bl
R0906123	SA34-34B	Antimony Tin	2.2U mg/Kg 10.8U mg/Kg	A	bl
R0906123	SA140-0.5B	Antimony Boron Tin Platinum	2.2U mg/Kg 10.9U mg/Kg 10.9U mg/Kg 0.11U mg/Kg	A	bl

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906123	SA140-10B	Antimony Boron Tin Platinum	2.1U mg/Kg 10.5U mg/Kg 10.5U mg/Kg 0.11U mg/Kg	A	bl
R0906123	SA140009-10B	Antimony Boron Tin Platinum	2.0U mg/Kg 9.9U mg/Kg 9.9U mg/Kg 0.10U mg/Kg	A	bl
R0906123	SA140-20B	Antimony Boron Tin	2.1U mg/Kg 10.3U mg/Kg 10.3U mg/Kg	A	bl
R0906123	SA140-30B	Antimony Boron Tin	2.0U mg/Kg 10.0U mg/Kg 10.0U mg/Kg	A	bl
R0906123	SA140-40B	Antimony Tin	2.2U mg/Kg 11.1U mg/Kg	A	bl
R0906123	RSAP7-0.5B	Antimony Boron Tin Platinum	2.1U mg/Kg 10.5U mg/Kg 10.5U mg/Kg 0.10U mg/Kg	A	bl
R0906123	RSAP7-14B	Antimony Boron Tin	2.2U mg/Kg 10.9U mg/Kg 10.9U mg/Kg	A	bl
R0906123	RSAP7-25B	Antimony Boron Tin	2.0U mg/Kg 10.1U mg/Kg 10.1U mg/Kg	A	bl
R0906123	RSAP7-41B	Antimony Tin Tungsten	2.2U mg/Kg 11.0U mg/Kg 0.21U mg/Kg	A	bl
R0906123	RSAQ7-0.5B	Antimony Boron Tin	2.1U mg/Kg 10.6U mg/Kg 10.6U mg/Kg	A	bl
R0906123	RSAQ7-10B	Antimony Boron Tin	2.1U mg/Kg 10.7U mg/Kg 10.7U mg/Kg	A	bl
R0906123	RSAQ7-38B	Antimony Tin	2.4U mg/Kg 12.2U mg/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Equipment Blank Data Qualification Summary - SDG R0906123

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906123	SA140-0.5B	Tin	10.9U mg/Kg	A	be
R0906123	SA140-10B	Tin	10.5U mg/Kg	A	be
R0906123	SA140009-10B	Tin	9.9U mg/Kg	A	be
R0906123	SA140-20B	Tin	10.3U mg/Kg	A	be
R0906123	SA140-30B	Tin	10.0U mg/Kg	A	be
R0906123	SA140-40B	Tin	11.1U mg/Kg	A	be
R0906123	RSAP7-0.5B	Tin	10.5U mg/Kg	A	be
R0906123	RSAP7-14B	Tin	10.9U mg/Kg	A	be
R0906123	RSAP7-25B	Tin	10.1U mg/Kg	A	be
R0906123	RSAP7-41B	Tin	11.0U mg/Kg	A	be
R0906123	RSAQ7-0.5B	Tin	10.6U mg/Kg	A	be
R0906123	RSAQ7-10B	Tin	10.7U mg/Kg	A	be
R0906123	RSAQ7-38B	Tin	12.2U mg/Kg	A	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Field Blank Data Qualification Summary - SDG R0906123

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 4

LDC #: 22234M4
SDG #: R0906123
Laboratory: Columbia Analytical Services

Date: 12-30-09
Page: 1 of 1
Reviewer: CR
2nd Reviewer: V

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
I.	Technical holding times	A	Sampling dates: 10/26/09 - 10/27/09
II.	ICP/MS Tune	A	
III.	Calibration	A	
IV.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	SW	MS
VII.	Duplicate Sample Analysis	SW	DUP
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	A	
X.	Furnace Atomic Absorption QC	N	Not utilized
XI.	ICP Serial Dilution	SW	
XII.	Sample Result Verification	A	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	SW	(8,9)
XV	Field Blanks	SW	EB=6, FB=FB082809-SO (SDG # 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: all soil except 6 = water

1	SA34-0.5B	11	SA140-30B	21	RSAP7-0.5BDUP	31	PBW
2	SA34-10B	12	SA140-40B	22		32	PBS
3	SA34-20B	13	RSAP7-0.5B	23		33	
4	SA34-31B	14	RSAP7-14B	24		34	
5	SA34-34B	15	RSAP7-25B	25		35	
6	EB102709-SO1A3	16	RSAP7-41B	26		36	
7	SA140-0.5B	17	RSAQ7-0.5B	27		37	
8	SA140-10B	18	RSAQ7-10B	28		38	
9	SA140009-10B	19	RSAQ7-38B	29		39	
10	SA140-20B	20	RSAP7-0.5BMS	30		40	

Notes: _____

LDC #: 22234M4
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Reviewer: CR
2nd Reviewer: [signature]

Method: Metals (EPA SW 846 Method 6010/7000/6020)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Calibration				
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. Blanks				
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				
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) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were ≤ 5X the RL, including when only one of the duplicate sample values were < 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?	✓			

LDC #: 22234M4
SDG #: see cover

VALIDATION FINDINGS CHECKLIST

Reviewer: ER
2nd Reviewer: W

Validation Area	Yes	No	NA	Findings/Comments
VI. Furnace Atomic Absorption QC				
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?			✓	
VII. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the IDL?	✓			
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?	✓			
If the %Rs were outside the criteria, was a reanalysis performed?	✓			
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
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.	✓			
XII. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.	✓			
XIII. Field blanks				
Field blanks were identified in this SDG.	✓			
Target analytes were detected in the field blanks.		✓		

LDC #: 22234M4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Page: 1 of 1
Reviewer: CR
2nd reviewer: L

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-5,7-19	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
6	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
QC: 20		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
21		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
Analysis Method		
ICP	S/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
ICP-MS	S/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
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 #: 22234M4
SDG #: See Cover
METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)
Sample Concentration units, unless otherwise noted: ug/L

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES
Soil preparation factor applied: 100x
Associated Samples: All Water

Reason Code: bl

Analyte	Maximum PB[a] (ug/l)	Maximum ICB/CCB[a] (ug/l)	Action Limit	6										
Sb		0.026												
Ba		1.5												
B		8.6												
Cu		2.3												
Pb		0.006												
Hg	0.02													
Mn		0.2												
Mo		0.7		1.0 / 2.0										
Ag		0.7												
Na		60												
Sr		0.2		1.2 / 10.0										
Tl	0.005	0.009												
W	0.02	0.03												
U		0.004												

LDC #: 22234M4
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
Soil preparation factor applied: 100x
Associated Samples: All Soil
Reason Code: bl

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/l)	Action Limit	1	2	3	4	5	7	8	9	10	11	12	13	14	15	16	17	18	19
Sb	0.6			1.1 / 2.1	0.9 / 2.1	1.4 / 2.1	1.0 / 2.2	1.8 / 2.2	0.6 / 2.2	0.9 / 2.1	0.5 / 2.0	1.6 / 2.1	1.7 / 2.0	1.5 / 2.2	1.6 / 2.1	1.6 / 2.2	0.9 / 2.0	1.1 / 2.2	1.2 / 2.1	1.4 / 2.1	1.3 / 2.4
B		3.0							3.3 / 10.9	4.6 / 10.5	4.3 / 9.9	6.0 / 10.3	5.6 / 10.0		6.7 / 10.5	9.1 / 10.9	6.1 / 10.1		6.6 / 10.6	5.3 / 10.7	
Ca		10.0																			
Cr	0.04																				
Fe	0.8																				
Mg	0.3																				
Mn	0.02	0.10																			
Ni		0.70																			
Se																					
Sn	3.8			3.8 / 10.3	3.9 / 10.6	3.5 / 10.5	4.2 / 10.9	4.2 / 10.8	4.2 / 10.9	4.1 / 10.5	4.0 / 9.9	4.2 / 10.3	3.9 / 10.0	4.5 / 11.1	3.7 / 10.5	3.9 / 10.9	3.4 / 10.1	4.5 / 11.0	3.6 / 10.6	4.3 / 10.7	4.8 / 12.2
Sr		0.10																			
W	0.013					0.10 / 0.10												0.20 / 0.21			

Sample Concentration units, unless otherwise noted: mg/Kg
Associated Samples: 12-19

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/l)	Action Limit	No Qualifiers
Al		2.0		
Ba		2.00		
Pb		3.0		

Sample Concentration units, unless otherwise noted: mg/Kg
Associated Samples: 1-5, 7-11

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/l)	Action Limit	No Qualifiers
Ba		0.70		

LDC #: 22234M4
SDG #: See Cover
METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Soil preparation factor applied: 100x Reason Code: bl

Reviewer:
2nd Reviewer:

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 19

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Mg		3.0												
Ti		0.5												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 12-18

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Mg		2.0												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 1, 7-9, 13

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	1	7	8	9	13						
Pt		0.011		0.008 / 0.10	0.008 / 0.11	0.009 / 0.11	0.007 / 0.10	0.032 / 0.10						
Tl		0.024												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 13

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
W		0.090												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 1, 7-9

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
W		0.087												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 2-5, 10-12, 14-19

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	3	16									
W		0.079		See PB	See PB									

Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC #: 22234M4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: SR
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW846 6010B/7000)

Y N N/A 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 Reason Code: be

Sampling date: 10/27/09 Soil factor applied 100x

Field blank type: (circle one) Field Blank / Rinsate / Other: EB Associated Samples: 7-19

Analyte	Blank ID	Sample Identification													
	6	Action Level	7	8	9	10	11	12	13	14	15	16	17	18	19
Al	10.9														
Cr	0.7														
Ca	114	114													
Fe	51.3	51.3													
Pb	0.027	0.027													
Mg	22.6	22.6													
Mn	5.4	5.4													
Mo	1.0														
Sr	1.2														
Sn	2.7		4.2 / 10.9	4.1 / 10.5	4.0 / 9.9	4.2 / 10.3	3.9 / 10.0	4.5 / 11.1	3.7 / 10.5	3.9 / 10.9	3.4 / 10.1	4.5 / 11.0	3.6 / 10.6	4.3 / 10.7	4.8 / 12.2
Ti	0.8														

LDC #: 22234M4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 1 of 1
Reviewer: SR
2nd Reviewer: [illegible]

METHOD: Trace Metals (EPA SW846 6010B/7000)

Y N N/A Were field blanks identified in this SDG?
Y N N/A Were target analytes detected in the field blanks? Reason Code: bf

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: _____ Associated Samples: All Soil

Analyte	Blank ID	Sample Identification										
	FB082809-SO (SDG#: R0904894)	Action Level	No Qualifiers									
Al	3.3											
Ca	17											
Pb	0.006											
Mg	5.0											
Mn	0.2											
Na	39.2											
Sr	0.1											
Zn	1.0											

LDC #: 22234m4
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Page: 1 of 1
Reviewer: CR
2nd Reviewer: [illegible]

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".

Y N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y N N/A Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

Y N N/A Was a post digestion spike analyzed for ICP elements that did not meet the required criteria for matrix spike recovery?

LEVEL IV ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
	V B 20	Soil	Sb	54.1	All Soil	J-(UJ) A (m)
			Se	74.7	↓	↓
			V	71.7	↓	↓

Comments: _____

MS.4S2

LDC #: 22234M4
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Duplicate Analysis

Reviewer: AR
2nd Reviewer: [illegible]

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".

Y N N/A Was a duplicate sample analyzed for each matrix in this SDG?

Y N N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤ 35% for soil samples? If no, see qualifications below. A control limit of ±R.L. (±2X R.L for soil) was used for sample values that were <5X the R.L., including the case when only one of the duplicate sample values was <5X R.L.. If field blanks were used for laboratory duplicates, note in the Overall Assessment.

LEVEL IV ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Duplicate ID	Matrix	Analyte	RPD (Limits)	Difference (Limits)	Associated Samples	Qualifications
	21	So:1	Ba	23.6 (≤20)		All So.1	J/UJ/AC(d)

Comments:

LDC #: 22234M4
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
ICP Serial Dilution

Reviewer: CR
2nd Reviewer: L

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".

(Y) N N/A If analyte concentrations were > 50X the IDL, was an ICP serial dilution analyzed?
Y (N) N/A Were ICP serial dilution percent differences (%D) ≤10%?
Y (N) N/A Is there evidence of negative interference? If yes, professional judgement will be used to qualify the data.

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Diluted Sample ID	Matrix	Analyte	%D	Associated Samples	Qualifications
	13	Soil	Be	18	All Soil	J UJ A (sg)
			Mn	11.2	↓	↓
			U	13	↓	↓

Comments:

LDC 22234M4
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: AR
2nd Reviewer: W

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg) 8	Concentration (mg/Kg) 9	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Aluminum	9120	9230	1			
Antimony	0.9	0.5		0.4	(≤2.1)	
Arsenic	1.98	1.84		0.14	(≤0.54)	
Barium	191	164	15			
Beryllium	0.433	0.404	7			
Boron	4.6	4.3		0.3	(≤10.5)	
Cadmium	0.13	0.08		0.05	(≤0.11)	
Calcium	25500	20000	24			
Chromium	6.67	6.16	8			
Cobalt	7.8	7.8		0	(≤2.1)	
Copper	20.3	19.9	2			
Iron	15500	15100	3			
Lead	9.5	8.7		0.8	(≤2.1)	
Magnesium	9320	10200	9			
Manganese	448	368	20			
Mercury	0.014	0.013		0.001	(≤0.019)	
Molybdenum	0.34	0.42		0.08	(≤0.32)	
Nickel	17.0	16.3	4			
Platinum	0.009	0.007		0.002	(≤0.11)	

LDC#: 22234M4
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: AR
2nd Reviewer: W

METHOD: Metals (EPA Method 6020/6010/7000)

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Compound	Concentration (mg/Kg) 8	Concentration (mg/Kg) 9	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Potassium	1870	1800	4			
Sodium	625	544	14			
Strontium	190	158		32	(≤42.1)	
Thallium	0.093	0.103		0.01	(≤0.021)	
Tin	4.1	4.0		0.1	(≤10.5)	
Titanium	710	725	2			
Tungsten	0.17	0.15		0.02	(≤0.11)	
Uranium	0.706	0.684	3			
Vanadium	42.9	42.2	2			
Zinc	33.3	33.0	1			

LDC #: 22234M4
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Reviewer: GR
2nd Reviewer: [illegible]

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 / True x 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

Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	Recalculated %R	Reported %R	Acceptable (Y/N)
ICV	ICP (Initial calibration)	Ti	2058	2000	103	103	Y
	GFAA (Initial calibration)						
ICV	CVAA (Initial calibration)	Hg	4.90	5.00	98	98	Y
CCV9	ICP (Continuing calibration)	Ti	10040	10000	100	100	Y
	GFAA (Continuing calibration)						
CCV4	CVAA (Continuing calibration)	Hg	5.04	5.00	101	101	Y
ICV	ICP/MS (Initial calibration)	W	26.3	25.0	105	105	↓
CCV5	ICP/MS (Continuing calibation)	Tl	25.9	25.0	104	104	↓

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.

LDC #: 22234M4
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: CR
2nd Reviewer: [illegible]

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:

$\%R = \frac{Found}{True} \times 100$ 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:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample concentration
D = Duplicate sample concentration

An ICP serial dilution percent difference (%D) was recalculated using the following formula:

$\%D = \frac{|I-SDR|}{I} \times 100$ Where, I = Initial Sample Result (mg/L)
SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	Recalculated %R / RPD / %D	Reported %R / RPD / %D	Acceptable (Y/N)
ICSAB	ICP interference check	As	24.5	25.0	98	98	Y
LCS	Laboratory control sample	Mo	58.0	59.8	97	97	
20	Matrix spike	Ag	(SSR-SR) 10.0	10.36	96.5	96.5	
21	Duplicate	Sr	219	240	9.2	9.2	
13	ICP serial dilution	Al	45030	42355	5.9	5.9	

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 #: 22234M4
SDG #: 561661

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: CR
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".

Y N N/A Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments and within the linear range of the ICP?
Y N N/A Are all detection limits below the CRDL?

Detected analyte results for Cu were recalculated and verified using the following equation:

Concentration = $\frac{(RD)(FV)(Dil)}{(In.\ Vol.)(\%S)}$

Recalculation:

$$\frac{(0.1L)(2)(0.1296 mg/L)}{(0.917)(0.00106 kg)} = 26.7 mg/kg$$

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor
%S = Decimal percent solids

Sample ID	Analyte	Reported Concentration (mg/kg)	Calculated Concentration (mg/kg)	Acceptable (Y/N)
1	Al	9240	9240	Y
	Sb	1.1	1.1	
	As	1.59	1.59	
	Ba	167	167	
	Be	0.440	0.440	
	B	12.7	12.7	
	Ca	16100	16100	
	Cr	6.69	6.69	
	Co	8.2	8.2	
	Cu	26.7	26.7	
	Fe	16200	16200	
	Pb	10.5	10.5	
	Mg	8090	8090	
	Mn	400	400	
	Hg	0.025	0.025	
	Mo	0.33	0.33	
	Ni	15.7	15.7	
	Pt	0.008	0.008	
	K	2400	2400	
	Na	632	632	
	Sr	145	145	
	Tl	0.177	0.177	

LDC #: 22234M4
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: CP
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".

Y N N/A Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments and within the linear range of the ICP?
Y N N/A Are all detection limits below the CRDL?

Detected analyte results for Tl were recalculated and verified using the following equation:

Concentration = $\frac{(RD)(FV)(Dil)}{(In.\ Vol.)(\%S)}$

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor
%S = Decimal percent solids

Recalculation:

11 = $\frac{(0.1L)(5)\left(\frac{0.1023mg/L}{1000}\right)}{(0.934)(0.00107kg)}$ = 0.051 mg/kg

Sample ID	Analyte	Reported Concentration (mg/kg)	Calculated Concentration (mg/kg)	Acceptable (Y/N)
...1 cont	Sn	3.8	3.8	Y
	Ti	8.17	8.17	
	W	0.21	0.21	
	U	0.772	0.772	
	V	46.3	46.3	
	Zn	36.2	36.2	
11	Al	6830	6830	Y
	Sb	1.7	1.7	
	As	4.49	4.49	
	Ba	99.0	99.0	
	Be	0.297	0.296	
	B	5.6	5.6	
	Ca	19600	19600	
	Cr	5.24	5.23	
	Co	6.0	6.0	
	Cu	18.5	18.5	
	Fe	13300	13300	
	Pb	7.2	7.2	
	Mg	8740	8740	
	Mn	552	552	
	Hg	0.009	0.009	

LDC #: 22234M4
SDG #: seeaer

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: CR
2nd reviewer: [signature]

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".

Y N N/A Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments and within the linear range of the ICP?
Y N N/A Are all detection limits below the CRDL?

Detected analyte results for _____ were recalculated and verified using the following equation:

Concentration = $\frac{(RD)(FV)(Dil)}{(In.\ Vol.)(\%S)}$

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor
%S = Decimal percent solids

Recalculation:

see Previous sheet

Sample ID	Analyte	Reported Concentration (mg/kg)	Calculated Concentration (mg/kg)	Acceptable (Y/N)
...11 cont	Mo	0.32	0.32	Y
	Ni	14.0	14.0	
	Pb	0.009	0009	
	Ca	1460	1460	
	Na	744	744	
	Sr	241	241	
	Tl	0.051	0.051	
	Sn	3.9	3.9	
	Ti	662	662	
	W	0.18	0.18	
	U	1.580	1.580	
	V	44.2	442	
	Zn	30.1	30.1	

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 6, 2010

Matrix: Soil

Parameters: Metals

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
RSAS8-35BDUP

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 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)	Aluminum Calcium Cobalt Iron Magnesium Manganese Selenium Tin Tungsten Zinc	0.5 mg/Kg 3.0 mg/Kg 0.06 mg/Kg 0.7 mg/Kg 0.4 mg/Kg 0.14 mg/Kg 0.8 mg/Kg 3.5 mg/Kg 0.026 mg/Kg 0.4 mg/Kg	All samples in SDG R0906191
ICB/CCB	Aluminum Barium Boron Calcium Magnesium Manganese Nickel Strontium Titanium	2.0 ug/L 2.00 ug/L 3.0 ug/L 10.0 ug/L 3.0 ug/L 0.10 ug/L 0.70 ug/L 0.10 ug/L 0.5 ug/L	All samples in SDG R0906191
ICB/CCB	Beryllium Platinum Thallium	0.007 ug/L 0.011 ug/L 0.024 ug/L	RSAS8-10B

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Thallium	0.015 ug/L	RSAS8-0.5B RSAS8-35B
ICB/CCB	Tungsten	0.090 ug/L	RSAS8-0.5B RSAS8-10B RSAS8-35B
ICB/CCB	Tungsten	0.079 ug/L	RSAS8-25B

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
RSAS8-0.5B	Boron Tin	6.4 mg/Kg 4.1 mg/Kg	10.3U mg/Kg 10.3U mg/Kg
RSAS8-10B	Boron Selenium Tin Platinum	6.7 mg/Kg 0.9 mg/Kg 4.3 mg/Kg 0.008 mg/Kg	10.6U mg/Kg 4.2U mg/Kg 10.6U mg/Kg 0.11U mg/Kg
RSAS8-25B	Tin	4.4 mg/Kg	11.3U mg/Kg
RSAS8-35B	Selenium Tin	1.0 mg/Kg 3.8 mg/Kg	4.3U mg/Kg 10.8U 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 R0906191

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
RSAS8-35BMS (All samples in SDG R0906191)	Antimony	33.8 (75-125)	J- (all detects) UJ (all non-detects)	A
	Tungsten	54.9 (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 with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (Limits)	Difference (Limits)	Flag	A or P
RSAS8-35BDUP (All samples in SDG R0906191)	Barium	118.4 (≤20)	-	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.

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 R0906191	All analytes 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
Metals - Data Qualification Summary - SDG R0906191

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0906191	RSAS8-0.5B RSAS8-10B RSAS8-25B RSAS8-35B	Antimony Tungsten	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	A	Matrix spike analysis (%R) (m)
R0906191	RSAS8-0.5B RSAS8-10B RSAS8-25B RSAS8-35B	Barium	J (all detects) UJ (all non-detects)	A	Duplicate sample analysis (RPD) (ld)
R0906191	RSAS8-0.5B RSAS8-10B RSAS8-25B RSAS8-35B	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 R0906191

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906191	RSAS8-0.5B	Boron Tin	10.3U mg/Kg 10.3U mg/Kg	A	bl
R0906191	RSAS8-10B	Boron Selenium Tin Platinum	10.6U mg/Kg 4.2U mg/Kg 10.6U mg/Kg 0.11U mg/Kg	A	bl
R0906191	RSAS8-25B	Tin	11.3U mg/Kg	A	bl
R0906191	RSAS8-35B	Selenium Tin	4.3U mg/Kg 10.8U mg/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Metals - Field Blank Data Qualification Summary - SDG R0906191

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234N4
SDG #: R0906191
Laboratory: Columbia Analytical Services

Date: 12-30-09
Page: 1 of 1
Reviewer: CR
2nd Reviewer: W

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
I.	Technical holding times	A	Sampling dates: 10/28/09
II.	ICP/MS Tune	A	
III.	Calibration	A	
IV.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	SW	MS
VII.	Duplicate Sample Analysis	SW	Dup
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	N	Not reviewed
X.	Furnace Atomic Absorption QC	N	Not utilized
XI.	ICP Serial Dilution	A	
XII.	Sample Result Verification	N	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	N	
XV	Field Blanks	SW	FB = FB082801C1-SO (SDG# 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: Soil

1	RSAS8-0.5B	11	PBS	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	RSAS8-35BDUP	16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes: _____

LDC #: 22234N4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Reviewer: CR
2nd reviewer: [illegible]

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-4	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: 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
1 6		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
Analysis Method		
ICP	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
ICP-MS	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
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 #: 22234N4
SDG #: See Cover
METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES
Soil preparation factor applied: 100x Reason Code: bl

Reviewer: CR
2nd Reviewer: VN

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: All

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	1	2	3	4							
Al	0.5	2.0												
Ba		2.00												
B		3.0		6.4 / 10.3	6.7 / 10.6									
Ca	3.0	10.0												
Co	0.06													
Fe	0.7													
Mg	0.4	3.0												
Mn	0.14	0.10												
Ni		0.70												
Se	0.8				0.9 / 4.2		1.0 / 4.3							
Sn	3.5			4.1 / 10.3	4.3 / 10.6	4.4 / 11.3	3.8 / 10.8							
Sr		0.10												
Ti		0.5												
W	0.026													
Zn	0.4													

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 2

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	2										
Be		0.007												
Pt		0.011		0.008 / 0.11										
Tl		0.024												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 1, 4

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qualifiers										
Tl		0.015												

LDC #: 22234N4
SDG #: See Cover
METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES
Soil preparation factor applied: 100x Reason Code: bl

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 1, 2, 4

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/l)	Action Limit	No Qualifiers										
W		0.090												

Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: 3

Analyte	Maximum PB[a] (mg/Kg)	Maximum ICB/CCB[a] (ug/l)	Action Limit	No Qualifiers										
W		0.079												

Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC #: 22234N4
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: CR
2nd Reviewer:

METHOD: Trace Metals (EPA SW846 6010B/7000)
Y N N/A Were field blanks identified in this SDG?
Y N N/A Were target analytes detected in the field blanks? Reason Code: bf
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: Associated Samples: All Soil

Analyte	Blank ID	Sample Identification										
	FB082809-SO (SDG#: R0904894)	Action Level	No Qualifiers									
Al	3.3											
Ca	17											
Pb	0.006											
Mg	5.0											
Mn	0.2											
Na	39.2											
Sr	0.1											
Zn	1.0											

LDC #: 22234M4
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Reviewer: CR
2nd Reviewer: 1A

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".

(Y) N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

(Y) N N/A Was a post digestion spike analyzed for ICP elements that did not meet the required criteria for matrix spike recovery?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
	5	Soil	Sb	33.8	All	J-/UJ/A (m)
			W	54.9	↓	↓

Comments: _____

LDC #: 22234W4
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Duplicate Analysis

Reviewer: CR
2nd Reviewer: LA

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".

(Y) N N/A Was a duplicate sample analyzed for each matrix in this SDG?

Y (N) N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤ 35% for soil samples? If no, see qualifications below. A control limit of ±R.L. (±2X R.L. for soil) was used for sample values that were <5X the R.L., including the case when only one of the duplicate sample values was <5X R.L.. If field blanks were used for laboratory duplicates, note in the Overall Assessment.

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Duplicate ID	Matrix	Analyte	RPD (Limits)	Difference (Limits)	Associated Samples	Qualifications
	6	Soil	Ba	118.4 (≤20)		All	J (all J/A (6))

Comments:

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Data Validation Reports
LDC #22234

Wet Chemistry

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: August 4 through August 5, 2009

LDC Report Date: January 8, 2010

Matrix: Soil

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0904329

Sample Identification

SA146-0.5B
SA146-10B
SA146-25B
SA146009-25B
SA146-40B
SA146-55B
SA147-0.5B
SA147-10B
SA147-25B
SA147009-25B
SA147-40B
SA147-56B
RSAU5-0.5B
RSAU5-10B
RSAU5-25B
RSAU5-40B
RSAU5-40BRE
RSAU5-50B
RSAU5-50BRE
RSAU5-55B
RSAU5-55BRE

Introduction

This data review covers 21 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/Kahn 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 with the following exceptions:

Sample	Analyte	Total Time From Sample Leaching Until Analysis	Required Holding Time From Sample Leaching Until Analysis	Flag	A or P
RSAU5-40BRE	Nitrate as N	74 hours	48 hours	J- (all detects) UJ (all non-detects)	A
RSAU5-50BRE	Nitrate as N	74.25 hours	48 hours	J- (all detects) UJ (all non-detects)	A
RSAU5-55BRE	Nitrate as N	75 hours	48 hours	J- (all detects) UJ (all non-detects)	A

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. 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
8/18/09	CCV (00:29)	Hexavalent chromium	118 (90-110)	SA147-25B	J+ (all detects)	P
8/18/09	CCV (04:49)	Hexavalent chromium	121 (90-110)	SA147-25B SA147009-25B SA147-40B SA147-56B RSAU5-0.5B RSAU5-10B	J+ (all detects)	P

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
8/18/09	CCV (06:54)	Hexavalent chromium	120 (90-110)	SA147009-25B SA147-40B SA147-56B RSAU5-0.5B RSAU5-10B RSAU5-25B RSAU5-40B RSAU5-50B RSAU5-55B	J+ (all detects)	P

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 Bromide Chloride Sulfate	12 mg/Kg 12 mg/Kg 0.5 mg/Kg 1.3 mg/Kg 1.2 mg/Kg	SA146-0.5B SA146-10B SA146-25B SA146009-25B SA146-40B
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate Chloride	19 mg/Kg 19 mg/Kg 1.4 mg/Kg	SA146-55B SA147-0.5B SA147-10B SA147-25B SA147009-25B SA147-40B SA147-56B RSAU5-0.5B RSAU5-10B RSAU5-25B
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate Chloride Sulfate	22 mg/Kg 22 mg/Kg 1.5 mg/Kg 1.2 mg/Kg	RSAU5-40B RSAU5-50B RSAU5-55B
PB (prep blank)	Total organic carbon	80 mg/Kg	SA146-0.5B SA146-10B SA146-25B SA146009-25B SA146-40B SA146-55B SA147-0.5B SA147-10B SA147-25B SA147009-25B SA147-40B SA147-56B

Method Blank ID	Analyte	Concentration	Associated Samples
PB (prep blank)	Total organic carbon	70 mg/Kg	RSAU5-0.5B RSAU5-10B RSAU5-25B RSAU5-40B RSAU5-50B RSAU5-55B
ICB/CCB	Total phosphorus Total organic carbon	0.008 mg/L 116.0 mg/Kg	SA146-0.5B SA146-10B SA146-25B SA146009-25B SA146-40B SA146-55B SA147-0.5B SA147-10B SA147-25B SA147009-25B SA147-40B SA147-56B RSAU5-0.5B RSAU5-10B RSAU5-25B RSAU5-40B RSAU5-50B RSAU5-55B
PB (prep blank)	Total phosphorus	1.3 mg/Kg	SA146-40B SA146-55B SA147-0.5B SA147-10B SA147-25B SA147009-25B SA147-40B SA147-56B RSAU5-0.5B RSAU5-10B RSAU5-25B RSAU5-40B RSAU5-50B RSAU5-55B
PB (prep blank)	Total phosphorus	1.8 mg/Kg	SA146-0.5B SA146-10B SA146-25B SA146009-25B
ICB/CCB	Alkalinity, total	1.1 mg/L	RSAU5-55B

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Alkalinity, total	1.0 mg/L	SA146-10B SA146-25B SA146009-25B SA146-40B SA146-55B SA147-0.5B SA147-10B SA147-25B SA147009-25B SA147-56B RSAU5-10B RSAU5-25B RSAU5-40B RSAU5-50B
ICB/CCB	Sulfate	0.123 mg/L	SA147-0.5B
ICB/CCB	Chloride	0.163 mg/L	RSAU5-40B RSAU5-50B RSAU5-55B
ICB/CCB	Sulfate	0.089 mg/L	SA146-0.5B SA146-10B SA146-25B SA146009-25B SA146-40B SA146-55B SA147-10B SA147-25B SA147009-25B

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
SA146009-25B	Bromide	1.1 mg/Kg	1.1U mg/Kg
SA147-0.5B	Chloride	1.7 mg/Kg	2.2U mg/Kg
SA146-40B	Total organic carbon	280 mg/Kg	290U mg/Kg
SA146-55B	Total organic carbon	120 mg/Kg	290U mg/Kg
SA147-40B	Total organic carbon	190 mg/Kg	280U mg/Kg
RSAU5-25B	Total organic carbon	220 mg/Kg	290U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
RSAU5-50B	Total organic carbon	150 mg/Kg	280U mg/Kg

Sample FB080309-SO (from SDG R0904279) 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
FB080309-SO	8/3/09	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Total organic carbon Chloride Nitrate as N pH Total phosphorus Sulfate Surfactants	3.0 mg/L 3.0 mg/L 0.113 mg/L 1.2 mg/L 3.9 mg/L 0.65 mg/L 6.48 units 0.015 mg/L 1.6 mg/L 0.043 mg/L	SA146-0.5B SA146-10B SA146-25B SA146009-25B SA146-40B SA146-55B SA147-0.5B SA147-10B SA147-25B SA147009-25B SA147-40B SA147-56B RSAU5-0.5B RSAU5-10B RSAU5-25B RSAU5-40B RSAU5-50B RSAU5-55B
FB080309-SO	8/3/09	Nitrate as N	0.65 mg/L	RSAU5-40BRE RSAU5-50BRE RSAU5-55BRE

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
SA146-0.5B	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Chloride Nitrate as N Surfactants	130 mg/Kg 130 mg/Kg 1.11 mg/Kg 296 mg/Kg 8.62 mg/Kg 1.2 mg/Kg	130J+ mg/Kg 130J+ mg/Kg 1.11J+ mg/Kg 296J+ mg/Kg 8.62J+ mg/Kg 2.1U mg/Kg
SA146-10B	Alkalinity, total Alkalinity, bicarbonate Chloride Nitrate as N Surfactants	254 mg/Kg 254 mg/Kg 266 mg/Kg 15.3 mg/Kg 3.6 mg/Kg	254J+ mg/Kg 254J+ mg/Kg 266J+ mg/Kg 15.3J+ mg/Kg 3.6J+ mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA146-25B	Chloride Nitrate as N	293 mg/Kg 4.60 mg/Kg	293J+ mg/Kg 4.60J+ mg/Kg
SA146009-25B	Alkalinity, total Alkalinity, bicarbonate Chloride Nitrate as N Surfactants	249 mg/Kg 246 mg/Kg 247 mg/Kg 5.88 mg/Kg 1.9 mg/Kg	249J+ mg/Kg 246J+ mg/Kg 247J+ mg/Kg 5.88J+ mg/Kg 2.1U mg/Kg
SA146-40B	Total organic carbon Nitrate as N Surfactants	280 mg/Kg 8.29 mg/Kg 1.2 mg/Kg	290U mg/Kg 8.29J+ mg/Kg 2.6U mg/Kg
SA146-55B	Total organic carbon Chloride Nitrate as N Surfactants	120 mg/Kg 86.9 mg/Kg 2.03 mg/Kg 0.7 mg/Kg	290U mg/Kg 86.9J+ mg/Kg 2.03J+ mg/Kg 2.8U mg/Kg
SA147-0.5B	Chloride Nitrate as N Surfactants	1.7 mg/Kg 1.48 mg/Kg 0.8 mg/Kg	2.2U mg/Kg 1.48J+ mg/Kg 2.2U mg/Kg
SA147-10B	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Chloride Nitrate as N Surfactants	222 mg/Kg 222 mg/Kg 0.45 mg/Kg 5.1 mg/Kg 1.17 mg/Kg 1.5 mg/Kg	222J+ mg/Kg 222J+ mg/Kg 0.55U mg/Kg 5.1J+ mg/Kg 1.17J+ mg/Kg 2.2U mg/Kg
SA147-25B	Alkalinity, total Alkalinity, bicarbonate Chloride Nitrate as N	273 mg/Kg 273 mg/Kg 106 mg/Kg 1.93 mg/Kg	273J+ mg/Kg 273J+ mg/Kg 106J+ mg/Kg 1.93J+ mg/Kg
SA147009-25B	Chloride Nitrate as N Surfactants	160 mg/Kg 2.66 mg/Kg 0.8 mg/Kg	160J+ mg/Kg 2.66J+ mg/Kg 2.2U mg/Kg
SA147-40B	Alkalinity, total Alkalinity, bicarbonate Total organic carbon Chloride Nitrate as N	182 mg/Kg 182 mg/Kg 190 mg/Kg 309 mg/Kg 6.22 mg/Kg	182J+ mg/Kg 182J+ mg/Kg 280U mg/Kg 309J+ mg/Kg 6.22J+ mg/Kg
SA147-56B	Chloride Nitrate as N Surfactants	39.4 mg/Kg 1.44 mg/Kg 1.8 mg/Kg	39.4J+ mg/Kg 1.44J+ mg/Kg 2.8U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
RSAU5-0.5B	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Chloride Nitrate as N	136 mg/Kg 136 mg/Kg 1.05 mg/Kg 334 mg/Kg 9.80 mg/Kg	136J+ mg/Kg 136J+ mg/Kg 1.05J+ mg/Kg 334J+ mg/Kg 9.80J+ mg/Kg
RSAU5-10B	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Chloride Nitrate as N Surfactants	246 mg/Kg 246 mg/Kg 0.57 mg/Kg 103 mg/Kg 3.64 mg/Kg 1.3 mg/Kg	246J+ mg/Kg 246J+ mg/Kg 0.57J+ mg/Kg 103J+ mg/Kg 3.64J+ mg/Kg 2.1U mg/Kg
RSAU5-25B	Alkalinity, total Alkalinity, bicarbonate Total organic carbon Chloride Nitrate as N	34 mg/Kg 34 mg/Kg 220 mg/Kg 12.3 mg/Kg 1.19 mg/Kg	34J+ mg/Kg 34J+ mg/Kg 290U mg/Kg 12.3J+ mg/Kg 1.19J+ mg/Kg
RSAU5-40B	Alkalinity, total Alkalinity, bicarbonate Chloride Nitrate as N Surfactants	252 mg/Kg 252 mg/Kg 33.4 mg/Kg 1.35 mg/Kg 1.6 mg/Kg	252J+ mg/Kg 252J+ mg/Kg 33.4J+ mg/Kg 1.35J+ mg/Kg 2.5U mg/Kg
RSAU5-40BRE	Nitrate as N	1.30 mg/Kg	1.30J+ mg/Kg
RSAU5-50B	Alkalinity, total Alkalinity, bicarbonate Total organic carbon Chloride Nitrate as N Surfactants	116 mg/Kg 116 mg/Kg 150 mg/Kg 35.3 mg/Kg 1.55 mg/Kg 1.3 mg/Kg	116J+ mg/Kg 116J+ mg/Kg 280U mg/Kg 35.3J+ mg/Kg 1.55J+ mg/Kg 2.5U mg/Kg
RSAU5-50BRE	Nitrate as N	1.50 mg/Kg	1.50J+ mg/Kg
RSAU5-55B	Chloride Nitrate as N Surfactants	52.8 mg/Kg 2.69 mg/Kg 2.4 mg/Kg	52.8J+ mg/Kg 2.69J+ mg/Kg 2.7U mg/Kg
RSAU5-55BRE	Nitrate as N	2.72 mg/Kg	2.72J+ mg/Kg

IV. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) analyses specified for the samples in this SDG, and therefore matrix spike analyses were not performed for this SDG.

V. Duplicates

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

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 R0904329	All analytes reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

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
RSAU5-40BRE RSAU5-50BRE RSAU5-55BRE	All TCL compounds	X	A

Data flags are summarized at the end of this report if data has been qualified.

X. Field Duplicates

Samples SA146-25B and SA146009-25B and samples SA147-25B and SA147009-25B were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA146-25B	SA146009-25B				
Alkalinity, total	471 mg/Kg	246 mg/Kg	63 (≤50)	-	J (all detects)	A
Alkalinity, bicarbonate	450 mg/Kg	246 mg/Kg	59 (≤50)	-	J (all detects)	A
Alkalinity, carbonate	21 mg/Kg	3U mg/Kg	-	18 (≤22)	-	-
Chloride	293 mg/Kg	247 mg/Kg	17 (≤50)	-	-	-
Nitrate as N	4.60 mg/Kg	5.88 mg/Kg	24 (≤50)	-	-	-
Bromide	1.3 mg/Kg	1.1 mg/Kg	-	0.2 (≤1.1)	-	-
pH	8.62 units	8.14 units	6 (≤50)	-	-	-
Sulfate	419 mg/Kg	2940 mg/Kg	150 (≤50)	-	J (all detects)	A
Surfactants	0.6U mg/Kg	1.9 mg/Kg	-	1.3 (≤2.2)	-	-
Total organic carbon	510 mg/Kg	670 mg/Kg	-	160 (≤290)	-	-
Total phosphorus	388 mg/Kg	490 mg/Kg	23 (≤50)	-	-	-
Chlorate	44U ug/Kg	117 ug/Kg	-	73 (≤220)	-	-
Perchlorate	146 ug/Kg	112 ug/Kg	-	34 (≤54)	-	-

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA147-25B	SA147009-25B				
Alkalinity, total	273 mg/Kg	334 mg/Kg	20 (≤50)	-	-	-
Alkalinity, bicarbonate	273 mg/Kg	334 mg/Kg	20 (≤50)	-	-	-
Chloride	106 mg/Kg	160 mg/Kg	41 (≤50)	-	-	-
Nitrate as N	1.93 mg/Kg	2.66 mg/Kg	32 (≤50)	-	-	-
Nitrite as N	0.37 mg/Kg	0.39 mg/Kg	-	0.02 (≤0.11)	-	-

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA147-25B	SA147009-25B				
pH	8.07 units	8.04 units	0 (≤50)	-	-	-
Sulfate	2790 mg/Kg	5260 mg/Kg	61 (≤50)	-	J (all detects)	A
Surfactants	0.6U mg/Kg	0.8 mg/Kg	-	0.2 (≤2.2)	-	-
Total organic carbon	480 mg/Kg	630 mg/Kg	27 (≤50)	-	-	-
Total phosphorus	769 mg/Kg	624	21 (≤50)	-	-	-
Perchlorate	149 ug/Kg	285 ug/Kg	-	136 (≤56)	J (all detects)	A

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Data Qualification Summary - SDG R0904329

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0904329	RSAU5-40BRE RSAU5-50BRE RSAU5-55BRE	Nitrate as N	J- (all detects) UJ (all non-detects)	A	Technical holding times (h)
R0904329	SA147-25B SA147009-25B SA147-40B SA147-56B RSAU5-0.5B RSAU5-10B RSAU5-25B RSAU5-40B RSAU5-50B RSAU5-55B	Hexavalent chromium	J+ (all detects)	P	Calibration (CCV %R) (c)
R0904329	SA146-0.5B SA146-10B SA146-25B SA146009-25B SA146-40B SA146-55B SA147-0.5B SA147-10B SA147-25B SA147009-25B SA147-40B SA147-56B RSAU5-0.5B RSAU5-10B RSAU5-25B RSAU5-40B RSAU5-40BRE RSAU5-50B RSAU5-50BRE RSAU5-55B RSAU5-55BRE	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)
R0904329	RSAU5-40BRE RSAU5-50BRE RSAU5-55BRE	All TCL compounds	X	A	Overall assessment of data (o)
R0904329	SA146-25B SA146009-25B	Alkalinity, total Alkalinity, bicarbonate Sulfate	J (all detects) J (all detects) J (all detects)	A	Field duplicates (RPD) (fd)
R0904329	SA147-25B SA147009-25B	Sulfate	J (all detects)	A	Field duplicates (RPD) (fd)
R0904329	SA147-25B SA147009-25B	Perchlorate	J (all detects)	A	Field duplicates (Difference) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R0904329

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0904329	SA146009-25B	Bromide	1.1U mg/Kg	A	bl
R0904329	SA147-0.5B	Chloride	2.2U mg/Kg	A	bl
R0904329	SA146-40B	Total organic carbon	290U mg/Kg	A	bl
R0904329	SA146-55B	Total organic carbon	290U mg/Kg	A	bl
R0904329	SA147-40B	Total organic carbon	280U mg/Kg	A	bl
R0904329	RSAU5-25B	Total organic carbon	290U mg/Kg	A	bl
R0904329	RSAU5-50B	Total organic carbon	280U mg/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Field Blank Data Qualification Summary - SDG R0904329

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0904329	SA146-0.5B	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Chloride Nitrate as N Surfactants	130J+ mg/Kg 130J+ mg/Kg 1.11J+ mg/Kg 296J+ mg/Kg 8.62J+ mg/Kg 2.1U mg/Kg	A	bf
R0904329	SA146-10B	Alkalinity, total Alkalinity, bicarbonate Chloride Nitrate as N Surfactants	254J+ mg/Kg 254J+ mg/Kg 266J+ mg/Kg 15.3J+ mg/Kg 3.6J+ mg/Kg	A	bf
R0904329	SA146-25B	Chloride Nitrate as N	293J+ mg/Kg 4.60J+ mg/Kg	A	bf
R0904329	SA146009-25B	Alkalinity, total Alkalinity, bicarbonate Chloride Nitrate as N Surfactants	249J+ mg/Kg 246J+ mg/Kg 247J+ mg/Kg 5.88J+ mg/Kg 2.1U mg/Kg	A	bf

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0904329	SA146-40B	Total organic carbon Nitrate as N Surfactants	290U mg/Kg 8.29J+ mg/Kg 2.6U mg/Kg	A	bf
R0904329	SA146-55B	Total organic carbon Chloride Nitrate as N Surfactants	290U mg/Kg 86.9J+ mg/Kg 2.03J+ mg/Kg 2.8U mg/Kg	A	bf
R0904329	SA147-0.5B	Chloride Nitrate as N Surfactants	2.2U mg/Kg 1.48J+ mg/Kg 2.2U mg/Kg	A	bf
R0904329	SA147-10B	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Chloride Nitrate as N Surfactants	222J+ mg/Kg 222J+ mg/Kg 0.55U mg/Kg 5.1J+ mg/Kg 1.17J+ mg/Kg 2.2U mg/Kg	A	bf
R0904329	SA147-25B	Alkalinity, total Alkalinity, bicarbonate Chloride Nitrate as N	273J+ mg/Kg 273J+ mg/Kg 106J+ mg/Kg 1.93J+ mg/Kg	A	bf
R0904329	SA147009-25B	Chloride Nitrate as N Surfactants	160J+ mg/Kg 2.66J+ mg/Kg 2.2U mg/Kg	A	bf
R0904329	SA147-40B	Alkalinity, total Alkalinity, bicarbonate Total organic carbon Chloride Nitrate as N	182J+ mg/Kg 182J+ mg/Kg 280U mg/Kg 309J+ mg/Kg 6.22J+ mg/Kg	A	bf
R0904329	SA147-56B	Chloride Nitrate as N Surfactants	39.4J+ mg/Kg 1.44J+ mg/Kg 2.8U mg/Kg	A	bf
R0904329	RSAU5-0.5B	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Chloride Nitrate as N	136J+ mg/Kg 136J+ mg/Kg 1.05J+ mg/Kg 334J+ mg/Kg 9.80J+ mg/Kg	A	bf
R0904329	RSAU5-10B	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Chloride Nitrate as N Surfactants	246J+ mg/Kg 246J+ mg/Kg 0.57J+ mg/Kg 103J+ mg/Kg 3.64J+ mg/Kg 2.1U mg/Kg	A	bf

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0904329	RSAU5-25B	Alkalinity, total Alkalinity, bicarbonate Total organic carbon Chloride Nitrate as N	34J+ mg/Kg 34J+ mg/Kg 290U mg/Kg 12.3J+ mg/Kg 1.19J+ mg/Kg	A	bf
R0904329	RSAU5-40B	Alkalinity, total Alkalinity, bicarbonate Chloride Nitrate as N Surfactants	252J+ mg/Kg 252J+ mg/Kg 33.4J+ mg/Kg 1.35J+ mg/Kg 2.5U mg/Kg	A	bf
R0904329	RSAU5-40BRE	Nitrate as N	1.30J+ mg/Kg	A	bf
R0904329	RSAU5-50B	Alkalinity, total Alkalinity, bicarbonate Total organic carbon Chloride Nitrate as N Surfactants	116J+ mg/Kg 116J+ mg/Kg 280U mg/Kg 35.3J+ mg/Kg 1.55J+ mg/Kg 2.5U mg/Kg	A	bf
R0904329	RSAU5-50BRE	Nitrate as N	1.50J+ mg/Kg	A	bf
R0904329	RSAU5-55B	Chloride Nitrate as N Surfactants	52.8J+ mg/Kg 2.69J+ mg/Kg 2.7U mg/Kg	A	bf
R0904329	RSAU5-55BRE	Nitrate as N	2.72J+ mg/Kg	A	bf

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234A6
SDG #: R0904329
Laboratory: Columbia Analytical Services

Date: 12-31-09
Page: 1 of 1
Reviewer: CR
2nd Reviewer: V

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), ~~Dissolved Hexavalent Chromium (EPA Method 218.6)~~, 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: 8/4/09 - 8/5/09
IIa.	Initial calibration	A	
IIb.	Calibration verification	SW	
III.	Blanks	SW	
IV	Surrogate Spikes	A	
V	Matrix Spike/Matrix Spike Duplicates	N	client specified
VI.	Duplicates	N	
VII.	Laboratory control samples	A	LCS/D
VIII.	Sample result verification	N	
IX.	Overall assessment of data	SW	
X.	Field duplicates	SW	(3,4), (9,10)
XI	Field blanks	SW	FB= FB090309-SO (SDG# R0904279)

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

ND = No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Soil

1	SA146-0.5B	11	SA147-40B	21	RSAU5-55BRE	31	PBS
2	SA146-10B	12	SA147-56B	22		32	
3	SA146-25B	13	RSAU5-0.5B	23		33	
4	SA146009-25B	14	RSAU5-10B	24		34	
5	SA146-40B	15	RSAU5-25B	25		35	
6	SA146-55B	16	RSAU5-40B	26		36	
7	SA147-0.5B	17	RSAU5-40BRE	27		37	
8	SA147-10B	18	RSAU5-50B	28		38	
9	SA147-25B	19	RSAU5-50BRE	29		39	
10	SA147009-25B	20	RSAU5-55B	30		40	

Notes:

LDC #: 22234A6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: CR
2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1-16,18,20	soil	[✓ 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]
17,19,21		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

Comments:

LDC #: 22234A6
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Page: 1 of 1
Reviewer: CR
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?

Method:		9056					
Parameters:		NO_3-N					
Technical holding time:		48hrs *					
Sample ID	~~Sampling~~ Leach date	Analysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier
17	8/14/09 14:57	8/17/09 16:58	(74hrs)				J-/UJ/ (h) A
19	↓	17:14	(74.25hrs)				↓
21	↓	18:03	(75hrs)				↓

HT.6

*Reanalysis from leaching to analysis

LDC #: 22234A6
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Calibration

Reviewer: CR
2nd Reviewer: [illegible]

METHOD: Inorganics, EPA 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 instruments calibrated daily, each set-up time, and were the proper number of standards used?
Y N N/A Were all initial and continuing calibration verification percent recoveries (%R) within the control limits of 90-110% ?
Y N N/A Are all correlation coefficients ≥0.995 ?

LEVEL IV/D ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recaluculation Worksheet for recalulations.
Y N N/A Was a balance check conducted prior to the TDS analysis.?
Y N N/A Was the titrant normality checked?

#	Date	Calibration ID	Analyte	%R	Associated Samples	Qualifications
	8/18/09	CCV (00:29)	Cr6+	118	9	J+ det /P(C)
		(04:49)		121	9-14	
		(06:54)		120	10-16, 18, 20	

Comments:

LDC #: 22234A6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: GR
2nd 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?

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/Kg **Associated Samples:** 1-5

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			4									
Alk., Total	12												
Alk., Bicarb.	12												
Br	0.5			1.1 / 1.1									
Cl	1.3												
SO4	1.2												

Conc. units: mg/Kg **Associated Samples:** 6-15

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			7									
Alk., Total	19												
Alk., Bicarb.	19												
Cl	1.4			1.7 / 2.2									

LDC #: 22234A6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CR
2nd Reviewer: [illegible]

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?
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/Kg **Associated Samples:** 16, 18, 20

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Alk., Total	22		220										
Alk., Bicarb.	22		220										
Cl	1.5												
SO4	1.2												

Conc. units: mg/Kg **Associated Samples:** 1-12

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			5	6	11							
TOC	80			280 / 290	120 / 290	190 / 280							

Conc. units: mg/Kg **Associated Samples:** 13-16, 18, 20

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			15	18								
TOC	70			220 / 290	150 / 280								

LDC #: 22234A6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CP
2nd Reviewer: [illegible]

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?
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/Kg **Associated Samples:** 1-16, 18, 20

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			5	6	11	15	18					
T-P		0.008											
TOC		116.0 mg/Kg		See PB	See PB	See PB	See PB	See PB					

Conc. units: mg/Kg **Associated Samples:** 5-16, 18, 20

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
T-P	1.3												

Conc. units: mg/Kg **Associated Samples:** 1-4

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
T-P	1.8												

Conc. units: mg/Kg **Associated Samples:** 20

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Alk., Total	~~1.1~~ CB	1.1											

LDC #: 22234A6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CR
2nd 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?
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/Kg **Associated Samples:** 2-10, 12, 14-16, 18

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Alk., Total	~~1.0~~	1.0											

Conc. units: mg/Kg **Associated Samples:** 7

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
SO4		0.123											

Conc. units: mg/Kg **Associated Samples:** 16, 18, 20

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.163											

Conc. units: mg/Kg **Associated Samples:** 1-6, 8-10

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
SO4		0.089											

LDC #: 22234A6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 1 of 1
Reviewer: CR
2nd Reviewer:

METHOD: Inorganics, Method See Cover
Y N N/A 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 Reason Code: bf
Sampling date: 8/3/09 ~~Soil factor~~ applied 10X except TOC 1X
Field blank type: (circle one) Field Blank / Rinsate / Other: FB Associated Samples: 1-16, 18, 20=All. 17, 19, 21=NO3 only.

Analyte	Blank ID	Sample Identification																				
	FB080309-SO (SDG# R0904279)	Action Level	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Total alkalinity	3.0	300	130 J+	254 J+		249 J+				222 J+	273 J+		182 J+		136 J+	246 J+	34 J+	252 J+		116 J+			
Bicarbonate alkalinity	3.0	300	130 J+	254 J+		246 J+				222 J+	273 J+		182 J+		136 J+	246 J+	34 J+	252 J+		116 J+			
Ammonia as N	0.113	11.3	1.11 J+							0.45/ 0.55					1.05 J+	0.57 J+							
TOC (average)	1.2						280 / 290	120 / 290					190 / 280				220 / 290			150 / 280			
Cl	3.9	390	296 J+	266 J+	293 J+	247 J+		86.9 J+	1.7 / 2.2	5.1 J+	106 J+	160 J+	309 J+	39.4 J+	334 J+	103 J+	12.3 J+	33.4 J+		35.3 J+		52.8 J+	
Nitrate as N	0.65	65	8.62 J+	15.3 J+	4.60 J+	5.88 J+	8.29 J+	2.03 J+	1.48 J+	1.17 J+	1.93 J+	2.66 J+	6.22 J+	1.44 J+	9.80 J+	3.64 J+	1.19 J+	1.35 J+	1.30 J+	1.55 J+	1.50 J+	2.69 J+	2.72 J+
pH (pH Units)	6.48																						
Total Phosphorus	0.015																						
~~TDS~~	~~22~~	not reported			this	SDG																	
Sulfate	1.6																						
Surfactants	0.043	4.3	1.2 / 2.1	3.6 J+		1.9 / 2.1	1.2 / 2.6	0.7 / 2.8	0.8 / 2.2	1.5 / 2.2		0.8 / 2.2		1.8 / 2.8		1.3 / 2.1		1.6 / 2.5		1.3 / 2.5		2.4 / 2.7	

LDC #: 22234A6
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: CR2
2nd Reviewer: VN

METHOD: Inorganics, Method see cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		17,19,21	NO_3-N (reanalysis not necessary)		X(o)

Comments:

LDC#: 22234A6
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer: [illegible]

Inorganics, Method See Cover

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Analyte	Concentration (mg/Kg) 3	Concentration (mg/Kg) 4	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Total Alkalinity	471	246	63			Jdet/A (fd)
Bicarbonate Alkalinity	450	246	59			Jdet/A (fd)
Carbonate Alkalinity	21	3U		18	(≤22)	
Chloride	293	247	17			
Nitrate as N	4.60	5.88	24			
Bromide	1.3	1.1		0.2	(≤1.1)	
pH (pH Units)	8.62	8.14	6			
Sulfate	419	2940	150			Jdet/A (fd)
Surfactants	0.6U	1.9		1.3	(≤2.2)	
TOC	510	670		160	(≤290)	
Total Phosphorus	388	490	23			
Chlorate (ug/Kg)	44U	117		73	(≤220)	
Perchlorate (ug/Kg)	146	112		34	(≤54)	

LDC#: 22234A6
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer: V

Inorganics, Method See Cover

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Analyte	Concentration (mg/Kg)		RPD (≤50)	Difference	Limits	Qualification (Parent only)
	9	10				
Total Alkalinity	273	334	20			
Bicarbonate Alkalinity	273	334	20			
Chloride	106	160	41			
Nitrate as N	1.93	2.66	32			
Nitrite as N	0.37	0.39		0.02	(≤0.11)	
pH (pH Units)	8.07	8.04	0			
Sulfate	2790	5260	61			Jdet/A (fd)
Surfactants	0.6U	0.8		0.2	(≤2.2)	
TOC	480	630	27			
Total Phosphorus	769	624	21			
Perchlorate (ug/Kg)	149	285		136	(≤56)	Jdet/A (fd)

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: September 24 through September 25, 2009

LDC Report Date: December 29, 2009

Matrix: Water

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905462

Sample Identification

M-89B
M-2AB
M-2009AB
FiltB092509-A2
M-89BMS
M-89BMSD
M-89BDUP

Introduction

This data review covers 7 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 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.

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
FiltB092509-A2	Hexavalent chromium	26.5 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.

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 Total phosphorus Cyanide Sulfate	1.7 mg/L 1.7 mg/L 0.006 mg/L 0.026 mg/L 0.13 mg/L	M-89B M-2AB M-2009AB
ICB/CCB	Alkalinity, total Total phosphorus Sulfate Ammonia as N	1.9 mg/L 0.0166 mg/L 0.192 mg/L 0.0161 mg/L	M-89B M-2AB M-2009AB
PB (prep blank)	Total organic carbon	0.2 mg/L	M-2AB M-2009AB
ICB/CCB	Total organic carbon Nitrite as N	0.118 mg/L 0.0071 mg/L	M-2AB M-2009AB

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Nitrite as N	0.0070 mg/L	M-89B

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-89B	Total phosphorus	0.030 mg/L	0.050U mg/L
M-2AB	Total phosphorus Ammonia as N	0.029 mg/L 0.023 mg/L	0.050U mg/L 0.050U mg/L
M-2009AB	Total phosphorus	0.030 mg/L	0.050U mg/L

Sample FB080409-GW (from SDG R0904290) 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
FB080409-GW	8/4/09	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Total organic carbon Chloride pH Total phosphorus Sulfate	1.9 mg/L 1.9 mg/L 0.035 mg/L 0.2 mg/L 1.3 mg/L 5.89 units 0.014 mg/L 0.9 mg/L	M-89B M-2AB M-2009AB

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-89B	Total phosphorus	0.030 mg/L	0.050U mg/L
M-2AB	Total phosphorus Ammonia as N	0.029 mg/L 0.023 mg/L	0.050U mg/L 0.050U mg/L
M-2009AB	Total phosphorus	0.030 mg/L	0.050U mg/L

Sample PB100209-A2 (from SDG R0905636) 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
PB100209-A2	10/2/09	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Chloride Conductivity pH Total phosphorus	1.1 mg/L 1.1 mg/L 0.025 mg/L 0.9 mg/L 1.84 umhos/cm 6.49 units 0.007 mg/L	M-89B M-2AB M-2009AB

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-89B	Total phosphorus	0.030 mg/L	0.050U mg/L
M-2AB	Ammonia as N Total phosphorus	0.023 mg/L 0.029 mg/L	0.050U mg/L 0.050U mg/L
M-2009AB	Total phosphorus	0.030 mg/L	0.050U mg/L

Samples MC-3B-FILT (from SDG R0902886) and FiltB092509-A2 were identified as filter blanks. No contaminant concentrations were found in these blanks.

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
M-89BMS (M-89B M-2AB M-2009AB)	Cyanide	11 (75-125)	-	-	J- (all detects) R (all non-detects)	A
M-89BMS (M-89B M-2AB M-2009AB)	Nitrate as N Sulfate	71 (75-125) 35 (75-125)	- -	- -	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	A

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.

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 R0905462	All analytes reported below the PQL.	J (all detects)	A

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-2AB and M-2009AB were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-2AB	M-2009AB				
Ammonia as N	0.023 mg/L	0.202 mg/L	-	0.179 (≤0.050)	J (all detects)	A
Alkalinity, total	109 mg/L	109 mg/L	0 (≤30)	-	-	-
Alkalinity, bicarbonate	109 mg/L	109 mg/L	0 (≤30)	-	-	-
Bromide	0.3U mg/L	1.7 mg/L	-	1.4 (≤2.0)	-	-

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-2AB	M-2009AB				
Chloride	1460 mg/L	1360 mg/L	7 (≤30)	-	-	-
Conductivity	11700 umhos/cm	12100 umhos/cm	3 (≤30)	-	-	-
Hexavalent chromium	20.6 mg/L	21.9 mg/L	6 (≤30)	-	-	-
Nitrate as N	15.2 mg/L	15.0 mg/L	1 (≤30)	-	-	-
Nitrite as N	0.190 mg/L	0.170 mg/L	11 (≤30)	-	-	-
pH	6.92 units	7.01 units	1 (≤30)	-	-	-
Sulfate	1250 mg/L	1160 mg/L	7 (≤30)	-	-	-
Surfactants	1.67 mg/L	1.67 mg/L	0 (≤30)	-	-	-
Total dissolved solids	11100 mg/L	11300 mg/L	2 (≤30)	-	-	-
Total organic carbon	1.4 mg/L	1.4 mg/L	-	0 (≤1.0)	-	-
Total phosphorus	0.029 mg/L	0.030 mg/L	-	0.001 (≤0.050)	-	-
Total suspended solids	1.5 mg/L	1.0U mg/L	-	0.5 (≤1.0)	-	-
Chlorate	4700000 ug/L	4720000 ug/L	-	20000 (≤1000000)	-	-
Perchlorate	545000 ug/L	552000 ug/L	1 (≤30)	-	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Data Qualification Summary - SDG R0905462

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0905462	FiltB092509-A2	Hexavalent chromium	J- (all detects) UJ (all non-detects)	P	Technical holding times (h)
R0905462	M-89B M-2AB M-2009AB	Cyanide	J- (all detects) R (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R) (m)
R0905462	M-89B M-2AB M-2009AB	Nitrate as N Sulfate	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R) (m)
R0905462	M-89B M-2AB M-2009AB FiltB092509-A2	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)
R0905462	M-2AB M-2009AB	Ammonia as N	J (all detects)	A	Field duplicates (Difference) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R0905462

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905462	M-89B	Total phosphorus	0.050U mg/L	A	bl
R0905462	M-2AB	Total phosphorus Ammonia as N	0.050U mg/L 0.050U mg/L	A	bl
R0905462	M-2009AB	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 R0905462

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905462	M-89B	Total phosphorus	0.050U mg/L	A	bf
R0905462	M-2AB	Total phosphorus Ammonia as N	0.050U mg/L 0.050U mg/L	A	bf

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905462	M-2009AB	Total phosphorus	0.050U mg/L	A	bf

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Pump Blank Data Qualification Summary - SDG R0905462

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905462	M-89B	Total phosphorus	0.050U mg/L	A	bp
R0905462	M-2AB	Ammonia as N Total phosphorus	0.050U mg/L 0.050U mg/L	A	bp
R0905462	M-2009AB	Total phosphorus	0.050U mg/L	A	bp

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Filter Blank Data Qualification Summary - SDG R0905462

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234B6
SDG #: R0905462
Laboratory: Columbia Analytical Services

Date: 12-24-09
Page: 1 of 1
Reviewer: CB
2nd Reviewer: [illegible]

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), 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), TDS(SM2540C), TSS(~~SM2540D~~)(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: 9/24/09-9/25/09
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	SW	
IV	Surrogate Spikes	A	
V	Matrix Spike/Matrix Spike Duplicates	SW	MS/D
VI.	Duplicates	A	DUP
VII.	Laboratory control samples	A	LCS
VIII.	Sample result verification	N	
IX.	Overall assessment of data	A	
X.	Field duplicates	SW	(2,3)
XI	Field blanks	SW	FilterBlank=4, FB=FB090409-GW FilterBlank=MC-3B-FILT (SDG# R0902588) (SDG# R0904290) (See below)

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-89B	11	PBW	21		31	
2	M-2AB	12		22		32	
3	M-2009AB	13		23		33	
4	FiltB092509-A2	14		24		34	
5	M-89BMS	15		25		35	
6	M-89BMSD	16		26		36	
7	M-89BDUP	17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes: Pump Blank = PB100209-A2 (SDG# R0905636)

LDC #: 22234B6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: CR
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]
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
QC: 5		[✓ 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]
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]
7		[✓ 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 #: 22234B6
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Page: 1 of 1
Reviewer: CR
2nd reviewer: V

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?

Method:		7199					
Parameters:		Cr6+					
Technical holding time:		24hrs					
Sample ID	**Sampling date**	**Analysis date**	**Analysis date**	**Analysis date**	**Analysis date**	**Analysis date**	**Qualifier**
34	9/25/09 0931	9/26/09 11:10	(26.5hrs)				J-/UJ/P (h)
↓	↓	↓ 11:59	↓				↓

HT.6

LDC #: 22234B6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CR
2nd Reviewer: L

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?
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:** 1-3

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/L)			1	2	3							
Alk., Total	1.7	1.9											
Alk., Bicarb.	1.7												
T-P	0.006	0.0166		0.030 / 0.050	0.029 / 0.050	0.030 / 0.050							
CN	0.026		0.26										
SO4	0.13	0.192											
NH3-N		0.0161			0.023 / 0.050								

Conc. units: mg/L **Associated Samples:** 2, 3

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/L)			No Qualifiers									
TOC	0.2	0.118											
NO2-N		0.0071											

Conc. units: mg/L **Associated Samples:** 1

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/L)			No Qualifiers									
NO2-N		0.0070											

LDC #: 22234B6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: CR
2nd Reviewer:

METHOD: Inorganics, Method See Cover
Y N N/A 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: 8/4/09 Soil factor applied NA
Field blank type: (circle one) Field Blank / Rinsate / Other: FB
Reason Code: bf
Associated Samples: 1-3

Analyte	Blank ID	Sample Identification								
	FB080409-GW (SDG#: R0904290)	Action Level	1	2	3					
Total Alkalinity	1.9									
Bicarbonate Alkalinity	1.9									
Ammonia as N	0.035			0.023 / 0.050						
TOC (average)	0.2									
Chloride	1.3									
pH (pH Units)	5.89									
Total Phosphorus	0.014		0.030 / 0.050	0.029 / 0.050	0.030 / 0.050					
Sulfate	0.9									

LDC #: 22234B6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: CB
2nd Reviewer:

METHOD: Inorganics, Method See Cover

Y N N/A 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 Reason Code: bp

Sampling date: 10/2/09 Soil factor applied NA

Field blank type: (circle one) Field Blank / Rinsate / Other: Pump Blank Associated Samples: 1-3

Analyte	Blank ID	Sample Identification								
	PB100209-A2 (SDG#R0905636)	Action Level	1	2	3					
Total Alkalinity	1.1									
Bicarbonate Alkalinity	1.1									
Ammonia as N	0.025			0.023 / 0.050						
Chloride	0.9									
Conductivity (umhos/cm)	1.84	18.4								
pH (pH Units)	6.49									
Total Phosphorus	0.007		0.030 / 0.050	0.029 / 0.050	0.030 / 0.050					

LDC #: 22234B6
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Reviewer: CR
2nd Reviewer: [illegible]

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 Was a matrix spike analyzed for each matrix in this SDG?

Y N N/A Were matrix spike percent recoveries (%R) within the control limits of 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:

Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
	5	water	CN	11	1-3	J-/RIA (m)
			NO3-N	71	↓	J-/UJ/A ↓
			SO4	35	↓	↓

Comments: _____

LDC#: 22234B6
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer:

Inorganics, Method See Cover

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Analyte	Concentration (mg/L) 2	Concentration (mg/L) 3	RPD (≤30)	Difference	Limits	Qualification (Parent only)
Ammonia as N	0.023	0.202		0.179	(≤0.050)	Jde+/A(sd)
Total Alkalinity	109	109	0			
Bicarbonate Alkalinity	109	109	0			
Bromide	0.3U	1.7		1.4	(≤2.0)	
Chloride	1460	1360	7			
Conductivity (umhos/cm)	11700	12100	3			
Hexavalent Chromium	20.6	21.9	6			
Nitrate as N	15.2	15.0	1			
Nitrite as N	0.190	0.170	11			
pH (pH Units)	6.92	7.01	1			
Sulfate	1250	1160	7			
Surfactants	1.67	1.67	0			
TDS	11100	11300	2			
TOC, Average	1.4	1.4		0	(≤1.0)	
Total Phosphorus	0.029	0.030		0.001	(≤0.050)	
TSS	1.5	1.0U		0.5	(≤1.0)	
Chlorate (ug/L)	4700000	4720000		20000	(≤1000000)	
Perchlorate (ug/L)	545000	552000	1			

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 2 through October 7, 2009

LDC Report Date: December 30, 2009

Matrix: Water

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905636

Sample Identification

PB100209-A2
M-76B
M-76009B
MC-94B
PB100209-A2MS
PB100209-A2MSD
PB100209-A2DUP

Introduction

This data review covers 7 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
M-76009B	Nitrate as N	75.25 hours	48 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.

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)	Total organic carbon	0.2 mg/L	All samples in SDG R0905636
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate	1.9 mg/L 1.9 mg/L	MC-94B
ICB/CCB	Alkalinity, total	1.9 mg/L	MC-94B
PB (prep blank)	Sulfate	0.13 mg/L	M-76B M-76009B
ICB/CCB	Sulfate	0.192 mg/L	M-76B M-76009B

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Cyanide	0.00753 mg/L	M-76B M-76009B MC-94B
ICB/CCB	Nitrate as N	0.069 mg/L	PB100209-A2

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-76B	Total organic carbon	0.7 mg/L	1.0U mg/L
M-76009B	Total organic carbon	0.9 mg/L	1.0U mg/L

Samples FB060409 (from SDG R0903051) and FB080409-GW (from SDG R0904290) 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
FB060409	6/4/09	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Total organic carbon Conductivity pH Total phosphorus	1.9 mg/L 1.9 mg/L 0.102 mg/L 0.4 mg/L 1.81 umhos/cm 6.08 units 0.020 mg/L	MC-94B
FB080409-GW	8/4/09	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Total organic carbon Chloride pH Total phosphorus Sulfate	1.9 mg/L 1.9 mg/L 0.035 mg/L 0.2 mg/L 1.3 mg/L 5.89 units 0.014 mg/L 0.9 mg/L	M-76B M-76009B

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-76B	Ammonia as N Total organic carbon Total phosphorus	0.037 mg/L 0.7 mg/L 0.014 mg/L	0.050U mg/L 1.0U mg/L 0.050U mg/L
M-76009B	Total organic carbon Total phosphorus	0.9 mg/L 0.015 mg/L	1.0U mg/L 0.050U mg/L

Sample PB100209-A2 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
PB100209-A2	10/2/09	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Chloride Conductivity pH Total phosphorus	1.1 mg/L 1.1 mg/L 0.025 mg/L 0.9 mg/L 1.84 umhos/cm 6.49 units 0.007 mg/L	M-76B M-76009B

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-76B	Ammonia as N Total phosphorus	0.037 mg/L 0.014 mg/L	0.050U mg/L 0.050U mg/L
M-76009B	Total phosphorus	0.015 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	Total suspended solids	77 (80-120)	PB100209-A2	J- (all detects) UJ (all non-detects)	P

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 R0905636	All analytes reported below the PQL.	J (all detects)	A

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-76B and M-76009B were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-76B	M-76009B				
Ammonia as N	0.037 mg/L	0.331 mg/L	-	0.294 (≤0.050)	J (all detects)	A
Alkalinity, total	111 mg/L	113 mg/L	2 (≤30)	-	-	-
Alkalinity, bicarbonate	111 mg/L	113 mg/L	2 (≤30)	-	-	-

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-76B	M-76009B				
Bromide	1.5 mg/L	1.5 mg/L	-	0 (≤1.0)	-	-
Chloride	1160 mg/L	1260 mg/L	8 (≤30)	-	-	-
Conductivity	6280 umhos/cm	6270 umhos/cm	0 (≤30)	-	-	-
Hexavalent chromium	2.56 mg/L	2.63 mg/L	3 (≤30)	-	-	-
Nitrate as N	8.85 mg/L	7.86 mg/L	12 (≤30)	-	-	-
Nitrite as N	0.022 mg/L	0.021 mg/L	-	0.001 (≤0.010)	-	-
pH	7.68 units	7.74 units	1 (≤30)	-	-	-
Sulfate	758 mg/L	843 mg/L	11 (≤30)	-	-	-
Surfactants	0.149 mg/L	0.286 mg/L	63 (≤30)	-	J (all detects)	A
Total dissolved solids	4380 mg/L	4220 mg/L	4 (≤30)	-	-	-
Total organic carbon	0.7 mg/L	0.9 mg/L	-	0.2 (≤1.0)	-	-
Total phosphorus	0.014 mg/L	0.015 mg/L	-	0.001 (≤0.050)	-	-
Total suspended solids	2.1 mg/L	2.3 mg/L	-	0.2 (≤1.0)	-	-
Chlorate	583000 ug/L	595000 ug/L	2 (≤30)	-	-	-
Perchlorate	121000 ug/L	121000 ug/L	0 (≤30)	-	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Data Qualification Summary - SDG R0905636

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0905636	M-76009B	Nitrate as N	J- (all detects) UJ (all non-detects)	P	Technical holding times (h)
R0905636	PB100209-A2	Total suspended solids	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0905636	PB100209-A2 M-76B M-76009B MC-94B	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)
R0905636	M-76B M-76009B	Ammonia as N	J (all detects)	A	Field duplicates (Difference) (fd)
R0905636	M-76B M-76009B	Surfactants	J (all detects)	A	Field duplicates (RPD) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R0905636

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905636	M-76B	Total organic carbon	1.0U mg/L	A	bl
R0905636	M-76009B	Total organic carbon	1.0U mg/L	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Field Blank Data Qualification Summary - SDG R0905636

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905636	M-76B	Ammonia as N Total organic carbon Total phosphorus	0.050U mg/L 1.0U mg/L 0.050U mg/L	A	bf
R0905636	M-76009B	Total organic carbon Total phosphorus	1.0U mg/L 0.050U mg/L	A	bf

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Pump Blank Data Qualification Summary - SDG R0905636

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905636	M-76B	Ammonia as N Total phosphorus	0.050U mg/L 0.050U mg/L	A	bp
R0905636	M-76009B	Total phosphorus	0.050U mg/L	A	bp

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Filter Blank Data Qualification Summary - SDG R0905636

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234C6
SDG #: R0905636
Laboratory: Columbia Analytical Services

Date: 12-29-09
Page: 1 of 1
Reviewer: ar
2nd Reviewer: V

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), ~~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), 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: 10/2/09 - 10/7/09
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	SW	
IV	Surrogate Spikes	A	
V	Matrix Spike/Matrix Spike Duplicates	A	MS/D
VI.	Duplicates	A	DUP
VII.	Laboratory control samples	SW	LCS
VIII.	Sample result verification	N	
IX.	Overall assessment of data	A	
X.	Field duplicates	SW	(2,3)
XI	Field blanks	SW	PB=1. FilterBlank=FiltBlk092509-A2 (R0905462) (see below)

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 Blank

Validated Samples: water

1	PB100209-A2	11		21	PBW	31	
2	M-76B	12		22		32	
3	M-76009B	13		23		33	
4	MC-94B	14		24		34	
5	PB100209-A2MS	15		25		35	
6	PB100209-A2MSD	16		26		36	
7	PB100209-A2DUP	17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes: FB = FB060409 (SDG# R0903051)
FB = FB080409-GW (SDG# R0904290)

LDC #: 22234C6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: CR
2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1-4	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: 5		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]
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]
7		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

Comments:

LDC #: 22234G6
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Page: 1 of 1
Reviewer: CR
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?

Method:		9056					
Parameters:		NO_3-N					
Technical holding time:		48hrs					
Sample ID	Sampling date	Analysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier
3	10/2/09 11:55	10/5/09 15:13	(75.25hrs)				J-/UJ/R (h)

HT.6

LDC #: 22234C6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: CR
2nd Reviewer: [illegible]

METHOD: Inorganics, Method See Cover

Reason Codes: 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?
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:** All

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/L)			2	3								
TOC	0.2			0.7 / 1.0	0.9 ~~0.3~~ / 1.0								

Conc. units: mg/L **Associated Samples:** 4

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/L)			No Qualifiers									
Alk., Total	1.9	1.9											
Alk., Bicarb.	1.9												

Conc. units: mg/L **Associated Samples:** 2, 3

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/L)			No Qualifiers									
SO4	0.13	0.192											

Conc. units: mg/L **Associated Samples:** 2-4

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/L)			No Qualifiers									
CN		0.00753											

Conc. units: mg/L **Associated Samples:** 1

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/L)			No Qualifiers									
NO3-N		0.069	0.69										

LDC #: 22234C6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

METHOD: Inorganics, Method See Cover
Y N N/A 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: 6/4/09 ~~Soil factor~~ applied MA
Field blank type: (circle one) Field Blank / Rinsate / Other: FB
Associated Samples: 4

Reason Code: bf

Analyte	Blank ID	Sample Identification								
	FB060409 (SDG#: R0903051)	Action Level	No Qualifiers							
Total Alkalinity	1.9									
Bicarbonate Alkalinity	1.9									
Ammonia as N	0.102	1.02								
TOC (average)	0.4									
Conductivity (umhos/cm)	1.81									
pH (pH Units)	6.08									
Total Phosphorus	0.020									

LDC #: 22234C6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: QR
2nd Reviewer:

METHOD: Inorganics, Method See Cover

Y N N/A 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 Reason Code: bf
Sampling date: 8/4/09 Soil factor applied NA
Field blank type: (circle one) Field Blank / Rinsate / Other: FB Associated Samples: 2, 3

Analyte	Blank ID	Sample Identification								
	FB080409-GW (SDG#: R0904290)	Action Level	2	3						
Total Alkalinity	1.9									
Bicarbonate Alkalinity	1.9									
Ammonia as N	0.035		0.037 / 0.050							
TOC (average)	0.2		0.7 / 1.0	0.9 / 1.0						
Chloride	1.3									
pH (pH Units)	5.89									
Total Phosphorus	0.014		0.014 / 0.050	0.015 / 0.050						
Sulfate	0.9									

LDC #: 22234C6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: CR
2nd Reviewer: V

METHOD: Inorganics, Method See Cover
Y N N/A 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: 10/2/09 Soil factor applied NA
Field blank type: (circle one) Field Blank / Rinsate / Other: Pump Blank
Associated Samples: 2, 3

Reason Code: bp

Analyte	Blank ID	Sample Identification								
	1	Action Level	2	3						
Total Alkalinity	1.1									
Bicarbonate Alkalinity	1.1									
Ammonia as N	0.025		0.037 / 0.050							
Chloride	0.9									
Conductivity (umhos/cm)	1.84	18.4								
pH (pH Units)	6.49									
Total Phosphorus	0.007		0.014 / 0.050	0.015 / 0.050						

LDC #: 222346
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: CR
2nd Reviewer: VC

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 Was a laboratory control sample (LCS) analyzed for each matrix in this SDG?

Y (N) N/A Were all LCS percent recoveries (%R) within the control limits of 80-120% (85-115% for Method 300.0)?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	LCS ID	Matrix	Analyte	%R (limits)	Associated Samples	Qualifications
	LCS	water	TSS	77 (80-120)	1	J-/UJ/P (L)

Comments:

LDC#: 22234C6
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer:

Inorganics, Method See Cover

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Analyte	Concentration (mg/L)		RPD (≤30)	Difference	Limits	Qualification (Parent only)
	2	3				
Ammonia as N	0.037	0.331		0.294	(≤0.050)	Jdet/A (fd)
Total Alkalinity	111	113	2			
Bicarbonate Alkalinity	111	113	2			
Bromide	1.5	1.5		0	(≤1.0)	
Chloride	1160	1260	8			
Conductivity (umhos/cm)	6280	6270	0			
Dissolved Hexavalent Chromium	2.56	2.63	3			
Nitrate as N	8.85	7.86	12			
Nitrite as N	0.022	0.021		0.001	(≤0.010)	
pH (pH Units)	7.68	7.74	1			
Sulfate	758	843	11			
Surfactants	0.149	0.286	63			Jdet/A (fd)
TDS	4380	4220	4			
TOC, Average	0.7	0.9		0.2	(≤1.0)	
Total Phosphorus	0.014	0.015		0.001	(≤0.050)	
TSS	2.1	2.3		0.2	(≤1.0)	
Chlorate (ug/L)	583000	595000	2			
Perchlorate (ug/L)	121000	121000	0			

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 6, 2009

LDC Report Date: January 7, 2010

Matrix: Soil/Water

Parameters: Wet Chemistry

Validation Level: Stage 4

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905693

Sample Identification

EB100609-SO1A4
SA138-0.5B
SA138-10B
SA138009-10B
SA138-30B
SA138-45B
SA103-0.5B
SA103-10B
SA103009-10B
SA103-25B
SA103-35B
RSAR5-0.5B
RSAR5-10B
RSAR5-25B
RSAR5-40B
RSAS5-0.5B
RSAS5-10B
RSAS5-25B
RSAS5-36B
RSAS5009-36B
RSAR5-40BMS
RSAR5-40BMSD
RSAR5-40BDUP

Introduction

This data review covers 22 soil samples and 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 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 Methods 9040B/9045D for pH, Standard Method 5540C for Surfactants, EPA Method 314.0 for Perchlorate, EPA Method 365.1 for Total Phosphorus, and EPA SW 846 Method 9060 and Lloyd/Kahn 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.

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)	Total organic carbon Chloride	0.2 mg/L 0.10 mg/L	All water samples in SDG R0905693
ICB/CCB	Total organic carbon Chloride Total phosphorus	0.112 mg/L 0.112 mg/L 0.0245 mg/L	All water samples in SDG R0905693
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate	15 mg/Kg 15 mg/Kg	SA138-0.5B SA138-10B SA138009-10B SA138-30B SA138-45B SA103-0.5B SA103-10B SA103009-10B SA103-25B SA103-35B RSAR5-0.5B RSAR5-10B RSAR5-25B RSAR5-40B

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Alkalinity, total Alkalinity, bicarbonate Chloride	12 mg/Kg 12 mg/Kg 0.8 mg/Kg	RSAS5-0.5B RSAS5-10B RSAS5-25B RSAS5-36B RSAS5009-36B
PB (prep blank)	Total phosphorus	1.6 mg/Kg	SA138-0.5B SA138-10B SA138009-10B SA138-30B SA138-45B
ICB/CCB	Total organic carbon	60 mg/Kg	RSAS5-10B RSAS5-25B RSAS5-36B RSAS5009-36B
ICB/CCB	Total organic carbon Total phosphorus	116.0 mg/Kg 0.0060 mg/L	All soil samples in SDG R0905693
ICB/CCB	Alkalinity, total	0.5 mg/L	RSAR5-10B RSAR5-25B RSAS5-0.5B RSAS5-10B RSAS5-25B RSAS5-36B RSAS5009-36B
ICB/CCB	Chloride	0.111 mg/L	SA138-10B SA138009-10B
ICB/CCB	Chloride	0.107 mg/L	SA103-10B SA103009-10B SA103-25B RSAR5-0.5B RSAR5-10B RSAR5-25B
ICB/CCB	Sulfate	0.075 mg/L	SA103-10B SA103009-10B RSAR5-0.5B RSAR5-25B
ICB/CCB	Chloride	0.068 mg/L	RSAS5009-36B
ICB/CCB	Chloride	0.098 mg/L	SA138-0.5B SA138-45B SA103-0.5B
ICB/CCB	Chloride	0.095 mg/L	SA103-35B RSAR5-40B

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Chloride	0.086 mg/L	SA138-30B RSAS5-0.5B RSAS5-10B RSAS5-25B RSAS5-36B
ICB/CCB	Sulfate	0.076 mg/L	RSAS5-0.5B RSAS5-10B RSAS5-25B RSAS5-36B RSAS5009-36B

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
EB100609-SO1A4	Total organic carbon Chloride	0.2 mg/L 1.4 mg/L	1.0U mg/L 2.0U mg/L
SA138-30B	Total organic carbon	270 mg/Kg	300U mg/Kg
SA138-45B	Total organic carbon	100 mg/Kg	300U mg/Kg
SA103-35B	Total organic carbon	280 mg/Kg	280U mg/Kg
RSAR5-40B	Total organic carbon	190 mg/Kg	300U mg/Kg

Sample EB100609-SO1A4 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
EB100609-SO1A4	10/6/09	Total organic carbon Chloride Nitrate as N pH Sulfate	0.2 mg/L 1.4 mg/L 1.52 mg/L 3.922 units 1.3 mg/L	All soil samples in SDG R0905693

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
SA138-0.5B	Nitrate as N	5.46 mg/Kg	5.46J+ mg/Kg
SA138-10B	Nitrate as N	0.80 mg/Kg	0.80J+ mg/Kg
SA138009-10B	Nitrate as N	0.82 mg/Kg	0.82J+ mg/Kg
SA138-30B	Total organic carbon Nitrate as N	270 mg/Kg 8.14 mg/Kg	300U mg/Kg 8.14J+ mg/Kg
SA138-45B	Total organic carbon Nitrate as N	100 mg/Kg 2.51 mg/Kg	300U mg/Kg 2.51J+ mg/Kg
SA103-0.5B	Nitrate as N	6.77 mg/Kg	6.77J+ mg/Kg
SA103-10B	Nitrate as N	2.14 mg/Kg	2.14J+ mg/Kg
SA103009-10B	Nitrate as N	2.26 mg/Kg	2.26J+ mg/Kg
SA103-25B	Nitrate as N	2.52 mg/Kg	2.52J+ mg/Kg
SA103-35B	Total organic carbon Nitrate as N	280 mg/Kg 4.28 mg/Kg	280U mg/Kg 4.28J+ mg/Kg
RSAR5-0.5B	Nitrate as N	1.28 mg/Kg	1.28J+ mg/Kg
RSAR5-10B	Nitrate as N	2.44 mg/Kg	2.44J+ mg/Kg
RSAR5-25B	Nitrate as N	2.10 mg/Kg	2.10J+ mg/Kg
RSAR5-40B	Total organic carbon Nitrate as N	190 mg/Kg 6.87 mg/Kg	300U mg/Kg 6.87J+ mg/Kg
RSAS5-0.5B	Nitrate as N	10.2 mg/Kg	10.2J+ mg/Kg
RSAS5-10B	Nitrate as N	1.66 mg/Kg	1.66J+ mg/Kg
RSAS5-25B	Nitrate as N	2.53 mg/Kg	2.53J+ mg/Kg
RSAS5-36B	Nitrate as N	2.37 mg/Kg	2.37J+ mg/Kg
RSAS5009-36B	Nitrate as N	2.36 mg/Kg	2.36J+ mg/Kg

Sample FB080309-SO (from SDG R0904279) 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
FB080309-SO	8/3/09	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Total organic carbon Chloride Nitrate as N pH Total phosphorus Sulfate Surfactants	3.0 mg/L 3.0 mg/L 0.113 mg/L 1.2 mg/L 3.9 mg/L 0.65 mg/L 6.48 units 0.015 mg/L 1.6 mg/L 0.043 mg/L	All soil samples in SDG R0905693

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
SA138-0.5B	Alkalinity, total Alkalinity, bicarbonate Chloride Nitrate as N	167 mg/Kg 161 mg/Kg 318 mg/Kg 5.46 mg/Kg	167J+ mg/Kg 161J+ mg/Kg 318J+ mg/Kg 5.46J+ mg/Kg
SA138-10B	Chloride Nitrate as N	47.2 mg/Kg 0.80 mg/Kg	47.2J+ mg/Kg 0.80J+ mg/Kg
SA138009-10B	Chloride Nitrate as N	48.7 mg/Kg 0.82 mg/Kg	48.7J+ mg/Kg 0.82J+ mg/Kg
SA138-30B	Total organic carbon Nitrate as N	270 mg/Kg 8.14 mg/Kg	300U mg/Kg 8.14J+ mg/Kg
SA138-45B	Total organic carbon Chloride Nitrate as N	100 mg/Kg 178 mg/Kg 2.51 mg/Kg	300U mg/Kg 178J+ mg/Kg 2.51J+ mg/Kg
SA103-0.5B	Chloride Nitrate as N	120 mg/Kg 6.77 mg/Kg	120J+ mg/Kg 6.77J+ mg/Kg
SA103-10B	Chloride Nitrate as N	25.8 mg/Kg 2.14 mg/Kg	25.8J+ mg/Kg 2.14J+ mg/Kg
SA103009-10B	Alkalinity, bicarbonate Chloride Nitrate as N	270 mg/Kg 30.0 mg/Kg 2.26 mg/Kg	270J+ mg/Kg 30.0J+ mg/Kg 2.26J+ mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA103-25B	Alkalinity, total Alkalinity, bicarbonate Chloride Nitrate as N	117 mg/Kg 117 mg/Kg 24.2 mg/Kg 2.52 mg/Kg	117J+ mg/Kg 117J+ mg/Kg 24.2J+ mg/Kg 2.52J+ mg/Kg
SA103-35B	Total organic carbon Chloride Nitrate as N	280 mg/Kg 382 mg/Kg 4.28 mg/Kg	280U mg/Kg 382J+ mg/Kg 4.28J+ mg/Kg
RSAR5-0.5B	Chloride Nitrate as N	7.6 mg/Kg 1.28 mg/Kg	7.6J+ mg/Kg 1.28J+ mg/Kg
RSAR5-10B	Chloride Nitrate as N	37.5 mg/Kg 2.44 mg/Kg	37.5J+ mg/Kg 2.44J+ mg/Kg
RSAR5-25B	Chloride Nitrate as N Surfactants	69.7 mg/Kg 2.10 mg/Kg 2.2 mg/Kg	69.7J+ mg/Kg 2.10J+ mg/Kg 2.2J+ mg/Kg
RSAR5-40B	Alkalinity, total Alkalinity, bicarbonate Total organic carbon Chloride Nitrate as N	83 mg/Kg 83 mg/Kg 190 mg/Kg 380 mg/Kg 6.87 mg/Kg	83J+ mg/Kg 83J+ mg/Kg 300U mg/Kg 380J+ mg/Kg 6.87J+ mg/Kg
RSAS5-0.5B	Alkalinity, total Alkalinity, bicarbonate Nitrate as N Surfactants	230 mg/Kg 223 mg/Kg 10.2 mg/Kg 1.5 mg/Kg	230J+ mg/Kg 223J+ mg/Kg 10.2J+ mg/Kg 2.1U mg/Kg
RSAS5-10B	Chloride Nitrate as N Surfactants	154 mg/Kg 1.66 mg/Kg 3.1 mg/Kg	154J+ mg/Kg 1.66J+ mg/Kg 3.1J+ mg/Kg
RSAS5-25B	Chloride Nitrate as N	260 mg/Kg 2.53 mg/Kg	260J+ mg/Kg 2.53J+ mg/Kg
RSAS5-36B	Chloride Nitrate as N	135 mg/Kg 2.37 mg/Kg	135J+ mg/Kg 2.37J+ mg/Kg
RSAS5009-36B	Chloride Nitrate as N	142 mg/Kg 2.36 mg/Kg	142J+ mg/Kg 2.36J+ 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.

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 with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
LCS (RSAS5-36B)	Cyanide	119 (85-115)	-	-	J+ (all detects)	P

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 R0905693	All analytes reported below the PQL.	J (all detects)	A

IX. Overall Assessment

Data flags are summarized at the end of this report if data has been qualified.

X. Field Duplicates

Samples SA138-10B and SA138009-10B, samples SA103-10B and SA103009-10B, RSAS5-36B and RSAS5009-36B were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA138-10B	SA138009-10B				
Alkalinity, total	357 mg/Kg	357 mg/Kg	0 (≤50)	-	-	-
Alkalinity, bicarbonate	336 mg/Kg	342 mg/Kg	2 (≤50)	-	-	-
Alkalinity, carbonate	21 mg/Kg	15 mg/Kg	-	6 (≤22)	-	-
Chloride	47.2 mg/Kg	48.7 mg/Kg	3 (≤50)	-	-	-
Nitrate as N	0.80 mg/Kg	0.82 mg/Kg	-	0.02 (≤0.54)	-	-
pH	8.79 units	8.80 units	0 (≤50)	-	-	-
Sulfate	105 mg/Kg	105 mg/Kg	0 (≤50)	-	-	-
Surfactants	0.6U mg/Kg	6.7 mg/Kg	-	6.1 (≤2.2)	J (all detects) UJ (all non-detects)	A
Total organic carbon	1580 mg/Kg	1340 mg/Kg	16 (≤50)	-	-	-
Total phosphorus	646 mg/Kg	732 mg/Kg	12 (≤50)	-	-	-
Chlorate	3580 ug/Kg	3560 ug/Kg	1 (≤50)	-	-	-
Perchlorate	1900 ug/Kg	1970 ug/Kg	-	70 (≤540)	-	-

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA103-10B	SA103009-10B				
Alkalinity, total	358 mg/Kg	358 mg/Kg	0 (≤50)	-	-	-
Alkalinity, bicarbonate	341 mg/Kg	270 mg/Kg	23 (≤50)	-	-	-
Alkalinity, carbonate	17 mg/Kg	89 mg/Kg	-	72 (≤22)	J (all detects)	A
Chloride	25.8 mg/Kg	30.0 mg/Kg	15 (≤50)	-	-	-
Nitrate as N	2.14 mg/Kg	2.26 mg/Kg	-	0.12 (≤0.54)	-	-
pH	9.00 units	9.00 units	0 (≤50)	-	-	-

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA103-10B	SA103009-10B				
Sulfate	13.7 mg/Kg	15.0 mg/Kg	9 (≤50)	-	-	-
Total organic carbon	730 mg/Kg	570 mg/Kg	-	160 (≤290)	-	-
Total phosphorus	630 mg/Kg	752 mg/Kg	18 (≤50)	-	-	-
Chlorate	1910 ug/Kg	2000 ug/Kg	5 (≤50)	-	-	-
Perchlorate	788 ug/Kg	1350 ug/Kg	-	562 (≤540)	J (all detects)	A

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAS5-36B	RSAS5009-36B				
Alkalinity, total	578 mg/Kg	624 mg/Kg	8 (≤50)	-	-	-
Alkalinity, bicarbonate	557 mg/Kg	598 mg/Kg	7 (≤50)	-	-	-
Alkalinity, carbonate	20 mg/Kg	26 mg/Kg	-	6 (≤30)	-	-
Chloride	135 mg/Kg	142 mg/Kg	5 (≤50)	-	-	-
Nitrate as N	2.37 mg/Kg	2.36 mg/Kg	0 (≤50)	-	-	-
pH	8.40 units	8.41 units	0 (≤50)	-	-	-
Sulfate	1080 mg/Kg	984 mg/Kg	9 (≤50)	-	-	-
Total organic carbon	570 mg/Kg	460 mg/Kg	-	110 (≤290)	-	-
Total phosphorus	541 mg/Kg	638 mg/Kg	16 (≤50)	-	-	-
Chlorate	13700 ug/Kg	15200 ug/Kg	10 (≤50)	-	-	-
Perchlorate	1750 ug/Kg	376 ug/Kg	-	1374 (≤750)	J (all detects)	A

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Data Qualification Summary - SDG R0905693

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0905693	RSAS5-36B	Cyanide	J+ (all detects)	P	Laboratory control samples (%R) (l)
R0905693	EB100609-SO1A4 SA138-0.5B SA138-10B SA138009-10B SA138-30B SA138-45B SA103-0.5B SA103-10B SA103009-10B SA103-25B SA103-35B RSAR5-0.5B RSAR5-10B RSAR5-25B RSAR5-40B RSAS5-0.5B RSAS5-10B RSAS5-25B RSAS5-36B RSAS5009-36B	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)
R0905693	SA138-10B SA138009-10B	Surfactants	J (all detects) UJ (all non-detects)	A	Field duplicates (Difference) (fd)
R0905693	SA103-10B SA103009-10B	Alkalinity, carbonate Perchlorate	J (all detects) J (all detects)	A	Field duplicates (Difference) (fd)
R0905693	RSAS5-36B RSAS5009-36B	Perchlorate	J (all detects)	A	Field duplicates (Difference) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R0905693

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905693	EB100609-SO1A4	Total organic carbon Chloride	1.0U mg/L 2.0U mg/L	A	bl
R0905693	SA138-30B	Total organic carbon	300U mg/Kg	A	bl
R0905693	SA138-45B	Total organic carbon	300U mg/Kg	A	bl
R0905693	SA103-35B	Total organic carbon	280U mg/Kg	A	bl

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905693	RSAR5-40B	Total organic carbon	300U mg/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Equipment Blank Data Qualification Summary - SDG R0905693

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905693	SA138-0.5B	Nitrate as N	5.46J+ mg/Kg	A	be
R0905693	SA138-10B	Nitrate as N	0.80J+ mg/Kg	A	be
R0905693	SA138009-10B	Nitrate as N	0.82J+ mg/Kg	A	be
R0905693	SA138-30B	Total organic carbon Nitrate as N	300U mg/Kg 8.14J+ mg/Kg	A	be
R0905693	SA138-45B	Total organic carbon Nitrate as N	300U mg/Kg 2.51J+ mg/Kg	A	be
R0905693	SA103-0.5B	Nitrate as N	6.77J+ mg/Kg	A	be
R0905693	SA103-10B	Nitrate as N	2.14J+ mg/Kg	A	be
R0905693	SA103009-10B	Nitrate as N	2.26J+ mg/Kg	A	be
R0905693	SA103-25B	Nitrate as N	2.52J+ mg/Kg	A	be
R0905693	SA103-35B	Total organic carbon Nitrate as N	280U mg/Kg 4.28J+ mg/Kg	A	be
R0905693	RSAR5-0.5B	Nitrate as N	1.28J+ mg/Kg	A	be
R0905693	RSAR5-10B	Nitrate as N	2.44J+ mg/Kg	A	be
R0905693	RSAR5-25B	Nitrate as N	2.10J+ mg/Kg	A	be
R0905693	RSAR5-40B	Total organic carbon Nitrate as N	300U mg/Kg 6.87J+ mg/Kg	A	be
R0905693	RSAS5-0.5B	Nitrate as N	10.2J+ mg/Kg	A	be

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905693	RSAS5-10B	Nitrate as N	1.66J+ mg/Kg	A	be
R0905693	RSAS5-25B	Nitrate as N	2.53J+ mg/Kg	A	be
R0905693	RSAS5-36B	Nitrate as N	2.37J+ mg/Kg	A	be
R0905693	RSAS5009-36B	Nitrate as N	2.36J+ mg/Kg	A	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Field Blank Data Qualification Summary - SDG R0905693

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905693	SA138-0.5B	Alkalinity, total Alkalinity, bicarbonate Chloride Nitrate as N	167J+ mg/Kg 161J+ mg/Kg 318J+ mg/Kg 5.46J+ mg/Kg	A	bf
R0905693	SA138-10B	Chloride Nitrate as N	47.2J+ mg/Kg 0.80J+ mg/Kg	A	bf
R0905693	SA138009-10B	Chloride Nitrate as N	48.7J+ mg/Kg 0.82J+ mg/Kg	A	bf
R0905693	SA138-30B	Total organic carbon Nitrate as N	300U mg/Kg 8.14J+ mg/Kg	A	bf
R0905693	SA138-45B	Total organic carbon Chloride Nitrate as N	300U mg/Kg 178J+ mg/Kg 2.51J+ mg/Kg	A	bf
R0905693	SA103-0.5B	Chloride Nitrate as N	120J+ mg/Kg 6.77J+ mg/Kg	A	bf
R0905693	SA103-10B	Chloride Nitrate as N	25.8J+ mg/Kg 2.14J+ mg/Kg	A	bf
R0905693	SA103009-10B	Alkalinity, bicarbonate Chloride Nitrate as N	270J+ mg/Kg 30.0J+ mg/Kg 2.26J+ mg/Kg	A	bf
R0905693	SA103-25B	Alkalinity, total Alkalinity, bicarbonate Chloride Nitrate as N	117J+ mg/Kg 117J+ mg/Kg 24.2J+ mg/Kg 2.52J+ mg/Kg	A	bf

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905693	SA103-35B	Total organic carbon Chloride Nitrate as N	280U mg/Kg 382J+ mg/Kg 4.28J+ mg/Kg	A	bf
R0905693	RSAR5-0.5B	Chloride Nitrate as N	7.6J+ mg/Kg 1.28J+ mg/Kg	A	bf
R0905693	RSAR5-10B	Chloride Nitrate as N	37.5J+ mg/Kg 2.44J+ mg/Kg	A	bf
R0905693	RSAR5-25B	Chloride Nitrate as N Surfactants	69.7J+ mg/Kg 2.10J+ mg/Kg 2.2J+ mg/Kg	A	bf
R0905693	RSAR5-40B	Alkalinity, total Alkalinity, bicarbonate Total organic carbon Chloride Nitrate as N	83J+ mg/Kg 83J+ mg/Kg 300U mg/Kg 380J+ mg/Kg 6.87J+ mg/Kg	A	bf
R0905693	RSAS5-0.5B	Alkalinity, total Alkalinity, bicarbonate Nitrate as N Surfactants	230J+ mg/Kg 223J+ mg/Kg 10.2J+ mg/Kg 2.1U mg/Kg	A	bf
R0905693	RSAS5-10B	Chloride Nitrate as N Surfactants	154J+ mg/Kg 1.66J+ mg/Kg 3.1J+ mg/Kg	A	bf
R0905693	RSAS5-25B	Chloride Nitrate as N	260J+ mg/Kg 2.53J+ mg/Kg	A	bf
R0905693	RSAS5-36B	Chloride Nitrate as N	135J+ mg/Kg 2.37J+ mg/Kg	A	bf
R0905693	RSAS5009-36B	Chloride Nitrate as N	142J+ mg/Kg 2.36J+ mg/Kg	A	bf

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 4

LDC #: 22234D6
SDG #: R0905693
Laboratory: Columbia Analytical Services

Date: 12-31-09
Page: 1 of 1
Reviewer: CR
2nd Reviewer: [illegible]

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), ~~Dissolved Hexavalent Chromium (EPA Method 218.6)~~, 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: 10/6/09
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	SW	
IV	Surrogate Spikes	A	
V	Matrix Spike/Matrix Spike Duplicates	A	MS/D
VI.	Duplicates	A	DUP
VII.	Laboratory control samples	SW	LCS/D
VIII.	Sample result verification	A	
IX.	Overall assessment of data	A	
X.	Field duplicates	SW	(3,4), (8,9), (19,20)
XI	Field blanks	SW	EB=1. FB=FB060309-SO (SDG# R0904279)

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: all soil except 1=water

1	EB100609-SO1A4	11	SA103-35B	21	RSAR5-40BMS	31	PBW
2	SA138-0.5B	12	RSAR5-0.5B	22	RSAR5-40BMSD	32	PBS
3	SA138-10B	13	RSAR5-10B	23	RSAR5-40BDUP	33	
4	SA138009-10B	14	RSAR5-25B	24		34	
5	SA138-30B	15	RSAR5-40B	25		35	
6	SA138-45B	16	RSAS5-0.5B	26		36	
7	SA103-0.5B	17	RSAS5-10B	27		37	
8	SA103-10B	18	RSAS5-25B	28		38	
9	SA103009-10B	19	RSAS5-36B	29		39	
10	SA103-25B	20	RSAS5009-36B	30		40	

Notes: _____

LDC #: 22234D6
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Reviewer: CR
2nd Reviewer: ✓

Method: Inorganics (EPA Method See Cover)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Calibration				
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)	✓			
Were balance checks performed as required? (Level IV only)			✓	
III. Blanks				
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. Matrix spike/Matrix spike duplicates and Duplicates				
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) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of ≤ CRDL(≤ 2X CRDL for soil) was used for samples that were ≤ 5X the CRDL, including when only one of the duplicate sample values were < 5X the CRDL.	✓			
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% (85-115% for Method 300.0) QC limits?		✓		
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	

LDC #: 222306
SDG #: See cover

VALIDATION FINDINGS CHECKLIST

Reviewer: CR
2nd Reviewer: V

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 assessment of data				
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.	✓			
Target analytes were detected in the field blanks.	✓			

LDC #: 2223406
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: CR
2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1-20	S/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
QC:21		[✓ 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]
22		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]
23		[✓ 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

Comments:

LDC #: 22234D6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CR
2nd Reviewer: VC

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?
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: All Water**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/L)			1									
TOC	0.2	0.112		0.2 / 1.0									
Cl	0.10	0.112		1.4 / 2.0									
T-P		0.0245											

Conc. units: mg/Kg **Associated Samples: 2-15**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			NoQual									
Alk., Total	15												
Alk., Bicarb.	15												

Conc. units: mg/Kg **Associated Samples: 16-20**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qual									
Alk., Total	12												
Alk., Bicarb.	12												
Cl	0.8												

LDC #: 22234D6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CR
2nd Reviewer: VN

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?
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/Kg **Associated Samples: ~~1-5~~ 2-6**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
T-P	← CA	1.6											

Conc. units: mg/Kg **Associated Samples: 17-20**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
TOC	60												

Conc. units: mg/Kg **Associated Samples: All Soil**

Analyte	Blank ID	Maximum ICB/CCB (mg/Kg)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			5	6	11	15						
TOC		116.0		270 / 300	100 / 300	280 / 280	190 / 300						
T-P		0.0060 mg/l											

Conc. units: mg/Kg **Associated Samples: 13, 14, 16-20**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Alk., Total		0.5											

LDC #: 22234D6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CR
2nd Reviewer: [illegible]

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?

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/Kg **Associated Samples: 3, 4**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.111											

Conc. units: mg/Kg **Associated Samples: 8-10, 12-14**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.107											

Conc. units: mg/Kg **Associated Samples: 8, 9, 12, 14**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
SO4		0.075											

Conc. units: mg/Kg **Associated Samples: 20**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.068											

LDC #: 22234D6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CR
2nd 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?
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/Kg **Associated Samples: 2, 6, 7**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.098											

Conc. units: mg/Kg **Associated Samples: 11, 15**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.095											

Conc. units: mg/Kg **Associated Samples: 5, 16-19**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.086											

Conc. units: mg/Kg **Associated Samples: 16-20**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
SO4		0.076											

LDC #: 22234D6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: Inorganics, Method See Cover

(Y) N N/A 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 Reason Code: be

Sampling date: 10/6/09 Soil factor applied 10X except TOC 1X

Field blank type: (circle one) Field Blank / Rinsate / Other (EB) Associated Samples: All Soil

Analyte	Blank ID	Sample Identification																		
	1	Action Level	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
TOC (average)	0.2					270 / 300	100 / 300					280 / 280				190 / 300					
Cl	1.4																				
Nitrate as N	1.52	152	5.46 J+	0.80 J+	0.82 J+	8.14 J+	2.51 J+	6.77 J+	2.14 J+	2.26 J+	2.52 J+	4.28 J+	1.28 J+	2.44 J+	2.10 J+	6.87 J+	10.2 J+	1.66 J+	2.53 J+	2.37 J+	2.36 J+
pH (pH Units)	3.922																				
Sulfate	1.3																				

LDC #: 22234D6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: QC
2nd Reviewer: [illegible]

METHOD: Inorganics, Method See Cover

Y N N/A 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 Reason Code: bf

Sampling date: 8/3/09 Soil factor applied 10X except TOC 1X

Field blank type: (circle one) Field Blank / Rinsate / Other: FB Associated Samples: All Soil

Analyte	Blank ID	Sample Identification																			
	FB080309-SO (SDG# R0904279)	Action Level	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Total alkalinity	3.0	300	167 J+								117 J+					83 J+	230 J+				
Bicarbonate alkalinity	3.0	300	161 J+							270 J+	117 J+					83 J+	223 J+				
Ammonia as N	0.113	11.3																			
TOC (average)	1.2					270 / 300	100 / 300					280 / 280				190 / 300					
Cl	3.9	390	318 J+	47.2 J+	48.7 J+		178 J+	120 J+	25.8 J+	30.0 J+	24.2 J+	382 J+	7.6 J+	37.5 J+	69.7 J+	380 J+		154 J+	260 J+	135 J+	142 J+
Nitrate as N	0.65	65	5.46 J+	0.80 J+	0.82 J+	8.14 J+	2.51 J+	6.77 J+	2.14 J+	2.26 J+	2.52 J+	4.28 J+	1.28 J+	2.44 J+	2.10 J+	6.87 J+	10.2 J+	1.66 J+	2.53 J+	2.37 J+	2.36 J+
pH (pH Units)	6.48																				
Total Phosphorus	0.015																				
~~TDS~~	~~22~~ not reported in This SDG																				
Sulfate	1.6																				
Surfactants	0.043	4.3													2.2 J+		1.5 / 2.1	3.1 J+			

LDC #: 22234B6
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: AR
2nd Reviewer: [illegible]

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 Was a laboratory control sample (LCS) analyzed for each matrix in this SDG?

Y (N) N/A Were all LCS percent recoveries (%R) within the control limits of 80-120% (85-115% for Method 300.0)?

LEVEL IV ONLY:

(Y) N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	LCS ID	Matrix	Analyte	%R (limits)	Associated Samples	Qualifications
	LCS	Soil	CN	119 (85-115)	19	J+ det/P(l)

Comments:

LDC#: 22234D6
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CA
2nd Reviewer: W

Inorganics, Method See Cover

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Analyte	Concentration (mg/Kg) 3	Concentration (mg/Kg) 4	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Total Alkalinity	357	357	0			
Bicarbonate Alkalinity	336	342	2			
Carbonate Alkalinity	21	15		6	(≤22)	
Chloride	47.2	48.7	3			
Nitrate as N	0.80	0.82		0.02	(≤0.54)	
pH (pH Units)	8.79	8.80	0			
Sulfate	105	105	0			
Surfactants	0.6U	6.7		6.1	(≤2.2)	J/UJ/A (fd)
TOC	1580	1340	16			
Total Phosphorus	646	732	12			
Chlorate (ug/Kg)	3580	3560	1			
Perchlorate (ug/Kg)	1900	1970		70	(≤540)	

V:\FIELD DUPLICATES\FD_inorganic\22234AD6.wpd

Analyte	Concentration (mg/Kg) 8	Concentration (mg/Kg) 9	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Total Alkalinity	358	358	0			
Bicarbonate Alkalinity	341	270	23			
Carbonate Alkalinity	17	89		72	(≤22)	Jdet/A (fd)
Chloride	25.8	30.0	15			
Nitrate as N	2.14	2.26		0.12	(≤0.54)	

LDC#: 22234D6
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer:

Inorganics, Method See Cover

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Analyte	Concentration (mg/Kg) 8	9	RPD (≤50)	Difference	Limits	Qualification (Parent only)
pH (pH Units)	9.00	9.00	0			
Sulfate	13.7	15.0	9			
TOC	730	570		160	(≤290)	
Total Phosphorus	630	752	18			
Chlorate (ug/Kg)	1910	2000	5			
Perchlorate (ug/Kg)	788	1350		562	(≤540)	Jdet/A (fd)

Analyte	Concentration (mg/Kg) 19	20	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Total Alkalinity	578	624	8			
Bicarbonate Alkalinity	557	598	7			
Carbonate Alkalinity	20	26		6	(≤30)	
Chloride	135	142	5			
Nitrate as N	2.37	2.36	0			
pH (pH Units)	8.40	8.41	0			
Sulfate	1080	984	9			
TOC	570	460		110	(≤290)	
Total Phosphorus	541	638	16			
Chlorate (ug/Kg)	13700	15200	10			
Perchlorate (ug/Kg)	1750	376		1374	(≤750)	Jdet/A (fd)

LDC #: 22234D6
SDG #: see cover

Validatin Findings Worksheet
Initial and Continuing Calibration Calculation Verification

Reviewer: CR
2nd Reviewer: [illegible]

Method: Inorganics, Method see cover

The correlation coefficient (r) for the calibration of NH3-N was recalculated.Calibration date: 9/4/09

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found X 100 / True

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

Type of analysis	Analyte	Standard	Conc. (ug/l)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial calibration	NH_3-N	s1	0	19629	0.9999	0.9999	Y
		s2	0.01	130419			
		s3	0.02	228582			
		s4	0.05	477261			
		s5	0.1	936416			
		s6	0.2	1777088			
		s7	0.5	4381031			
		s8	1	8484624			
		s9	2	16945238			
Calibration verification	TOC	CCV	4000	3969	99.23	99.23	
Calibration verification	C&T	CCV	0.5	0.5039	101	—	
Calibration verification	CN	CN	0.5	0.49841	100	—	Y

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.

LDC #: 22234J6
SDG #: Seecover

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: CR
2nd Reviewer: [illegible]

METHOD: Inorganics, Method Seecover

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

%R = Found / True x 100 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 = |S-D| / (S+D)/2 x 100 Where, S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated %R / RPD	Reported %R / RPD	Acceptable (Y/N)
LCS	Laboratory control sample	Br	9.88	10.0	99	99	Y
21	Matrix spike sample	NH_3-N	(SSR-SR) 7.95	8.33	95	95	
23	Duplicate sample	T-P	511	622	20	20	

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 #: 22234D6
SDG #: seecover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 2
Reviewer: CP
2nd reviewer: [illegible]

METHOD: Inorganics, Method seecover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments?
Y N N/A Are all detection limits below the CRQL?

Compound (analyte) results for NO_3-N reported with a positive detect were recalculated and verified using the following equation:

Concentration = $(2.031 \times 10^{-6})(Area) + 0.0678$

Recalculation: $\frac{((2.031 \times 10^{-6})(220126) + 0.0678)\,10}{0.944} = 5.45\ mg/kg$

#	Sample ID	Analyte	Reported Concentration (mg/kg)	Calculated Concentration (mg/kg)	Acceptable (Y/N)
	2	Alk, Total	167	167	Y
		Alk, Bicarb	161	161	
		Alk, Carb	6	6	
		Cl	318	318	
		NO_3-N	5.46	5.45	
		SO_4	789	789	
		T-P	736	736	
		TOC	560	560	Y
		pH (pH units)	8.35	8.35	

Note:

0.939

LDC #: 22234D6
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 21 of 3
Reviewer: CR
2nd reviewer: V

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 Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments?
Y N N/A Are all detection limits below the CRQL?

Compound (analyte) results for Cl reported with a positive detect were recalculated and verified using the following equation:

Concentration = ~~4.73x10^-6(Area)~~ CR ~~+0.09727~~ / 2.221x10^-6(Area)+0.07272

Recalculation: ~~4.73x10^-6(361033)+0.09727~~ CR / (2.221x10^-6(2498154)+0.07272)(10)(2) / 0.939 = 120 mg/kg

#	Sample ID	Analyte	Reported Concentration (mg/kg)	Calculated Concentration (mg/kg)	Acceptable (Y/N)
	~~10~~ 7	Alk. Total	852	852	Y
		Alk., Bicarb.	788	788	
		Alk., Carb.	64	64	
		Cl	120	120	
		NO3-N	6.77	6.77	
		SO4	349	349	
		T-P	890	890	
		TOC	9720	9720	
		pH (pH units)	10.01	10.01	

Note:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 7 through October 8, 2009

LDC Report Date: January 7, 2010

Matrix: Soil/Water

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905744

Sample Identification

RSAP5-0.5B
RSAP5-10B
RSAP5009-10B
RSAP5-25B
RSAP5-39B
SA192-0.5B
SA192-10B
SA192-25B
SA192-39B
EB100809-SO1A3
SA130-0.5B
SA130-10B
SA130-25B
SA130-43B
RSAP6-0.5B
RSAP6-10B
RSAP6-25B
RSAP6-44B
SA192-10BMS
SA192-10BMSD
SA192-10BDUP

Introduction

This data review covers 20 soil samples and 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 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 Methods 9040B/9045D for pH, Standard Method 5540C for Surfactants, EPA Method 314.0 for Perchlorate, EPA Method 365.1 for Total Phosphorus, and EPA SW 846 Method 9060 and Lloyd/Kahn 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 Total organic carbon	1.9 mg/L 1.9 mg/L 0.2 mg/L	All water samples in SDG R0905744
ICB/CCB	Alkalinity, total Total organic carbon Sulfate	1.9 mg/L 0.112 mg/L 0.192 mg/L	All water samples in SDG R0905744
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate Chloride	19 mg/Kg 19 mg/Kg 1 mg/Kg	SA130-25B SA130-43B RSAP6-0.5B RSAP6-10B RSAP6-25B RSAP6-44B
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate Chloride	5 mg/Kg 5 mg/Kg 1.1 mg/Kg	RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-25B RSAP5-39B SA192-0.5B SA192-10B SA192-25B SA192-39B SA130-0.5B SA130-10B

Method Blank ID	Analyte	Concentration	Associated Samples
PB (prep blank)	Total organic carbon	60 mg/Kg	RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-25B RSAP5-39B SA192-0.5B SA192-10B SA192-25B SA192-39B
ICB/CCB	Total organic carbon	116.0 mg/Kg	All soil samples in SDG R0905744
ICB/CCB	Alkalinity, total	0.5 mg/L	SA130-25B SA130-43B RSAP6-10B
ICB/CCB	Total phosphorus	0.0060 mg/L	RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-25B RSAP5-39B SA192-0.5B
ICB/CCB	Sulfate	0.058 mg/L	SA130-43B
ICB/CCB	Chloride	0.095 mg/L	SA130-25B SA130-43B RSAP6-10B RSAP6-25B
ICB/CCB	Chloride	0.087 mg/L	RSAP6-44B
ICB/CCB	Sulfate	0.033 mg/L	SA130-25B RSAP6-0.5B RSAP6-10B RSAP6-25B RSAP6-44B
ICB/CCB	Chloride	0.085 mg/L	RSAP5-10B RSAP5009-10B SA192-0.5B SA192-10B SA192-25B
ICB/CCB	Chloride	0.099 mg/L	SA192-39B
ICB/CCB	Sulfate	0.078 mg/L	SA192-10B
ICB/CCB	Chloride	0.133 mg/L	RSAP5-25B RSAP5-39B

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Sulfate	0.092 mg/L	RSAP5-10B RSAP5-25B RSAP5-39B
ICB/CCB	Sulfate	0.072 mg/L	SA192-39B

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
EB100809-SO1A3	Total organic carbon	0.2 mg/L	1.0U mg/L
SA130-43B	Total organic carbon	230 mg/Kg	280U mg/Kg

Sample EB100809-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
EB100809-SO1A3	10/8/09	Ammonia as N Total organic carbon Chloride Nitrate as N pH Sulfate Total phosphorus Surfactants	0.038 mg/L 0.2 mg/L 1.2 mg/L 0.69 mg/L 4.63 units 2.4 mg/L 0.008 mg/L 0.031 mg/L	SA130-0.5B SA130-10B SA130-25B SA130-43B RSAP6-0.5B RSAP6-10B RSAP6-25B RSAP6-44B

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
SA130-0.5B	Nitrate as N Surfactants	21.5 mg/Kg 0.9 mg/Kg	21.5J+ mg/Kg 2.0U mg/Kg
SA130-10B	Nitrate as N Surfactants	7.20 mg/Kg 0.9 mg/Kg	7.20J+ mg/Kg 2.1U mg/Kg
SA130-25B	Nitrate as N	2.73 mg/Kg	2.73J+ mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA130-43B	Total organic carbon Nitrate as N Sulfate	230 mg/Kg 1.51 mg/Kg 81.6 mg/Kg	280U mg/Kg 1.51J+ mg/Kg 81.6J+ mg/Kg
RSAP6-0.5B	Nitrate as N Surfactants	11.5 mg/Kg 0.9 mg/Kg	11.5J+ mg/Kg 2.2U mg/Kg
RSAP6-10B	Nitrate as N	5.88 mg/Kg	5.88J+ mg/Kg
RSAP6-25B	Nitrate as N Surfactants	1.65 mg/Kg 1.4 mg/Kg	1.65J+ mg/Kg 2.2U mg/Kg
RSAP6-44B	Nitrate as N	1.42 mg/Kg	1.42J+ mg/Kg

Samples FB080309-SO (from SDG R0904279) and FB082809-SO (from SDG R0904894) were identified as field blanks. No contaminant concentrations were found in these blanks with the following exceptions:

Field Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
FB080309-SO	8/3/09	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Total organic carbon Chloride Nitrate as N pH Total phosphorus Sulfate Surfactants	3.0 mg/L 3.0 mg/L 0.113 mg/L 1.2 mg/L 3.9 mg/L 0.65 mg/L 6.48 mg/L 0.015 mg/L 1.6 mg/L 0.043 mg/L	RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-25B RSAP5-39B SA192-0.5B SA192-10B SA192-25B SA192-39B
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	SA130-0.5B SA130-10B SA130-25B SA130-43B RSAP6-0.5B RSAP6-10B RSAP6-25B RSAP6-44B

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
RSAP5-0.5B	Alkalinity, total Alkalinity, bicarbonate Nitrate as N	218 mg/Kg 212 mg/Kg 6.79 mg/Kg	218J+ mg/Kg 212J+ mg/Kg 6.79J+ mg/Kg
RSAP5-10B	Alkalinity, total Alkalinity, bicarbonate Chloride Nitrate as N	98 mg/Kg 98 mg/Kg 45.7 mg/Kg 2.38 mg/Kg	98J+ mg/Kg 98J+ mg/Kg 45.7J+ mg/Kg 2.38J+ mg/Kg
RSAP5009-10B	Alkalinity, total Alkalinity, bicarbonate Chloride Nitrate as N	115 mg/Kg 115 mg/Kg 41.8 mg/Kg 2.39 mg/Kg	115J+ mg/Kg 115J+ mg/Kg 41.8J+ mg/Kg 2.39J+ mg/Kg
RSAP5-25B	Chloride Nitrate as N Surfactants	162 mg/Kg 4.43 mg/Kg 1.0 mg/Kg	162J+ mg/Kg 4.43J+ mg/Kg 2.2U mg/Kg
RSAP5-39B	Chloride Nitrate as N	347 mg/Kg 4.33 mg/Kg	347J+ mg/Kg 4.33J+ mg/Kg
SA192-0.5B	Chloride Nitrate as N Surfactants	10.0 mg/Kg 1.49 mg/Kg 1.1 mg/Kg	10.0J+ mg/Kg 1.49J+ mg/Kg 2.1U mg/Kg
SA192-10B	Chloride Nitrate as N Surfactants	10.1 mg/Kg 1.30 mg/Kg 1.2 mg/Kg	10.1J+ mg/Kg 1.30J+ mg/Kg 2.2U mg/Kg
SA192-25B	Alkalinity, total Alkalinity, bicarbonate Chloride Surfactants	57 mg/Kg 57 mg/Kg 16.8 mg/Kg 1.1 mg/Kg	57J+ mg/Kg 57J+ mg/Kg 16.8J+ mg/Kg 2.7U mg/Kg
SA192-39B	Chloride Nitrate as N	26.2 mg/Kg 1.64 mg/Kg	26.2J+ mg/Kg 1.64J+ mg/Kg
SA130-0.5B	Nitrate as N	21.5 mg/Kg	21.5J+ mg/Kg
SA130-10B	Nitrate as N	7.20 mg/Kg	7.20J+ mg/Kg
SA130-25B	Nitrate as N	2.73 mg/Kg	2.73J+ mg/Kg
SA130-43B	Total organic carbon Nitrate as N	230 mg/Kg 1.51 mg/Kg	280U mg/Kg 1.51J+ mg/Kg
RSAP6-0.5B	Nitrate as N	11.5 mg/Kg	11.5J+ mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
RSAP6-10B	Nitrate as N	5.88 mg/Kg	5.88J+ mg/Kg
RSAP6-25B	Nitrate as N	1.65 mg/Kg	1.65J+ mg/Kg
RSAP6-44B	Nitrate as N	1.42 mg/Kg	1.42J+ 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.

V. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (Limits)	Difference (Limits)	Flag	A or P
SA192-10BDUP (RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-25B RSAP5-39B SA192-0.5B SA192-10B SA192-25B SA192-39B)	Sulfate	21 (≤20)	-	J (all detects) UJ (all non-detects)	A

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 with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
LCS (RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-25B RSAP5-39B SA192-0.5B SA192-10B SA192-25B SA192-39B SA130-0.5B SA130-10B SA130-25B SA130-43B)	Cyanide	119 (85-115)	-	-	J+ (all detects)	P

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 R0905744	All analytes reported below the PQL.	J (all detects)	A

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 RSAP5-10B and RSAP5009-10B were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAP5-10B	RSAP5009-10B				
Alkalinity, total	98 mg/Kg	115 mg/Kg	-	17 (≤22)	-	-

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAP5-10B	RSAP5009-10B				
Alkalinity, bicarbonate	98 mg/Kg	115 mg/Kg	-	17 (≤22)	-	-
Chloride	45.7 mg/Kg	41.8 mg/Kg	9 (≤50)	-	-	-
Nitrate as N	2.38 mg/Kg	2.39 mg/Kg	-	0.01 (≤0.54)	-	-
pH	8.26 units	8.28 units	0 (≤50)	-	-	-
Sulfate	4580 mg/Kg	4280 mg/Kg	7 (≤50)	-	-	-
Total organic carbon	740 mg/Kg	660 mg/Kg	-	80 (≤290)	-	-
Total phosphorus	829 mg/Kg	921 mg/Kg	11 (≤50)	-	-	-
Chlorate	183 ug/Kg	400 ug/Kg	-	217 (≤220)	-	-
Perchlorate	1210 ug/Kg	980 ug/Kg	-	230 (≤550)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Data Qualification Summary - SDG R0905744

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0905744	RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-25B RSAP5-39B SA192-0.5B SA192-10B SA192-25B SA192-39B	Sulfate	J (all detects) UJ (all non-detects)	A	Duplicate sample analysis (RPD) (ld)
R0905744	RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-25B RSAP5-39B SA192-0.5B SA192-10B SA192-25B SA192-39B SA130-0.5B SA130-10B SA130-25B SA130-43B	Cyanide	J+ (all detects)	P	Laboratory control samples (%R) (l)
R0905744	RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-25B RSAP5-39B SA192-0.5B SA192-10B SA192-25B SA192-39B EB100809-SO1A3 SA130-0.5B SA130-10B SA130-25B SA130-43B RSAP6-0.5B RSAP6-10B RSAP6-25B RSAP6-44B	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 R0905744

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905744	EB100809-SO1A3	Total organic carbon	1.0U mg/L	A	bl

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905744	SA130-43B	Total organic carbon	280U mg/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Equipment Blank Data Qualification Summary - SDG R0905744

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905744	SA130-0.5B	Nitrate as N Surfactants	21.5J+ mg/Kg 2.0U mg/Kg	A	be
R0905744	SA130-10B	Nitrate as N Surfactants	7.20J+ mg/Kg 2.1U mg/Kg	A	be
R0905744	SA130-25B	Nitrate as N	2.73J+ mg/Kg	A	be
R0905744	SA130-43B	Total organic carbon Nitrate as N Sulfate	280U mg/Kg 1.51J+ mg/Kg 81.6J+ mg/Kg	A	be
R0905744	RSAP6-0.5B	Nitrate as N Surfactants	11.5J+ mg/Kg 2.2U mg/Kg	A	be
R0905744	RSAP6-10B	Nitrate as N	5.88J+ mg/Kg	A	be
R0905744	RSAP6-25B	Nitrate as N Surfactants	1.65J+ mg/Kg 2.2U mg/Kg	A	be
R0905744	RSAP6-44B	Nitrate as N	1.42J+ mg/Kg	A	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Field Blank Data Qualification Summary - SDG R0905744

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905744	RSAP5-0.5B	Alkalinity, total Alkalinity, bicarbonate Nitrate as N	218J+ mg/Kg 212J+ mg/Kg 6.79J+ mg/Kg	A	bf
R0905744	RSAP5-10B	Alkalinity, total Alkalinity, bicarbonate Chloride Nitrate as N	98J+ mg/Kg 98J+ mg/Kg 45.7J+ mg/Kg 2.38J+ mg/Kg	A	bf

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905744	RSAP5009-10B	Alkalinity, total Alkalinity, bicarbonate Chloride Nitrate as N	115J+ mg/Kg 115J+ mg/Kg 41.8J+ mg/Kg 2.39J+ mg/Kg	A	bf
R0905744	RSAP5-25B	Chloride Nitrate as N Surfactants	162J+ mg/Kg 4.43J+ mg/Kg 2.2U mg/Kg	A	bf
R0905744	RSAP5-39B	Chloride Nitrate as N	347J+ mg/Kg 4.33J+ mg/Kg	A	bf
R0905744	SA192-0.5B	Chloride Nitrate as N Surfactants	10.0J+ mg/Kg 1.49J+ mg/Kg 2.1U mg/Kg	A	bf
R0905744	SA192-10B	Chloride Nitrate as N Surfactants	10.1J+ mg/Kg 1.30J+ mg/Kg 2.2U mg/Kg	A	bf
R0905744	SA192-25B	Alkalinity, total Alkalinity, bicarbonate Chloride Surfactants	57J+ mg/Kg 57J+ mg/Kg 16.8J+ mg/Kg 2.7U mg/Kg	A	bf
R0905744	SA192-39B	Chloride Nitrate as N	26.2J+ mg/Kg 1.64J+ mg/Kg	A	bf
R0905744	SA130-0.5B	Nitrate as N	21.5J+ mg/Kg	A	bf
R0905744	SA130-10B	Nitrate as N	7.20J+ mg/Kg	A	bf
R0905744	SA130-25B	Nitrate as N	2.73J+ mg/Kg	A	bf
R0905744	SA130-43B	Total organic carbon Nitrate as N	280U mg/Kg 1.51J+ mg/Kg	A	bf
R0905744	RSAP6-0.5B	Nitrate as N	11.5J+ mg/Kg	A	bf
R0905744	RSAP6-10B	Nitrate as N	5.88J+ mg/Kg	A	bf
R0905744	RSAP6-25B	Nitrate as N	1.65J+ mg/Kg	A	bf
R0905744	RSAP6-44B	Nitrate as N	1.42J+ mg/Kg	A	bf

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234E6 Date: 12-3-09
SDG #: R0905744 Page: 1 of 1
Laboratory: Columbia Analytical Services Reviewer: ar
2nd Reviewer: w

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), ~~Dissolved Hexavalent Chromium (EPA Method 218.6)~~, 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: 10/7/09 - 10/8/09
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	SW	
IV	Surrogate Spikes	A	
V	Matrix Spike/Matrix Spike Duplicates	A	MS/D
VI.	Duplicates	SW	DUP
VII.	Laboratory control samples	SW	LCS/D
VIII.	Sample result verification	N	
IX.	Overall assessment of data	A	
X.	Field duplicates	SW	(2,3)
XI	Field blanks	SW	~~10~~ EB=10, FB=FB080809-SO, FB080309-SO soil: (R0904814) (R0904279)

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: All soil except 10 = water

1	RSAP5-0.5B	11	SA130-0.5B	21	SA192-10BDUP	31	PBW
2	RSAP5-10B	12	SA130-10B	22		32	PBS
3	RSAP5009-10B	13	SA130-25B	23		33	
4	RSAP5-25B	14	SA130-43B	24		34	
5	RSAP5-39B	15	RSAP6-0.5B	25		35	
6	SA192-0.5B	16	RSAP6-10B	26		36	
7	SA192-10B	17	RSAP6-25B	27		37	
8	SA192-25B	18	RSAP6-44B	28		38	
9	SA192-39B	19	SA192-10BMS	29		39	
10	EB100809-SO1A3	20	SA192-10BMSD	30		40	

Notes: _____

LDC #: 22234E6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: CR
2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1-18	S/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]
1-1A		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:19		[✓ 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]
20		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
↓21		[✓ 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

Comments:

LDC #: 22234E6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: SR
2nd 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?
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: All Water**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/L)			10									
Alk., Total	1.9	1.9											
Alk., Bicarb.	1.9												
TOC	0.2	0.112		0.2 / 1.0									
SO4		0.192											

Conc. units: mg/Kg **Associated Samples: 13-18**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Alk., Total	19												
Alk., Bicarb.	19												
Cl	1												

LDC #: 22234E6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CR
2nd 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?
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/Kg **Associated Samples: 1-9, 11, 12**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Alk., Total	5												
Alk., Bicarb.	5												
Cl	1.1												

Conc. units: mg/Kg **Associated Samples: 1-9**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
TOC	60												

Conc. units: mg/Kg **Associated Samples: All Soil**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			14									
TOC		116.0 mg/Kg		230 / 280									

LDC #: 22234E6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: QR
2nd 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?
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/Kg **Associated Samples: 13, 14, 16**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Alk., Total		0.5											

Conc. units: mg/Kg **Associated Samples: 1-6**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
T-P		0.0060											

Conc. units: mg/Kg **Associated Samples: 14**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
SO4		0.058											

Conc. units: mg/Kg **Associated Samples: 13, 14, 16, 17**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.095											

LDC #: 22234E6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CR
2nd Reviewer: M

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?
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/Kg **Associated Samples: 18**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.087											

Conc. units: mg/Kg **Associated Samples: 13, 15-18**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
SO4		0.033											

Conc. units: mg/Kg **Associated Samples: 2, 3, 6-8**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.085											

Conc. units: mg/Kg **Associated Samples: 9**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.099											

LDC #: 22234E6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CR
2nd Reviewer: VV

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?
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/Kg **Associated Samples: 7**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
SO4		0.078											

Conc. units: mg/Kg **Associated Samples: 4, 5**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.133											

Conc. units: mg/Kg **Associated Samples: 2, 4, 5**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
SO4		0.092											

Conc. units: mg/Kg **Associated Samples: 9**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
SO4		0.072											

LDC #: 22234E6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: SR
2nd Reviewer: [signature]

METHOD: Inorganics, Method See Cover
Y N N/A 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
Reason Code: be
Sampling date: 10/8/09 Soil factor applied 10X except TOC 1X
Field blank type: (circle one) Field Blank / Rinsate / Other: EB
Associated Samples: 11-18

Analyte	Blank ID	Sample Identification								
	10	Action Level	11	12	13	14	15	16	17	18
NH3-N	0.038									
TOC (average)	0.2					230 / 280				
Cl	1.2									
Nitrate as N	0.69	69	21.5 J+	7.20 J+	2.73 J+	1.51 J+	11.5 J+	5.88 J+	1.65 J+	1.42 J+
pH (pH Units)	4.63									
Sulfate	2.4	240				81.6 J+				
T-P	0.008									
Surfactants	0.031	3.1	0.9 / 2.0	0.9 / 2.1			0.9 / 2.2		1.4 / 2.2	

LDC #: 22234E6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: CR
2nd Reviewer: [illegible]

METHOD: Inorganics, Method See Cover
(Y) N N/A 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 Reason Code: bf
Sampling date: 8/3/09 Soil factor applied 10X except TOC 1X
Field blank type: (circle one) Field Blank / Rinsate / Other: FB Associated Samples: 1-9

Analyte	Blank ID	Sample Identification									
	FB080309-SO (SDG# R0904279)	Action Level	1	2	3	4	5	6	7	8	9
Total alkalinity	3.0	300	218 J+	98 J+	115 J+					57 J+	
Bicarbonate alkalinity	3.0	300	212 J+	98 J+	115 J+					57 J+	
Ammonia as N	0.113	11.3									
TOC (average)	1.2										
Cl	3.9	390		45.7 J+	41.8 J+	162 J+	347 J+	10.0 J+	10.1 J+	16.8 J+	26.2 J+
Nitrate as N	0.65	65	6.79 J+	2.38 J+	2.39 J+	4.43 J+	4.33 J+	1.49 J+	1.30 J+		1.64 J+
pH (pH Units)	6.48										
Total Phosphorus	0.015										
~~TDS~~	~~22~~	Not reported in this SDG									
Sulfate	1.6										
Surfactants	0.043	4.3				1.0 / 2.2		1.1 / 2.1	1.2 / 2.2	1.1 / 2.7	

LDC #: 22234E6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: CR
2nd Reviewer: h

METHOD: Inorganics, Method See Cover
Y N N/A 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 Reason Code: bf
Sampling date: 8/28/09 Soil factor applied 10X except TOC 1X
Field blank type: (circle one) Field Blank / Rinsate / Other: FB Associated Samples: 11-18

Analyte	Blank ID	Sample Identification									
	FB082809-SO (SDG# R0904894)	Action Level	11	12	13	14	15	16	17	18	
Total alkalinity	1.9										
Bicarbonate alkalinity	1.9										
Ammonia as N	0.033										
TOC (average)	0.2					230 / 280					
Cl	1.2										
Nitrate as N	0.68	68	21.5 J+	7.20 J+	2.73 J+	1.51 J+	11.5 J+	5.88 J+	1.65 J+	1.42 J+	
pH (pH Units)	5.88										
Total Phosphorus	0.008										
Sulfate	1.4										

LDC #: 22234E6
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Duplicate Analysis

Reviewer: CR
2nd Reviewer: [illegible]

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 Was a duplicate sample analyzed for each matrix in this SDG?

Y (N) N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water and ≤ 35% for soil samples (≤ 10% for Method 300.0)? If no, see qualification below. A control limit of ±CRDL (±2X CRDL for soil) was used for samples that were ≤5X the CRDL, including when only one of the duplicate sample values were ≤5X the CRDL. If field blanks were used for laboratory duplicates, see overall assessment.

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Duplicate ID	Matrix	Analyte	RPD (Limits)	Associated Samples	Qualifications
	21	Soil	SO4	21 (≤20)	1-9	J/UJ/A (id)

Comments: _____

LDC #: 22234E6
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: QR
2nd Reviewer: L

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 Was a laboratory control sample (LCS) analyzed for each matrix in this SDG?

Y (N) N/A Were all LCS percent recoveries (%R) within the control limits of ~~80-120%~~ (85-115% for Method 300.0)?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	LCS ID	Matrix	Analyte	%R (limits)	Associated Samples	Qualifications
	LCS	Soil	CN	119 (85-115)	1-9, 11-14	J+ det/P (1)

Comments:

LDC#: 22234E6
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer:

Inorganics, Method See Cover

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Analyte	Concentration (mg/Kg) 2	Concentration (mg/Kg) 3	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Total Alkalinity	98	115		17	(≤22)	
Bicarbonate Alkalinity	98	115		17	(≤22)	
Chloride	45.7	41.8	9			
Nitrate as N	2.38	2.39		0.01	(≤0.54)	
pH (pH Units)	8.26	8.28	0			
Sulfate	4580	4280	7			
TOC	740	660		80	(≤290)	
Total Phosphorus	829	921	11			
Chlorate (ug/Kg)	183	400		217	(≤220)	
Perchlorate (ug/Kg)	1210	980		230	(≤550)	

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 9 through October 12, 2009

LDC Report Date: January 7, 2010

Matrix: Soil/Water

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905829

Sample Identification

SA39-0.5B
SA39-10B
SA39-25B
SA39-41B
SA137-0.5B
SA137-15B
SA137-31B
EB101209-SO1A3
RSAR7-0.5B
RSAR7-9B
RSAR7009-9B
RSAR7-20B
RSAR7-34B
RSAO7-9B
RSAO7-19B
RSAO7-29B
RSAO7-47B
SA39-25BMS
SA39-25BDUP
SA39-25BMSD

Introduction

This data review covers 19 soil samples and 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 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 Methods 9040B/9045D for pH, Standard Method 5540C for Surfactants, EPA Method 314.0 for Perchlorate, EPA Method 365.1 for Total Phosphorus, and EPA SW 846 Method 9060 and Lloyd/Kahn 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)	Chloride Nitrite as N Sulfate	0.09 mg/L 0.008 mg/L 0.13 mg/L	All water samples in SDG R0905829
ICB/CCB	Chloride Nitrite as N Sulfate	0.088 mg/L 0.00711 mg/L 0.192 mg/L	All water samples in SDG R0905829
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate	19 mg/Kg 19 mg/Kg	SA39-0.5B SA39-10B SA39-25B
ICB/CCB	Alkalinity, total Sulfate	0.5 mg/L 0.033 mg/L	SA39-0.5B SA39-10B SA39-25B
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate Chloride	9 mg/Kg 9 mg/Kg 1 mg/Kg	RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B

Method Blank ID	Analyte	Concentration	Associated Samples
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate Chloride	11 mg/Kg 11 mg/Kg 1.2 mg/Kg	SA39-41B SA137-0.5B SA137-15B SA137-31B RSAR7-0.5B RSAR7-9B RSAR7009-9B
PB (prep blank)	Total phosphorus	1.3 mg/Kg	SA39-10B SA39-25B SA39-41B SA137-0.5B SA137-15B SA137-31B RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B
ICB/CCB	Alkalinity, total	0.5 mg/L	RSAR7-0.5B
ICB/CCB	Total organic carbon	116.0 mg/Kg	All soil samples in SDG R0905829
ICB/CCB	Chloride	0.115 mg/L	RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B
ICB/CCB	Chloride	0.087 mg/L	SA39-0.5B
ICB/CCB	Chloride	0.086 mg/L	SA39-25B
ICB/CCB	Chloride Sulfate	0.104 mg/L 0.061 mg/L	SA39-41B SA137-0.5B SA137-15B SA137-31B RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B

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
EB101209-SO1A3	Chloride Nitrite as N	1.1 mg/L 0.008 mg/L	2.0U mg/L 0.010U mg/L
SA39-41B	Total organic carbon	210 mg/Kg	290U mg/Kg
SA137-15B	Total organic carbon	220 mg/Kg	290U mg/Kg
RSAR7-34B	Total organic carbon	150 mg/Kg	280U mg/Kg

Sample EB101209-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
EB101209-SO1A3	10/12/09	Ammonia as N Total organic carbon Chloride Nitrate as N pH Nitrite as N Total phosphorus Sulfate Surfactants Perchlorate	0.214 mg/L 0.1 mg/L 1.1 mg/L 0.70 mg/L 4.36 units 0.008 mg/L 0.007 mg/L 2.5 mg/L 0.019 mg/L 2.4 ug/L	RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B

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
RSAR7-0.5B	Nitrate as N Nitrite as N Sulfate	1.79 mg/Kg 0.09 mg/Kg 51.5 mg/Kg	1.79J+ mg/Kg 0.11U mg/Kg 51.5J+ mg/Kg
RSAR7-9B	Ammonia as N Nitrate as N Sulfate	1.14 mg/Kg 1.88 mg/Kg 137 mg/Kg	1.14J+ mg/Kg 1.88J+ mg/Kg 137J+ mg/Kg
RSAR7009-9B	Ammonia as N Nitrate as N Sulfate	1.10 mg/Kg 1.77 mg/Kg 130 mg/Kg	1.10J+ mg/Kg 1.77J+ mg/Kg 130J+ mg/Kg
RSAR7-20B	Ammonia as N Nitrate as N Sulfate	0.38 mg/Kg 1.45 mg/Kg 173 mg/Kg	0.54U mg/Kg 1.45J+ mg/Kg 173J+ mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
RSAR7-34B	Total organic carbon Nitrate as N	150 mg/Kg 5.46 mg/Kg	280U mg/Kg 5.46J+ mg/Kg
RSAO7-9B	Nitrate as N	5.41 mg/Kg	5.41J+ mg/Kg
RSAO7-19B	Nitrate as N Sulfate	1.28 mg/Kg 236 mg/Kg	1.28J+ mg/Kg 236J+ mg/Kg
RSAO7-29B	Nitrate as N Perchlorate	1.60 mg/Kg 223 ug/Kg	1.60J+ mg/Kg 223J+ ug/Kg
RSAO7-47B	Nitrate as N Nitrite as N	11.7 mg/Kg 0.14 mg/Kg	11.7J+ mg/Kg 0.16U 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 R0905829

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
SA39-0.5B	Nitrate as N	25.5 mg/Kg	25.5J+ mg/Kg
SA39-10B	Nitrate as N	3.77 mg/Kg	3.77J+ mg/Kg
SA39-25B	Nitrate as N	13.2 mg/Kg	13.2J+ mg/Kg
SA39-41B	Total organic carbon Nitrate as N	210 mg/Kg 4.39 mg/Kg	290U mg/Kg 4.39J+ mg/Kg
SA137-0.5B	Nitrate as N	12.6 mg/Kg	12.6J+ mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA137-15B	Total organic carbon Nitrate as N	220 mg/Kg 0.84 mg/Kg	290U mg/Kg 0.84J+ mg/Kg
SA137-31B	Nitrate as N	3.07 mg/Kg	3.07J+ mg/Kg
RSAR7-0.5B	Nitrate as N	1.79 mg/Kg	1.79J+ mg/Kg
RSAR7-9B	Nitrate as N	1.88 mg/Kg	1.88J+ mg/Kg
RSAR7009-9B	Nitrate as N	1.77 mg/Kg	1.77J+ mg/Kg
RSAR7-20B	Ammonia as N Nitrate as N	0.38 mg/Kg 1.45 mg/Kg	0.54U mg/Kg 1.45J+ mg/Kg
RSAR7-34B	Total organic carbon Nitrate as N	150 mg/Kg 5.46 mg/Kg	280U mg/Kg 5.46J+ mg/Kg
RSAO7-9B	Nitrate as N	5.41 mg/Kg	5.41J+ mg/Kg
RSAO7-19B	Nitrate as N	1.28 mg/Kg	1.28J+ mg/Kg
RSAO7-29B	Nitrate as N	1.60 mg/Kg	1.60J+ mg/Kg
RSAO7-47B	Nitrate as N	11.7 mg/Kg	11.7J+ 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
SA39-25BMS/MSD (All soil samples in SDG R0905829)	Perchlorate	-	72 (75-125)	-	J- (all detects) UJ (all non-detects)	A
SA39-25BMS (All soil samples in SDG R0905829)	Sulfate	156 (75-125)	-	-	J+ (all detects)	A

V. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (Limits)	Difference (Limits)	Flag	A or P
SA39-25BDUP (All soil samples in SDG R0905829)	Chloride	24 (≤20)	-	J (all detects) UJ (all non-detects)	A

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 with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
LCS (SA137-0.5B SA137-15B SA137-31B)	Cyanide	119 (85-115)	-	-	J+ (all detects)	P

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)	Compound	Flag	A or P
SA137-31B	Dichloroacetate	67 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	A
RSAR7-0.5B	Dichloroacetate	131 (90-115)	Chlorate	J+ (all detects)	A
RSAR7-9B	Dichloroacetate	69 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	A
RSAR7009-9B	Dichloroacetate	135 (90-115)	Chlorate	J+ (all 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 R0905829	All analytes reported below the PQL.	J (all detects)	A

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 RSAR7-9B and RSAR7009-9B were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAR7-9B	RSAR7009-9B				
Ammonia as N	1.14 mg/Kg	1.10 mg/Kg	4 (≤50)	-	-	-
Alkalinity, total	1490 mg/Kg	1510 mg/Kg	1 (≤50)	-	-	-
Alkalinity, bicarbonate	1360 mg/Kg	1400 mg/Kg	3 (≤50)	-	-	-
Alkalinity, carbonate	123 mg/Kg	118 mg/Kg	4 (≤50)	-	-	-
Chloride	20.5 mg/Kg	20.1 mg/Kg	2 (≤50)	-	-	-
Nitrate as N	1.88 mg/Kg	1.77 mg/Kg	-	0.11 (≤0.54)	-	-
Nitrite as N	2.94 mg/Kg	3.02 mg/Kg	3 (≤50)	-	-	-
pH	9.78 units	9.82 units	0 (≤50)	-	-	-
Sulfate	137 mg/Kg	130 mg/Kg	5 (≤50)	-	-	-
Surfactants	0.6U mg/Kg	0.7 mg/Kg	-	0.1 (≤2.2)	-	-
Hexavalent chromium	0.89 mg/Kg	1.03 mg/Kg	-	0.14 (≤0.43)	-	-
Hexavalent chromium	0.94 mg/Kg	0.95 mg/Kg	-	0.01 (≤0.43)	-	-

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAR7-9B	RSAR7009-9B				
Total organic carbon	840 mg/Kg	760 mg/Kg	-	80 (≤290)	-	-
Total phosphorus	833 mg/Kg	838 mg/Kg	1 (≤50)	-	-	-
Chlorate	21000 ug/Kg	19700 ug/Kg	6 (≤50)	-	-	-
Perchlorate	1260000 ug/Kg	1210000 ug/Kg	4 (≤50)	-	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Data Qualification Summary - SDG R0905829

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0905829	SA39-0.5B SA39-10B SA39-25B SA39-41B SA137-0.5B SA137-15B SA137-31B RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B	Perchlorate	J- (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R) (m)
R0905829	SA39-0.5B SA39-10B SA39-25B SA39-41B SA137-0.5B SA137-15B SA137-31B RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B	Sulfate	J+ (all detects)	A	Matrix spike analysis (%R) (m)
R0905829	SA39-0.5B SA39-10B SA39-25B SA39-41B SA137-0.5B SA137-15B SA137-31B RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B	Chloride	J (all detects) UJ (all non-detects)	A	Duplicate sample analysis (RPD) (ld)
R0905829	SA137-0.5B SA137-15B SA137-31B	Cyanide	J+ (all detects)	P	Laboratory control samples (%R) (l)

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0905829	SA137-31B RSAR7-9B	Chlorate	J- (all detects) UJ (all non-detects)	A	Surrogate spikes (%R) (s)
R0905829	RSAR7-0.5B RSAR7009-9B	Chlorate	J+ (all detects)	A	Surrogate spikes (%R) (s)
R0905829	SA39-0.5B SA39-10B SA39-25B SA39-41B SA137-0.5B SA137-15B SA137-31B EB101209-SO1A3 RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B	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 R0905829

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905829	EB101209-SO1A3	Chloride Nitrite as N	2.0U mg/L 0.010U mg/L	A	bl
R0905829	SA39-41B	Total organic carbon	290U mg/Kg	A	bl
R0905829	SA137-15B	Total organic carbon	290U mg/Kg	A	bl
R0905829	RSAR7-34B	Total organic carbon	280U mg/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Equipment Blank Data Qualification Summary - SDG R0905829

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905829	RSAR7-0.5B	Nitrate as N Nitrite as N Sulfate	1.79J+ mg/Kg 0.11U mg/Kg 51.5J+ mg/Kg	A	be

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905829	RSAR7-9B	Ammonia as N Nitrate as N Sulfate	1.14J+ mg/Kg 1.88J+ mg/Kg 137J+ mg/Kg	A	be
R0905829	RSAR7009-9B	Ammonia as N Nitrate as N Sulfate	1.10J+ mg/Kg 1.77J+ mg/Kg 130J+ mg/Kg	A	be
R0905829	RSAR7-20B	Ammonia as N Nitrate as N Sulfate	0.54U mg/Kg 1.45J+ mg/Kg 173J+ mg/Kg	A	be
R0905829	RSAR7-34B	Total organic carbon Nitrate as N	280U mg/Kg 5.46J+ mg/Kg	A	be
R0905829	RSAO7-9B	Nitrate as N	5.41J+ mg/Kg	A	be
R0905829	RSAO7-19B	Nitrate as N Sulfate	1.28J+ mg/Kg 236J+ mg/Kg	A	be
R0905829	RSAO7-29B	Nitrate as N Perchlorate	1.60J+ mg/Kg 223J+ ug/Kg	A	be
R0905829	RSAO7-47B	Nitrate as N Nitrite as N	11.7J+ mg/Kg 0.16U mg/Kg	A	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Field Blank Data Qualification Summary - SDG R0905829

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905829	SA39-0.5B	Nitrate as N	25.5J+ mg/Kg	A	bf
R0905829	SA39-10B	Nitrate as N	3.77J+ mg/Kg	A	bf
R0905829	SA39-25B	Nitrate as N	13.2J+ mg/Kg	A	bf
R0905829	SA39-41B	Total organic carbon Nitrate as N	290U mg/Kg 4.39J+ mg/Kg	A	bf
R0905829	SA137-0.5B	Nitrate as N	12.6J+ mg/Kg	A	bf
R0905829	SA137-15B	Total organic carbon Nitrate as N	290U mg/Kg 0.84J+ mg/Kg	A	bf

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905829	SA137-31B	Nitrate as N	3.07J+ mg/Kg	A	bf
R0905829	RSAR7-0.5B	Nitrate as N	1.79J+ mg/Kg	A	bf
R0905829	RSAR7-9B	Nitrate as N	1.88J+ mg/Kg	A	bf
R0905829	RSAR7009-9B	Nitrate as N	1.77J+ mg/Kg	A	bf
R0905829	RSAR7-20B	Ammonia as N Nitrate as N	0.54U mg/Kg 1.45J+ mg/Kg	A	bf
R0905829	RSAR7-34B	Total organic carbon Nitrate as N	280U mg/Kg 5.46J+ mg/Kg	A	bf
R0905829	RSAO7-9B	Nitrate as N	5.41J+ mg/Kg	A	bf
R0905829	RSAO7-19B	Nitrate as N	1.28J+ mg/Kg	A	bf
R0905829	RSAO7-29B	Nitrate as N	1.60J+ mg/Kg	A	bf
R0905829	RSAO7-47B	Nitrate as N	11.7J+ mg/Kg	A	bf

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234F6
SDG #: R0905829
Laboratory: Columbia Analytical Services

Date: 1/4/10
Page: 1 of 1
Reviewer: CR
2nd Reviewer: [signature]

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), ~~Dissolved Hexavalent Chromium (EPA Method 218.6)~~, 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: 10/9 - 10/12/09
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	SW	
IV	Surrogate Spikes	SW	
V	Matrix Spike/Matrix Spike Duplicates	SW	MS/D
VI.	Duplicates	SW	DUP
VII.	Laboratory control samples	SW	LCS/D
VIII.	Sample result verification	N	
IX.	Overall assessment of data	A	
X.	Field duplicates	SW	(10, 11)
XI	Field blanks	SW	EB=8, 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: all soil except 8=water

1	SA39-0.5B	11	RSAR7009-9B	21		31	PBLW
2	SA39-10B	12	RSAR7-20B	22		32	PBS
3	SA39-25B	13	RSAR7-34B	23		33	
4	SA39-41B	14	RSAO7-9B	24		34	
5	SA137-0.5B	15	RSAO7-19B	25		35	
6	SA137-15B	16	RSAO7-29B	26		36	
7	SA137-31B	17	RSAO7-47B	27		37	
8	EB101209-SO1A3	18	SA39-25BMS	28		38	
9	RSAR7-0.5B	19	SA39-25BDUP	29		39	
10	RSAR7-9B	20	✓ MSD	30		40	

Notes:

LDC #: 22234F6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: CR
2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1-17	Soil/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]
5-7		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:18		[✓ 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]
↓ 19		[✓ 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]
↓ 20		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 #: 22234F6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: [illegible]
2nd Reviewer: [illegible]

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?

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:** All Water

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/L)			8									
Cl	0.09	0.088		1.1 / 2.0									
NO2-N	0.008	0.00711		0.008 / 0.010									
SO4	0.13	0.192											

Conc. units: mg/Kg **Associated Samples:** 1-3

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Alk., Total	19	0.5											
Alk., Bicarb.	19												
SO4		0.033											

Conc. units: mg/Kg **Associated Samples:** 12-17

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Alk., Total	9												
Alk., Bicarb.	9												
Cl	1												

LDC #: 22234F6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CR
2nd Reviewer: [illegible]

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?
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/Kg **Associated Samples: 4-7, 9-11**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Alk., Total	11												
Alk., Bicarb.	11												
Cl	1.2												

Conc. units: mg/Kg **Associated Samples: 2-7, 9-17**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
T-P	1.3												

Conc. units: mg/Kg **Associated Samples: 9**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Alk., Total		0.5											

Conc. units: mg/Kg **Associated Samples: All Soil**

Analyte	Blank ID	Maximum ICB/CCB (mg/Kg)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			4	6	13							
TOC		116.0		210 / 290	220 / 290	150 / 280							

LDC #: 22234F6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CA
2nd Reviewer: W

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?
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/Kg **Associated Samples: 12-16**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.115											

Conc. units: mg/Kg **Associated Samples: 1**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.087											

Conc. units: mg/Kg **Associated Samples: 3**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.086											

Conc. units: mg/Kg **Associated Samples: 4-7, 9-14**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.104											
SO4		0.061											

LDC #: 22234F6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: SR
2nd Reviewer:

METHOD: Inorganics, Method See Cover
Y N N/A 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
Reason Code: be
Sampling date: 10/12/09 Soil factor applied NA
Field blank type: (circle one) Field Blank / Rinsate / Other: Equipment Blank
Associated Samples: 9-17

Analyte	Blank ID	Sample Identification									
	8	Action Level	9	10	11	12	13	14	15	16	17
Ammonia as N	0.214	21.4		1.14 J+	1.10 J+	0.38 / 0.54					
TOC (average)	0.1						150 / 280				
Chloride	1.1										
Nitrate as Nitrogen	0.70	70	1.79 J+	1.88 J+	1.77 J+	1.45 J+	5.46 J+	5.41 J+	1.28 J+	1.60 J+	11.7 J+
pH (pH Units)	4.36										
Nitrite as Nitrogen	0.008		0.09 / 0.11								0.14 / 0.16
Total phosphorus	0.007										
Sulfate	2.5	250	51.5 J+	137 J+	130 J+	173 J+			236 J+		
Surfactants	0.019										
Perchlorate	2.4 (ug/L)	240								223 J+ (ug/Kg)	

LDC #: 22234F6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: SR
2nd Reviewer:

METHOD: Inorganics, Method See Cover
Y N N/A 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 Reason Code: bf
Sampling date: 8/28/09 Soil factor applied 10X except TOC 1X
Field blank type: (circle one) Field Blank / Rinsate / Other: FB Associated Samples: All Soil

Analyte	Blank ID	Sample Identification																
	FB082809-SO (SDG# R0904894)	Action Level	1	2	3	4	5	6	7	9	10	11	12	13	14	15	16	17
Total alkalinity	1.9																	
Bicarbonate alkalinity	1.9																	
Ammonia as N	0.033												0.38 / 0.54					
TOC (average)	0.2					210 / 290		220 / 290						150 / 280				
Cl	1.2																	
Nitrate as N	0.68	68	25.5 J+	3.77 J+	13.2 J+	4.39 J+	12.6 J+	0.84 J+	3.07 J+	1.79 J+	1.88 J+	1.77 J+	1.45 J+	5.46 J+	5.41 J+	1.28 J+	1.60 J+	11.7 J+
pH (pH Units)	5.88																	
Total Phosphorus	0.008																	
Sulfate	1.4																	

LDC #: 22234F6
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: CR
2nd Reviewer: [illegible]

METHOD: Inorganics, EPA Method See cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y N N/A Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

Y N N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤35% for soil samples?

LEVEL IV ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	MS/MSD ID	Matrix	Analyte	MS %Recovery	MSD %Recovery	RPD (Limits)	Associated Samples	Qualifications
	18/20	Soil	ClO_4		72		All Soil	J-/UJ/A(m)
	18	Soil	SO_4	156	No MSD		↓	J+ det/A ↓

Comments:

LDC #: 22234F6
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Duplicate Analysis

Reviewer: CR
2nd 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 Was a duplicate sample analyzed for each matrix in this SDG?

Y N N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water and ≤ 35% for soil samples (≤ 10% for Method 300.0)? If no, see qualification below. A control limit of ±CRDL (±2X CRDL for soil) was used for samples that were ≤5X the CRDL, including when only one of the duplicate sample values were ≤5X the CRDL. If field blanks were used for laboratory duplicates, see overall assessment.

LEVEL IV ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Duplicate ID	Matrix	Analyte	RPD (Limits)	Associated Samples	Qualifications
	19	Soil	Cl	24 (≤20)	All Soil	J↓UJ↓A (1d)

Comments:

LDC #: 22234F6
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: CR
2nd 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 Was a laboratory control sample (LCS) analyzed for each matrix in this SDG?

Y (N) N/A Were all LCS percent recoveries (%R) within the control limits of ~~80-120%~~ (85-115% for Method 300.0)?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	LCS ID	Matrix	Analyte	%R (limits)	Associated Samples	Qualifications
	LCS	Soil	CN	119 (85-115)	5-7	J+ de+/P (l)

Comments:

LDC #: 22234F6
SDG #: See cover

VALIDATION FINDINDS WORKSHEET
Surrogate Recovery

Page: 1 of 1
Reviewer: CR
2nd Reviewer:

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".
[✓ Y] N N/A Were surrogates spiked into all samples and blanks?
Y [✓ N] N/A Did all surrogate recoveries (%R) meet the QC limits?

#	Date	Lab ID/Reference	Column	Surrogate Compound	%R (Limits)	Associated Samples	Qualifications
		ClO3		DCA	*67 (90-115)	7	J-/UJ/A (S)
					131 ( )	9	J+det/A
					69 ( )	10	J-/UJ/A
					135 (↓)	11	J+det/A ↓
					( )		
					( )		
					( )		
					( )		
					( )		
					( )		
					( )		
					( )		
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					( )		
					( )		
					( )		
					( )		
					( )		
					( )		

Letter Designation	Surrogate Compound	Recovery QC Limits (Soil)	Recovery QC Limits (Water)	Comments
A	Dichloroacetate			
B				

LDC#: 22234F6
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: QR
2nd Reviewer: [illegible]

Inorganics, Method See Cover

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Analyte	Concentration (mg/Kg) 10	Concentration (mg/Kg) 11	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Ammonia as N	1.14	1.10	4			
Total Alkalinity	1490	1510	1			
Bicarbonate Alkalinity	1360	1400	3			
Carbonate Alkalinity	123	118	4			
Chloride	20.5	20.1	2			
Nitrate as N	1.88	1.77		0.11	(≤0.54)	
Nitrite as N	2.94	3.02	3			
pH (pH Units)	9.78	9.82	0			
Sulfate	137	130	5			
Surfactants	0.6U	0.7		0.1	(≤2.2)	
Hexavalent Chromium	0.89	1.03		0.14	(≤0.43)	
Hexavalent Chromium	0.94	0.95		0.01	(≤0.43)	
TOC	840	760		80	(≤290)	
Total Phosphorus	833	838	1			
Chlorate (ug/Kg)	21000	19700	6			
Perchlorate (ug/Kg)	12600000	1210000	4			

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 13 through October 15, 2009

LDC Report Date: January 7, 2010

Matrix: Soil/Water

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905882

Sample Identification

RSAN8-0.5B
RSAN8-10B
RSAN8-20B
RSAN8-28B
EB101409-SO1A3
SA160-0.5B
SA160-10B
SA160-20B
SA160-34B
SA178-0.5B
SA178-10B
SA178-17B
SA178-25B
SA178-43B
SA141-14B
SA141009-14B
SA141-24B
SA141-30B
SA143-24B
SA143-34B
SA143-50B
SA143009-50B
EB101409-SO1A3MS
EB101409-SO1A3MSD
EB101409-SO1A3DUP
SA160-10BMS
SA160-10BMSD
SA160-10BDUP

Introduction

This data review covers 24 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 9012A for Cyanide, 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 EPA SW 846 Method 9060 and Lloyd/Kahn 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)	Sulfate	0.13 mg/L	All water samples in SDG R0905882
ICB/CCB	Alkalinity, total Total organic carbon Cyanide Chloride Sulfate	0.5 mg/L 0.166 mg/L 0.00640 mg/L 0.094 mg/L 0.192 mg/L	All water samples in SDG R0905882
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate	9 mg/Kg 9 mg/Kg	RSAN8-0.5B RSAN8-10B RSAN8-20B RSAN8-28B SA160-0.5B SA160-10B SA160-20B SA160-34B SA178-0.5B SA178-10B

Method Blank ID	Analyte	Concentration	Associated Samples
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate Chloride	11 mg/Kg 11 mg/Kg 1 mg/Kg	SA178-17B SA178-25B SA178-43B SA141-14B SA141009-14B SA141-24B SA141-30B SA143-24B SA143-34B
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate Chloride	12 mg/Kg 12 mg/Kg 1.2 mg/Kg	SA143-50B SA143009-50B
ICB/CCB	Chloride	0.174 mg/L	SA143-50B SA143009-50B
PB (prep blank)	Total phosphorus	1.3 mg/Kg	All soil samples in SDG R0905882
ICB/CCB	Total organic carbon	116.0 mg/Kg	All soil samples in SDG R0905882
ICB/CCB	Alkalinity, total	0.5 mg/L	SA178-17B SA178-25B SA178-43B SA141-14B SA141009-14B SA143-24B SA143-34B
ICB/CCB	Sulfate	0.177 mg/L	RSAN8-0.5B
ICB/CCB	Sulfate	0.107 mg/L	SA178-10B
ICB/CCB	Chloride	0.115 mg/L	RSAN8-0.5B RSAN8-28B
ICB/CCB	Chloride	0.118 mg/L	SA160-0.5B SA160-34B SA178-0.5B SA178-10B
ICB/CCB	Chloride Sulfate	0.112 mg/L 0.088 mg/L	SA141009-14B SA141-24B SA141-30B SA143-24B SA143-34B
ICB/CCB	Chloride Sulfate	0.104 mg/L 0.061 mg/L	SA178-17B SA178-25B SA178-43B SA141-14B

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Chloride	0.105 mg/L	RSAN8-10B RSAN8-20B SA160-10B
ICB/CCB	Chloride	0.079 mg/L	SA160-20B
ICB/CCB	Sulfate	0.149 mg/L	RSAN8-10B RSAN8-20B RSAN8-28B SA160-0.5B SA160-10B SA160-20B SA160-34B SA178-0.5B

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
EB101409-SO1A3	Total organic carbon Chloride	0.2 mg/L 1.7 mg/L	1.0U mg/L 2.0U mg/L
RSAN8-28B	Total organic carbon	130 mg/Kg	300U mg/Kg
SA160-34B	Total organic carbon	200 mg/Kg	290U mg/Kg
SA178-43B	Total organic carbon	130 mg/Kg	290U mg/Kg
SA143-24B	Total organic carbon	230 mg/Kg	300U mg/Kg
SA143-34B	Total organic carbon	270 mg/Kg	300U mg/Kg
SA143-50B	Total organic carbon	250 mg/Kg	290U mg/Kg

Sample EB101409-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
EB101409-SO1A3	10/14/09	Ammonia as N Total organic carbon Chloride Nitrate as N pH Sulfate Surfactants	0.185 mg/L 0.2 mg/L 1.7 mg/L 0.73 mg/L 3.60 units 9.3 mg/L 0.051 mg/L	SA160-0.5B SA160-10B SA160-20B SA160-34B SA178-0.5B SA178-10B SA178-17B SA178-25B SA178-43B

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
SA160-0.5B	Ammonia as N Nitrate as N Sulfate	0.70 mg/Kg 6.02 mg/Kg 329 mg/Kg	0.70J+ mg/Kg 6.02J+ mg/Kg 329J+ mg/Kg
SA160-10B	Nitrate as N Sulfate	5.48 mg/Kg 566 mg/Kg	5.48J+ mg/Kg 566J+ mg/Kg
SA160-20B	Nitrate as N Sulfate	1.90 mg/Kg 214 mg/Kg	1.90J+ mg/Kg 214J+ mg/Kg
SA160-34B	Total organic carbon Nitrate as N	200 mg/Kg 2.55 mg/Kg	290U mg/Kg 2.55J+ mg/Kg
SA178-0.5B	Nitrate as N Sulfate	1.42 mg/Kg 294 mg/Kg	1.42J+ mg/Kg 294J+ mg/Kg
SA178-10B	Nitrate as N Sulfate	6.26 mg/Kg 54.8 mg/Kg	6.26J+ mg/Kg 54.8J+ mg/Kg
SA178-17B	Nitrate as N Sulfate	4.59 mg/Kg 63.9 mg/Kg	4.59J+ mg/Kg 63.9J+ mg/Kg
SA178-25B	Nitrate as N Sulfate	4.91 mg/Kg 37.5 mg/Kg	4.91J+ mg/Kg 37.5J+ mg/Kg
SA178-43B	Total organic carbon Nitrate as N Sulfate	130 mg/Kg 9.27 mg/Kg 287 mg/Kg	290U mg/Kg 9.27J+ mg/Kg 287J+ 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 R0905882

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
RSAN8-0.5B	Ammonia as N Nitrate as N	0.39 mg/Kg 2.47 mg/Kg	0.51U mg/Kg 2.47J+ mg/Kg
RSAN8-10B	Nitrate as N	7.89 mg/Kg	7.89J+ mg/Kg
RSAN8-20B	Nitrate as N	2.30 mg/Kg	2.30J+ mg/Kg
RSAN8-28B	Total organic carbon Nitrate as N	130 mg/Kg 6.67 mg/Kg	300U mg/Kg 6.67J+ mg/Kg
SA160-0.5B	Nitrate as N	6.02 mg/Kg	6.02J+ mg/Kg
SA160-10B	Nitrate as N	5.48 mg/Kg	5.48J+ mg/Kg
SA160-20B	Nitrate as N	1.90 mg/Kg	1.90J+ mg/Kg
SA160-34B	Total organic carbon Nitrate as N	200 mg/Kg 2.55 mg/Kg	290U mg/Kg 2.55J+ mg/Kg
SA178-0.5B	Nitrate as N	1.42 mg/Kg	1.42J+ mg/Kg
SA178-10B	Nitrate as N	6.26 mg/Kg	6.26J+ mg/Kg
SA178-17B	Nitrate as N	4.59 mg/Kg	4.59J+ mg/Kg
SA178-25B	Nitrate as N	4.91 mg/Kg	4.91J+ mg/Kg
SA178-43B	Total organic carbon Nitrate as N	130 mg/Kg 9.27 mg/Kg	290U mg/Kg 9.27J+ mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA141-14B	Nitrate as N	5.68 mg/Kg	5.68J+ mg/Kg
SA141009-14B	Nitrate as N	5.58 mg/Kg	5.58J+ mg/Kg
SA141-24B	Nitrate as N	2.50 mg/Kg	2.50J+ mg/Kg
SA141-30B	Nitrate as N	5.43 mg/Kg	5.43J+ mg/Kg
SA143-24B	Total organic carbon Nitrate as N	230 mg/Kg 6.71 mg/Kg	300U mg/Kg 6.71J+ mg/Kg
SA143-34B	Total organic carbon Nitrate as N	270 mg/Kg 1.42 mg/Kg	300U mg/Kg 1.42J+ mg/Kg
SA143-50B	Total organic carbon Nitrate as N	250 mg/Kg 2.60 mg/Kg	290U mg/Kg 2.60J+ mg/Kg
SA143009-50B	Nitrate as N	2.70 mg/Kg	2.70J+ 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
SA160-10BMS (All soil samples in SDG R0905882)	Chloride Sulfate	138 (75-125) 194 (75-125)	- -	- -	J+ (all detects) J+ (all detects)	A

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)	Compound	Flag	A or P
SA141-14B	Dichloroacetate	82 (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 R0905882	All analytes reported below the PQL.	J (all detects)	A

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 SA141-14B and SA141009-14B and samples SA143-50B and SA143009-50B were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA141-14B	SA141009-14B				
Alkalinity, total	269 mg/Kg	259 mg/Kg	4 (≤50)	-	-	-
Alkalinity, bicarbonate	260 mg/Kg	253 mg/Kg	3 (≤50)	-	-	-
Alkalinity, carbonate	8 mg/Kg	6 mg/Kg	-	2 (≤21)	-	-
Chloride	1060 mg/Kg	1020 mg/Kg	4 (≤50)	-	-	-
Nitrate as N	5.68 mg/Kg	5.58 mg/Kg	-	0.1 (≤0.54)	-	-

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA141-14B	SA141009-14B				
pH	8.22 units	8.27 units	1 (≤50)	-	-	-
Sulfate	444 mg/Kg	408 mg/Kg	8 (≤50)	-	-	-
Surfactants	0.6U mg/Kg	1.5 mg/Kg	-	0.9 (≤2.2)	-	-
Total organic carbon	620 mg/Kg	620 mg/Kg	-	0 (≤300)	-	-
Total phosphorus	702 mg/Kg	794 mg/Kg	12 (≤50)	-	-	-
Chlorate	11100 ug/Kg	9800 ug/Kg	12 (≤50)	-	-	-
Perchlorate	3560 ug/Kg	3180 ug/Kg	11 (≤50)	-	-	-

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA143-50B	SA143009-50B				
Alkalinity, total	170 mg/Kg	105 mg/Kg	47 (≤50)	-	-	-
Alkalinity, bicarbonate	170 mg/Kg	105 mg/Kg	47 (≤50)	-	-	-
Chloride	88.3 mg/Kg	85.7 mg/Kg	3 (≤50)	-	-	-
Nitrate as N	2.60 mg/Kg	2.70 mg/Kg	4 (≤50)	-	-	-
pH	7.24 units	7.48 units	3 (≤50)	-	-	-
Sulfate	7690 mg/Kg	6890 mg/Kg	11 (≤50)	-	-	-
Surfactants	0.6U mg/Kg	0.7 mg/Kg	-	0.1 (≤2.3)	-	-
Total organic carbon	250 mg/Kg	370 mg/Kg	-	120 (≤300)	-	-
Total phosphorus	585 mg/Kg	630 mg/Kg	7 (≤50)	-	-	-
Chlorate	1080 ug/Kg	1190 ug/Kg	-	110 (≤240)	-	-
Perchlorate	324 ug/Kg	414 ug/Kg	24 (≤50)	-	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Data Qualification Summary - SDG R0905882

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0905882	RSAN8-0.5B RSAN8-10B RSAN8-20B RSAN8-28B SA160-0.5B SA160-10B SA160-20B SA160-34B SA178-0.5B SA178-10B SA178-17B SA178-25B SA178-43B SA141-14B SA141009-14B SA141-24B SA141-30B SA143-24B SA143-34B SA143-50B SA143009-50B	Chloride Sulfate	J+ (all detects) J+ (all detects)	A	Matrix spike analysis (%R) (m)
R0905882	SA141-14B	Chlorate	J- (all detects) UJ (all non-detects)	A	Surrogate spikes (%R) (s)
R0905882	RSAN8-0.5B RSAN8-10B RSAN8-20B RSAN8-28B EB101409-SO1A3 SA160-0.5B SA160-10B SA160-20B SA160-34B SA178-0.5B SA178-10B SA178-17B SA178-25B SA178-43B SA141-14B SA141009-14B SA141-24B SA141-30B SA143-24B SA143-34B SA143-50B SA143009-50B	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 R0905882

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905882	EB101409-SO1A3	Total organic carbon Chloride	1.0U mg/L 2.0U mg/L	A	bl
R0905882	RSAN8-28B	Total organic carbon	300U mg/Kg	A	bl
R0905882	SA160-34B	Total organic carbon	290U mg/Kg	A	bl
R0905882	SA178-43B	Total organic carbon	290U mg/Kg	A	bl
R0905882	SA143-24B	Total organic carbon	300U mg/Kg	A	bl
R0905882	SA143-34B	Total organic carbon	300U mg/Kg	A	bl
R0905882	SA143-50B	Total organic carbon	290U mg/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Equipment Blank Data Qualification Summary - SDG R0905882

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905882	SA160-0.5B	Ammonia as N Nitrate as N Sulfate	0.70J+ mg/Kg 6.02J+ mg/Kg 329J+ mg/Kg	A	be
R0905882	SA160-10B	Nitrate as N Sulfate	5.48J+ mg/Kg 566J+ mg/Kg	A	be
R0905882	SA160-20B	Nitrate as N Sulfate	1.90J+ mg/Kg 214J+ mg/Kg	A	be
R0905882	SA160-34B	Total organic carbon Nitrate as N	290U mg/Kg 2.55J+ mg/Kg	A	be
R0905882	SA178-0.5B	Nitrate as N Sulfate	1.42J+ mg/Kg 294J+ mg/Kg	A	be
R0905882	SA178-10B	Nitrate as N Sulfate	6.26J+ mg/Kg 54.8J+ mg/Kg	A	be

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905882	SA178-17B	Nitrate as N Sulfate	4.59J+ mg/Kg 63.9J+ mg/Kg	A	be
R0905882	SA178-25B	Nitrate as N Sulfate	4.91J+ mg/Kg 37.5J+ mg/Kg	A	be
R0905882	SA178-43B	Total organic carbon Nitrate as N Sulfate	290U mg/Kg 9.27J+ mg/Kg 287J+ mg/Kg	A	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Field Blank Data Qualification Summary - SDG R0905882

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905882	RSAN8-0.5B	Ammonia as N Nitrate as N	0.51U mg/Kg 2.47J+ mg/Kg	A	bf
R0905882	RSAN8-10B	Nitrate as N	7.89J+ mg/Kg	A	bf
R0905882	RSAN8-20B	Nitrate as N	2.30J+ mg/Kg	A	bf
R0905882	RSAN8-28B	Total organic carbon Nitrate as N	300U mg/Kg 6.67J+ mg/Kg	A	bf
R0905882	SA160-0.5B	Nitrate as N	6.02J+ mg/Kg	A	bf
R0905882	SA160-10B	Nitrate as N	5.48J+ mg/Kg	A	bf
R0905882	SA160-20B	Nitrate as N	1.90J+ mg/Kg	A	bf
R0905882	SA160-34B	Total organic carbon Nitrate as N	290U mg/Kg 2.55J+ mg/Kg	A	bf
R0905882	SA178-0.5B	Nitrate as N	1.42J+ mg/Kg	A	bf
R0905882	SA178-10B	Nitrate as N	6.26J+ mg/Kg	A	bf
R0905882	SA178-17B	Nitrate as N	4.59J+ mg/Kg	A	bf
R0905882	SA178-25B	Nitrate as N	4.91J+ mg/Kg	A	bf

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905882	SA178-43B	Total organic carbon Nitrate as N	290U mg/Kg 9.27J+ mg/Kg	A	bf
R0905882	SA141-14B	Nitrate as N	5.68J+ mg/Kg	A	bf
R0905882	SA141009-14B	Nitrate as N	5.58J+ mg/Kg	A	bf
R0905882	SA141-24B	Nitrate as N	2.50J+ mg/Kg	A	bf
R0905882	SA141-30B	Nitrate as N	5.43J+ mg/Kg	A	bf
R0905882	SA143-24B	Total organic carbon Nitrate as N	300U mg/Kg 6.71J+ mg/Kg	A	bf
R0905882	SA143-34B	Total organic carbon Nitrate as N	300U mg/Kg 1.42J+ mg/Kg	A	bf
R0905882	SA143-50B	Total organic carbon Nitrate as N	290U mg/Kg 2.60J+ mg/Kg	A	bf
R0905882	SA143009-50B	Nitrate as N	2.70J+ mg/Kg	A	bf

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234G6
SDG #: R0905882
Laboratory: Columbia Analytical Services

Date: 1-4-10
Page: 1 of 1
Reviewer: CR
2nd Reviewer: W

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), ~~Dissolved Hexavalent Chromium (EPA Method 218.6)~~, 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 ~~A~~ CF	Sampling dates: 10/13 - 10/15/09
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	SW	
IV	Surrogate Spikes	SW	
V	Matrix Spike/Matrix Spike Duplicates	SW	MS/D
VI.	Duplicates	A	Dup
VII.	Laboratory control samples	A	LCS/D
VIII.	Sample result verification	N	
IX.	Overall assessment of data	A	
X.	Field duplicates	SW	(15,16), (21,22)
XI	Field blanks	SW	EB=5, FB= FB082807+SO (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: Soil/water

1	RSAN8-0.5B S	11	SA178-10B S	21	SA143-50B S	31	PBS
2	RSAN8-10B	12	SA178-17B	22	SA143009-50B	32	PBW
3	RSAN8-20B	13	SA178-25B	23	EB101409-SO1A3MS W	33	
4	RSAN8-28B	14	SA178-43B	24	EB101409-SO1A3MSD	34	
5	EB101409-SO1A3 W	15	SA141-14B	25	EB101409-SO1A3DUP	35	
6	SA160-0.5B S	16	SA141009-14B	26	SA160-10BMS S	36	
7	SA160-10B	17	SA141-24B	27	SA160-10BMSD	37	
8	SA160-20B	18	SA141-30B	28	SA160-10BDUP	38	
9	SA160-34B	19	SA143-24B	29		39	
10	SA178-0.5B	20	SA143-34B	30		40	

Notes: _____

LDC #: 22234G6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: CR
2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1-22	S/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]
1-5, 10-14		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: 23		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
24		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
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
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 Cl 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 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 #: 22234G6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CR
2nd 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?
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:** All Water

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/L)			5									
Alk., Total		0.5											
TOC		0.166		0.2 / 1.0									
CN		0.00640											
Cl		0.094		1.7 / 2.0									
SO4	0.13	0.192											

Conc. units: mg/Kg **Associated Samples:** 1-4, 6-11

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Alk., Total	9												
Alk., Bicarb.	9												

LDC #: 22234G6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

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?

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/Kg **Associated Samples: 12-20**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Alk., Total	11												
Alk., Bicarb.	11												
Cl	1												

Conc. units: mg/Kg **Associated Samples: 21, 22**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Alk., Total	12												
Alk., Bicarb.	12												
Cl	1.2	0.174											

Conc. units: mg/Kg **Associated Samples: All Soil**

Analyte	Blank ID	Maximum ICB/CCB (mg/Kg)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			4	9	14	19	20	21				
T-P	1.3												
TOC		116.0		130 / 300	200 / 290	130 / 290	230 / 300	270 / 300	250 / 290				

LDC #: 22234G6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CR
2nd Reviewer: [illegible]

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?
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/Kg **Associated Samples:** 12-16, 19, 20

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Alk., Total		0.5											

Conc. units: mg/Kg **Associated Samples:** 1

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
SO4		0.177											

Conc. units: mg/Kg **Associated Samples:** 11

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
SO4		0.107											

Conc. units: mg/Kg **Associated Samples:** 1, 4

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.115											

LDC #: 22234G6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CR
2nd 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?
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/Kg **Associated Samples: 6, 9-11**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.118											

Conc. units: mg/Kg **Associated Samples: 16-20**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.112											
SO4		0.088											

Conc. units: mg/Kg **Associated Samples: 12-15**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.104											
SO4		0.061											

LDC #: 22234G6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CR
2nd 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?
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/Kg **Associated Samples: 2, 3, 7**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.105											

Conc. units: mg/Kg **Associated Samples: 8**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.079											

Conc. units: mg/Kg **Associated Samples: 2-4, 6-10**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
SO4		0.149											

LDC #: 22234F6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: SR
2nd Reviewer:

METHOD: Inorganics, Method See Cover
Y N N/A 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: 10/14/09 Soil factor applied NA
Field blank type: (circle one) Field Blank / Rinsate / Other: Equipment Blank

Reason Code: be

Associated Samples: 6-14

Analyte	Blank ID	Sample Identification										
	5	Action Level	6	7	8	9	10	11	12	13	14
Ammonia as N	0.185	18.5	0.70 J+								
TOC (average)	0.2					200 / 290					130 / 290
Chloride	1.7										
Nitrate as Nitrogen	0.73	73	6.02 J+	5.48 J+	1.90 J+	2.55 J+	1.42 J+	6.26 J+	4.59 J+	4.91 J+	9.27 J+
pH (pH Units)	3.60										
~~Nitrite as Nitrogen~~											
~~Total phosphorus~~											
Sulfate	9.3	930	329 J+	566 J+	214 J+		294 J+	54.8 J+	63.9 J+	37.5 J+	287 J+
Surfactants	0.051	5.1									

LDC #: 22234G6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: QR
2nd Reviewer: [illegible]

METHOD: Inorganics, Method See Cover
Y N N/A 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 Reason Code: bf
Sampling date: 8/28/09 Soil factor applied 10X except TOC 1X
Field blank type: (circle one) Field Blank / Rinsate / Other: FB Associated Samples: All Soil

Analyte	Blank ID	Sample Identification																				
	FB082809-SO (SDG# R0904894)	Action Level	1	2	3	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Total alkalinity	1.9																						
Bicarbonate alkalinity	1.9																						
Ammonia as N	0.033		0.39 / 0.51																				
TOC (average)	0.2					130 / 300				200 / 290					130 / 290					230 / 300	270 / 300	250 / 290	
Cl	1.2																						
Nitrate as N	0.68	68	2.47 J+	7.89 J+	2.30 J+	6.67 J+	6.02 J+	5.48 J+	1.90 J+	2.55 J+	1.42 J+	6.26 J+	4.59 J+	4.91 J+	9.27 J+	5.68 J+	5.58 J+	2.50 J+	5.43 J+	6.71 J+	1.42 J+	2.60 J+	2.70 J+
pH (pH Units)	5.88																						
Total-P	0.008																						
Sulfate	1.4																						

LDC #: 2223466
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Reviewer: CR
2nd Reviewer: [illegible]

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 Was a matrix spike analyzed for each matrix in this SDG?

Y (N) N/A Were matrix spike percent recoveries (%R) within the control limits of 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:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
	26	Soil	Cl	138	All Soil	J+ det/A (m)
			SO4	194	↓	↓

Comments:

LDC #: 22253466
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: AR
2nd Reviewer: [illegible]

METHOD: Inorganics, EPA Method See cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y N N/A Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

Y N N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤35% for soil samples?

LEVEL IV ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	MS/MSD ID	Matrix	Analyte	MS %Recovery	MSD %Recovery	RPD (Limits)	Associated Samples	Qualifications
	26/27	Soil	ClO3			25 (≤20)	All Soil	No Qual

Comments:

LDC #: 22234G6
SDG #: see cover

VALIDATION FINDINDS WORKSHEET
Surrogate Recovery

Reviewer: CR
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".

(Y) N N/A Were surrogates spiked into all samples and blanks?

Y (N) N/A Did all surrogate recoveries (%R) meet the QC limits?

#	Date	Lab ID/Reference	Column	Surrogate Compound	%R (Limits)	Associated Samples	Qualifications
		ClO3		DCA	82 (90-115)	15	J-/UJ/A (s)
					( )		
					( )		
					( )		
					( )		
					( )		
					( )		
					( )		
					( )		
					( )		
					( )		
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					( )		
					( )		
					( )		
					( )		
					( )		

Letter Designation	Surrogate Compound	Recovery QC Limits (Soil)	Recovery QC Limits (Water)	Comments
A	Dichloroacetate			
B				

LDC#: 22234G6
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer: VW

Inorganics, Method See Cover

(Y) N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Analyte	Concentration (mg/Kg)		RPD (≤50)	Difference	Limits	Qualification (Parent only)
	15	16				
Total Alkalinity	269	259	4			
Bicarbonate Alkalinity	260	253	3			
Carbonate Alkalinity	8	6		2	(≤21)	
Chloride	1060	1020	4			
Nitrate as N	5.68	5.58		0.1	(≤0.54)	
pH (pH Units)	8.22	8.27	1			
Sulfate	444	408	8			
Surfactants	0.6U	1.5		0.9	(≤2.2)	
TOC	620	620		0	(≤300)	
Total Phosphorus	702	794	12			
Chlorate (ug/Kg)	11100	9800	12			
Perchlorate (ug/Kg)	3560	3180	11			

LDC#: 22234G6
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer: W

Inorganics, Method See Cover

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Analyte	Concentration (mg/Kg)		RPD (≤50)	Difference	Limits	Qualification (Parent only)
	21	22				
Total Alkalinity	170	105	47			
Bicarbonate Alkalinity	170	105	47			
Chloride	88.3	85.7	3			
Nitrate as N	2.60	2.70	4			
pH (pH Units)	7.24	7.48	3			
Sulfate	7690	6890	11			
Surfactants	0.6U	0.7		0.1	(≤2.3)	
TOC	250	370		120	(≤300)	
Total Phosphorus	585	630	7			
Chlorate (ug/Kg)	1080	1190		110	(≤240)	
Perchlorate (ug/Kg)	324	414	24			

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 13, 2009

LDC Report Date: January 7, 2010

Matrix: Soil

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905885/K0910208

Sample Identification

RAN8-10BSPLP2
RAN8-10BSPLP3
RAN8-10BSPLP2MS
RAN8-10BSPLP2MSD
RAN8-10BSPLP2DUP
RAN8-10BSPLP3RE

Samples in this SDG underwent SPLP extraction

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 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 365.1 for Total Phosphorus, Standard Method 2540C for Total Dissolved Solids, Standard Method 2540D for Total Suspended Solids, 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.

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 Nitrate as N pH Total phosphorus Sulfate	0.5 mg/L 0.5 mg/L 0.016 mg/L 0.1 mg/L 5.69 umhos/cm 0.110 mg/L 5.02 units 0.011 mg/L 0.78 mg/L	RAN8-10BSPLP2
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Chloride Conductivity Nitrate as N pH Total phosphorus Total dissolved solids Sulfate	1.9 mg/L 1.9 mg/L 0.027 mg/L 0.09 mg/L 2.09 umhos/cm 0.070 mg/L 5.61 units 0.008 mg/L 8 mg/L 0.07 mg/L	RAN8-10BSPLP3
ICB/CCB	Sulfate	0.098 mg/L	RAN8-10BSPLP2 RAN8-10BSPLP3

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
RAN8-10BSPLP2	Ammonia as N Total phosphorus	0.030 mg/L 0.006 mg/L	0.050U mg/L 0.050U mg/L
RAN8-10BSPLP3	Ammonia as N Nitrate as N Total phosphorus	0.030 mg/L 0.299 mg/L 0.007 mg/L	0.050U mg/L 0.299J+ 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) 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 R0905885/K0910208	All analytes reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

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
RAN8-10BSPLP3	Nitrite as N	X	A

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 R0905885/K0910208

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0905885/ K0910208	RAN8-10BSPLP2 RAN8-10BSPLP3 RAN8-10BSPLP3RE	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)
R0905885/ K0910208	RAN8-10BSPLP3	Nitrate as N	X	A	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R0905885/K0910208

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905885/ K0910208	RAN8-10BSPLP2	Ammonia as N Total phosphorus	0.050U mg/L 0.050U mg/L	A	bl
R0905885/ K0910208	RAN8-10BSPLP3	Ammonia as N Nitrate as N Total phosphorus	0.050U mg/L 0.299J+ mg/L 0.050U mg/L	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Field Blank Data Qualification Summary - SDG R0905885/K0910208

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234H6
SDG #: R0905885/K0910208
Laboratory: Columbia Analytical Services

Date: 1-4-10
Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: (Analyte) Alkalinity (SM2320B), Ammonia-N (EPA Method 350.1), Bromide, Chloride, Nitrate-N, ~~Nitrite-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)~~, Hexavalent Chromium (EPA SW846 Method 7199), pH (EPA SW846 Method 9040B/~~9045D),~~ Surfactants (SM5540C), Perchlorate (EPA Method 314.0), Total Phosphorus (EPA Method 365.1), TDS (SM2540C), TSS (SM2540D), Nitrite-N (353.2), TOC (EPA SW846 9.60)

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: 10/13/09
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	SW	
IV	Surrogate Spikes	A	
V	Matrix Spike/Matrix Spike Duplicates	A	MS/D
VI.	Duplicates	A	DUP
VII.	Laboratory control samples	A	LCS
VIII.	Sample result verification	N	
IX.	Overall assessment of data	SW	
X.	Field duplicates	N	
XI	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: Soil

1	RAN8-10BSPLP2	11	PBW	21		31	
2	RAN8-10BSPLP3	12	PBW	22		32	
3	RAN8-10BSPLP2MS	13		23		33	
4	RAN8-10BSPLP2MSD	14		24		34	
5	RAN8-10BSPLP2DUP	15		25		35	
6	RAN8-10SPLP3RE	16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes: _____

LDC #: 22234K6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer:
2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1,2	Soil	[✓ 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:3		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
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
5		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
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 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 #: 22234H6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CR
2nd 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?

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:** 1

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit								
	PB (mg/L)			1							
Alk., Total	0.5										
Alk., Bicarb.	0.5										
NH3-N	0.016			0.030 / 0.050							
Cl	0.1										
Cond (umhos/cm)	5.69		56.9								
NO3-N	0.110		1.10								
pH (pH units)	5.02										
T-P	0.011			0.006 / 0.050							
SO4	0.78		7.8								

LDC #: 22234H6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CR
2nd Reviewer: [illegible]

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?
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:** 2

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit								
	PB (mg/L)			2							
Alk., Total	1.9										
Alk., Bicarb.	1.9										
NH3-N	0.027			0.030 / 0.050							
Cl	0.09										
Cond (umhos/cm)	2.09		20.9								
NO3-N	0.070		0.70	0.299 J+							
pH (pH units)	5.61										
T-P	0.008			0.007 / 0.050							
TDS	8										
SO4	0.07										

Conc. units: mg/L **Associated Samples:** 1, 2

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit								
	PB (mg/L)			No Qualifiers							
SO4		0.098									

LDC #: 22234H6
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Reviewer: QR
2nd Reviewer: LA

METHOD: Inorganics, Method See cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		2	NO_3-N		X/A (a)

Comments:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 16 through October 19, 2009

LDC Report Date: January 7, 2010

Matrix: Soil/Water

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905963

Sample Identification

SA108-20B
SA108-30B
SA108-45B
SA142-20.5B
SA142009-20.5B
SA142-30.5B
SA142-51B
EB101909-SO1A3
SA157-10B
SA157-25B
SA157-44B
SA171-5B
SA171-15B
SA171-30B
SA171-41B
SA108-20BMS
SA108-20BMSD
SA108-20BDUP

Introduction

This data review covers 17 soil samples and 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 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 Methods 9040B/9045D for pH, Standard Method 5540C for Surfactants, EPA Method 314.0 for Perchlorate, EPA Method 365.1 for Total Phosphorus, and EPA SW 846 Method 9060 and Lloyd/Kahn 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 with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
10/20/09	CCV (09:28)	Hexavalent chromium	120 (90-110)	All water samples in SDG R0905963	J+ (all detects)	P
10/20/09	CCV (11:07)	Hexavalent chromium	125 (90-110)	All water samples in SDG R0905963	J+ (all detects)	P
10/20/09	CCV	Surfactants	88.8 (90-110)	All water samples in SDG R0905963	J- (all detects) UJ (all non-detects)	P

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)	Sulfate	0.13 mg/L	All water samples in SDG R0905963
ICB/CCB	Alkalinity, total Total organic carbon Cyanide Chloride Sulfate	0.5 mg/L 0.166 mg/L 0.00597 mg/L 0.092 mg/L 0.192 mg/L	All water samples in SDG R0905963

Method Blank ID	Analyte	Concentration	Associated Samples
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate Chloride	12 mg/Kg 12 mg/Kg 1 mg/Kg	SA108-20B SA108-30B SA108-45B SA142-20.5B SA142009-20.5B SA142-30.5B SA142-51B SA157-10B SA157-25B SA157-44B SA171-5B
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate Chloride	9 mg/Kg 9 mg/Kg 1.3 mg/Kg	SA171-15B SA171-30B SA171-41B
PB (prep blank)	Total phosphorus	1.5 mg/Kg	SA108-20B SA108-30B SA108-45B SA142-20.5B SA142009-20.5B SA142-30.5B SA142-51B SA157-10B
PB (prep blank)	Total phosphorus	1.1 mg/Kg	SA157-25B SA157-44B SA171-5B SA171-15B SA171-30B SA171-41B
ICB/CCB	Total organic carbon	116.0 mg/Kg	All soil samples in SDG R0905963
ICB/CCB	Nitrite as N	0.0074 mg/L	SA171-5B
ICB/CCB	Chloride	0.174 mg/L	SA108-45B
ICB/CCB	Chloride	0.114 mg/L	SA142-30.5B SA157-10B
ICB/CCB	Chloride	0.081 mg/L	SA171-30B SA171-41B
ICB/CCB	Chloride	0.117 mg/L	SA157-25B SA157-44B SA171-5B SA171-15B
ICB/CCB	Chloride	0.077 mg/L	SA108-30B SA142009-20.5B SA142-51B

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Sulfate	0.093 mg/L	SA108-20B SA108-30B SA108-45B SA142-20.5B SA142009-20.5B SA142-30.5B SA142-51B SA157-10B SA157-25B SA157-44B SA171-5B SA171-15B SA171-41B

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
EB101909-SO1A3	Total organic carbon Chloride	0.1 mg/L 1.6 mg/L	1.0U mg/L 2.0U mg/L
SA157-25B	Total organic carbon	240 mg/Kg	290U mg/Kg
SA157-44B	Total organic carbon	170 mg/Kg	290U mg/Kg
SA171-41B	Total organic carbon	270 mg/Kg	300U mg/Kg

Sample EB101909-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
EB101909-SO1A3	10/19/09	Ammonia as N Total organic carbon Chloride pH Total phosphorus Sulfate Surfactants	0.066 mg/L 0.1 mg/L 1.6 mg/L 4.37 units 0.006 mg/L 2.6 mg/L 0.018 mg/L	SA157-10B SA157-25B SA157-44B SA171-5B SA171-15B SA171-30B SA171-41B

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
SA157-10B	Surfactants	0.7 mg/Kg	2.2U mg/Kg
SA157-25B	Total organic carbon Sulfate	240 mg/Kg 131 mg/Kg	290U mg/Kg 131J+ mg/Kg
SA157-44B	Total organic carbon Surfactants	170 mg/Kg 1.5 mg/Kg	290U mg/Kg 3.4U mg/Kg
SA171-30B	Sulfate	125 mg/Kg	125J+ mg/Kg
SA171-41B	Total organic carbon	270 mg/Kg	300U 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 R0905963

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
SA108-20B	Nitrate as N	21.8 mg/Kg	21.8J+ mg/Kg
SA108-30B	Nitrate as N	3.71 mg/Kg	3.71J+ mg/Kg
SA108-45B	Nitrate as N	2.13 mg/Kg	2.13J+ mg/Kg
SA142-20.5B	Nitrate as N	7.69 mg/Kg	7.69J+ mg/Kg
SA142009-20.5B	Nitrate as N	9.42 mg/Kg	9.42J+ mg/Kg
SA142-30.5B	Nitrate as N	3.57 mg/Kg	3.57J+ mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA142-51B	Nitrate as N	2.68 mg/Kg	2.68J+ mg/Kg
SA157-10B	Nitrate as N	1.56 mg/Kg	1.56J+ mg/Kg
SA157-25B	Total organic carbon Nitrate as N	240 mg/Kg 1.00 mg/Kg	290U mg/Kg 1.00J+ mg/Kg
SA157-44B	Total organic carbon Nitrate as N	170 mg/Kg 9.59 mg/Kg	290U mg/Kg 9.59J+ mg/Kg
SA171-5B	Nitrate as N	13.1 mg/Kg	13.1J+ mg/Kg
SA171-15B	Nitrate as N	7.29 mg/Kg	7.29J+ mg/Kg
SA171-30B	Nitrate as N	4.24 mg/Kg	4.24J+ mg/Kg
SA171-41B	Total organic carbon Nitrate as N	270 mg/Kg 3.20 mg/Kg	300U mg/Kg 3.20J+ 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.

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 with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
LCS (All water samples in SDG R0905963)	Hexavalent chromium	114 (92-110)	-	-	J+ (all detects)	P

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
LCS (All water samples in SDG R0905963)	Hexavalent chromium	116 (92-110)	-	-	J+ (all detects)	P
LCS (All water samples in SDG R0905963)	Hexavalent chromium	115 (92-110)	-	-	J+ (all detects)	P
LCS (All water samples in SDG R0905963)	Hexavalent chromium	114 (92-110)	-	-	J+ (all detects)	P
LCS (All soil samples in SDG R0905963)	Perchlorate	122 (85-115)	-	-	J+ (all detects)	P

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)	Compound	Flag	A or P
SA142-20.5B	Dichloroacetate	117 (90-115)	Chlorate	J+ (all detects)	A
SA157-44B	Dichloroacetate	118 (90-115)	Chlorate	J+ (all 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 R0905963	All analytes reported below the PQL.	J (all detects)	A

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 SA142-20.5B and SA142009-20.5B were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA142-20.5B	SA142009-20.5B				
Alkalinity, total	135 mg/Kg	145 mg/Kg	7 (≤50)	-	-	-
Alkalinity, bicarbonate	135 mg/Kg	145 mg/Kg	7 (≤50)	-	-	-
Chloride	113 mg/Kg	151 mg/Kg	29 (≤50)	-	-	-
Nitrate as N	7.69 mg/Kg	9.42 mg/Kg	20 (≤50)	-	-	-
pH	7.98 units	7.95 units	0 (≤50)	-	-	-
Sulfate	6390 mg/Kg	7210 mg/Kg	12 (≤50)	-	-	-
Hexavalent chromium	0.22 mg/Kg	0.19U mg/Kg	-	0.03 (≤0.42)	-	-
Cyanide	0.9 mg/Kg	0.9 mg/Kg	-	0 (≤1.1)	-	-
Total organic carbon	1290 mg/Kg	1310 mg/Kg	2 (≤50)	-	-	-
Total phosphorus	854 mg/Kg	879 mg/Kg	3 (≤50)	-	-	-
Chlorate	70 ug/Kg	43U ug/Kg	-	27 (≤220)	-	-
Perchlorate	1330 ug/Kg	1100 ug/Kg	-	230 (≤540)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Data Qualification Summary - SDG R0905963

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0905963	EB101909-SO1A3	Hexavalent chromium	J+ (all detects)	P	Calibration (CCV %R) (c)
R0905963	EB101909-SO1A3	Surfactants	J- (all detects) UJ (all non-detects)	P	Calibration (CCV %R) (c)
R0905963	EB101909-SO1A3	Hexavalent chromium	J+ (all detects)	P	Laboratory control samples (%R) (l)
R0905963	SA108-20B SA108-30B SA108-45B SA142-20.5B SA142009-20.5B SA142-30.5B SA142-51B SA157-10B SA157-25B SA157-44B SA171-5B SA171-15B SA171-30B SA171-41B	Perchlorate	J+ (all detects)	P	Laboratory control samples (%R) (l)
R0905963	SA142-20.5B SA157-44B	Chlorate	J+ (all detects)	A	Surrogate spikes (%R) (s)
R0905963	SA108-20B SA108-30B SA108-45B SA142-20.5B SA142009-20.5B SA142-30.5B SA142-51B EB101909-SO1A3 SA157-10B SA157-25B SA157-44B SA171-5B SA171-15B SA171-30B SA171-41B	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 R0905963

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905963	EB101909-SO1A3	Total organic carbon Chloride	1.0U mg/L 2.0U mg/L	A	bl
R0905963	SA157-25B	Total organic carbon	290U mg/Kg	A	bl
R0905963	SA157-44B	Total organic carbon	290U mg/Kg	A	bl
R0905963	SA171-41B	Total organic carbon	300U mg/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Equipment Blank Data Qualification Summary - SDG R0905963

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905963	SA157-10B	Surfactants	2.2U mg/Kg	A	be
R0905963	SA157-25B	Total organic carbon Sulfate	290U mg/Kg 131J+ mg/Kg	A	be
R0905963	SA157-44B	Total organic carbon Surfactants	290U mg/Kg 3.4U mg/Kg	A	be
R0905963	SA171-30B	Sulfate	125J+ mg/Kg	A	be
R0905963	SA171-41B	Total organic carbon	300U mg/Kg	A	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Field Blank Data Qualification Summary - SDG R0905963

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905963	SA108-20B	Nitrate as N	21.8J+ mg/Kg	A	bf
R0905963	SA108-30B	Nitrate as N	3.71J+ mg/Kg	A	bf
R0905963	SA108-45B	Nitrate as N	2.13J+ mg/Kg	A	bf

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0905963	SA142-20.5B	Nitrate as N	7.69J+ mg/Kg	A	bf
R0905963	SA142009-20.5B	Nitrate as N	9.42J+ mg/Kg	A	bf
R0905963	SA142-30.5B	Nitrate as N	3.57J+ mg/Kg	A	bf
R0905963	SA142-51B	Nitrate as N	2.68J+ mg/Kg	A	bf
R0905963	SA157-10B	Nitrate as N	1.56J+ mg/Kg	A	bf
R0905963	SA157-25B	Total organic carbon Nitrate as N	290U mg/Kg 1.00J+ mg/Kg	A	bf
R0905963	SA157-44B	Total organic carbon Nitrate as N	290U mg/Kg 9.59J+ mg/Kg	A	bf
R0905963	SA171-5B	Nitrate as N	13.1J+ mg/Kg	A	bf
R0905963	SA171-15B	Nitrate as N	7.29J+ mg/Kg	A	bf
R0905963	SA171-30B	Nitrate as N	4.24J+ mg/Kg	A	bf
R0905963	SA171-41B	Total organic carbon Nitrate as N	300U mg/Kg 3.20J+ mg/Kg	A	bf

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234I6
SDG #: R0905963
Laboratory: Columbia Analytical Services

Date: 1-4-10
Page: 1 of 1
Reviewer: CR
2nd Reviewer: [illegible]

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), ~~Dissolved Hexavalent Chromium (EPA Method 218.6);~~ 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~~ A	Sampling dates: 10/16 -10/19/09
IIa.	Initial calibration	A	
IIb.	Calibration verification	SW	
III.	Blanks	SW	
IV	Surrogate Spikes	SW	
V	Matrix Spike/Matrix Spike Duplicates	A	MS/D
VI.	Duplicates	A	DUP
VII.	Laboratory control samples	SW	LCS/D
VIII.	Sample result verification	N	
IX.	Overall assessment of data	A	
X.	Field duplicates	SW	(4,5)
XI	Field blanks	SW	EB=8. FB= FB082809-SO (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: all soil except 8 = water

1	SA108-20B	11	SA157-44B	21		31	PBS
2	SA108-30B	12	SA171-5B	22		32	PMW
3	SA108-45B	13	SA171-15B	23		33	
4	SA142-20.5B	14	SA171-30B	24		34	
5	SA142009-20.5B	15	SA171-41B	25		35	
6	SA142-30.5B	16	SA108-20BMS	26		36	
7	SA142-51B	17	SA108-20BMSD	27		37	
8	EB101909-SO1A3	18	SA108-20BDUP	28		38	
9	SA157-10B	19		29		39	
10	SA157-25B	20		30		40	

Notes: _____

LDC #: 22234I6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: CR
2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1-15	S/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]
4-15		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:16		[✓ 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]
17		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]
18		[✓ 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 #: 22234I6
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Calibration

Page: 1 of 1
Reviewer: CR
2nd Reviewer: [signature]

METHOD: Inorganics, EPA 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 instruments calibrated daily, each set-up time, and were the proper number of standards used?
Y N N/A Were all initial and continuing calibration verification percent recoveries (%R) within the control limits of 90-110%?
Y N N/A Are all correlation coefficients ≥0.995 ?

LEVEL IV/D ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recaluculation Worksheet for recalulations.
Y N N/A Was a balance check conducted prior to the TDS analysis.?
Y N N/A Was the titrant normality checked?

#	Date	Calibration ID	Analyte	%R	Associated Samples	Qualifications
	10/20/09	CCV (09:28)	Cr^{6+}	120	All water	J+ det/P(C)
	↓	↓ (11:07)	↓	125	↓	↓
	10/20/09	CCV	Surfactants	88.8	All water	J-/UJ/P(C)

Comments:

LDC #: 22234I6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: [illegible]
2nd Reviewer: [illegible]

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?

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: All Water**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/L)			8									
Alk., Total		0.5											
TOC		0.166		0.1 / 1.0									
CN		0.00597											
Cl		0.092		1.6 / 2.0									
SO4	0.13	0.192											

Conc. units: mg/Kg **Associated Samples: 1-7, 9-12**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Alk., Total	12												
Alk., Bicarb.	12												
Cl	1												

LDC #: 22234I6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CR
2nd Reviewer: h

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?
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/Kg **Associated Samples: 13-15**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Alk., Total	9												
Alk., Bicarb.	9												
Cl	1.3												

Conc. units: mg/Kg **Associated Samples: 1-7, 9**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
T-P	1.5												

Conc. units: mg/Kg **Associated Samples: 10-15**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
T-P	1.1												

Conc. units: mg/Kg **Associated Samples: All Soil**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			10	11	15							
TOC		116.0		240 / 290	170 / 290	270 / 300							

LDC #: 22234I6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CR
2nd Reviewer: IN

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?

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/Kg **Associated Samples: 12**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
NO2-N		0.0074											

Conc. units: mg/Kg **Associated Samples: 3**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.174											

Conc. units: mg/Kg **Associated Samples: 6, 9**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.114											

Conc. units: mg/Kg **Associated Samples: 14, 15**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.081											

LDC #: 22234I6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CR
2nd Reviewer: [illegible]

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?

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/Kg **Associated Samples: 10-13**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.117											

Conc. units: mg/Kg **Associated Samples: 2, 5, 7**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.077											

Conc. units: mg/Kg **Associated Samples: 1-7, 9-13, 15**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
SO4		0.093											

LDC #: 22234I6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: CR
2nd Reviewer: W

METHOD: Inorganics, Method See Cover
(Y) N N/A 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
Reason Code: be
Sampling date: 10/19/09 Soil factor applied NA
Field blank type: (circle one) Field Blank / Rinsate / Other: Equipment Blank Associated Samples: 9-15

Analyte	Blank ID	Sample Identification									
	8	Action Level	9	10	11	14	15				
Ammonia as N	0.066	6.6									
TOC (average)	0.1			240 / 290	170 / 290		270 / 300				
Chloride	1.6										
pH (pH Units)	4.37										
Total phosphorus	0.006										
Sulfate	2.6	260		131 J+		125 J+					
Surfactants	0.018		0.7 / 2.2		1.5 / 3.4						

LDC #: 22234I6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: QR
2nd Reviewer: h

METHOD: Inorganics, Method See Cover
Y N N/A 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 Reason Code: bf
Sampling date: 8/28/09 Soil factor applied 10X except TOC 1X
Field blank type: (circle one) Field Blank / Rinsate / Other: FB Associated Samples: All Soil

Analyte	Blank ID	Sample Identification														
	FB082809-SO (SDG# R0904894)	Action Level	1	2	3	4	5	6	7	9	10	11	12	13	14	15
Total alkalinity	1.9															
Bicarbonate alkalinity	1.9															
Ammonia as N	0.033															
TOC (average)	0.2										240 / 290	170 / 290				270 / 300
Cl	1.2															
Nitrate as N	0.68	68	21.8 J+	3.71 J+	2.13 J+	7.69 J+	9.42 J+	3.57 J+	2.68 J+	1.56 J+	1.00 J+	9.59 J+	13.1 J+	7.29 J+	4.24 J+	3.20 J+
pH (pH Units)	5.88															
Total P	0.008															
Sulfate	1.4															

LDC #: 22234I6
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: QR
2nd Reviewer: [illegible]

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 Was a laboratory control sample (LCS) analyzed for each matrix in this SDG?

Y (N) N/A Were all LCS percent recoveries (%R) within the control limits ~~of 80-120~~% (85-115% for Method 300.0)?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	LCS ID	Matrix	Analyte	%R (limits)	Associated Samples	Qualifications
	LCS	water	Cr6+	114 (92-110)	All water	J+ det+ / P (l)
			↓	116 ↓	↓	↓
			Cr6+	115		
			↓	114 ↓	↓	↓
	LCS	soil	ClO4	122 (85-115)	All soil	J+ det+ / P (l)

Comments: _____

LDC #: 22234I6
SDG #: See cover

VALIDATION FINDINDS WORKSHEET
Surrogate Recovery

Page: 1 of
Reviewer: CR
2nd Reviewer: h

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".
[✓ Y] N N/A Were surrogates spiked into all samples and blanks?
Y [✓ N] N/A Did all surrogate recoveries (%R) meet the QC limits?

#	Date	Lab ID/Reference	Column	Surrogate Compound	%R (Limits)	Associated Samples	Qualifications
		C103		DCA	117 (90-115)	4	J+det/A (S)
					118 (↓)	11	↓
					( )		
					( )		
					( )		
					( )		
					( )		
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					( )		
					( )		
					( )		

Letter Designation	Surrogate Compound	Recovery QC Limits (Soil)	Recovery QC Limits (Water)	Comments
A	Dichloroacetate			
B				

LDC#: 22234I6
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer: LA

Inorganics, Method See Cover

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Analyte	Concentration (mg/Kg) 4	Concentration (mg/Kg) 5	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Total Alkalinity	135	145	7			
Bicarbonate Alkalinity	135	145	7			
Chloride	113	151	29			
Nitrate as N	7.69	9.42	20			
pH (pH Units)	7.98	7.95	0			
Sulfate	6390	7210	12			
Hexavalent Chromium	0.22	0.19U		0.03	(≤0.42)	
Cyanide	0.9	0.9		0	(≤1.1)	
TOC	1290	1310	2			
Total Phosphorus	854	879	3			
Chlorate (ug/Kg)	70	43U		27	(≤220)	
Perchlorate (ug/Kg)	1330	1100		230	(≤540)	

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 20 through October 21, 2009

LDC Report Date: January 8, 2010

Matrix: Soil

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906024

Sample Identification

SA33-0.5B
SA33009-0.5B
SA33-10B
SA33-20B
SA33-33B
SA156-0.5B
SA156-10B
SA156-30B
SA156-35B
SA156-45B
SA157-0.5B
SA157009-0.5B
SA52-15B
SA52-28B
SA52-43B
SA149-22B
SA149-32B
SA149-45B
SA149009-45B
SA149009-45BMS
SA149009-45BMSD
SA149009-45BDUP

Introduction

This data review covers 22 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/Kahn 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	9 mg/Kg 9 mg/Kg 1.3 mg/Kg	SA33-0.5B SA33009-0.5B SA33-10B SA33-20B SA33-33B SA156-0.5B SA156-10B SA156-30B SA156-35B
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate Chloride	11 mg/Kg 11 mg/Kg 1.1 mg/Kg	SA156-45B SA157-0.5B SA157009-0.5B SA52-15B SA52-28B SA52-43B SA149-22B SA149-32B SA149-45B SA149009-45B

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Alkalinity, total	0.5 mg/L	SA156-45B SA157-0.5B SA157009-0.5B SA52-15B SA52-28B SA52-43B SA149-22B SA149-32B SA149-45B SA149009-45B
PB (prep blank)	Total phosphorus	1.1 mg/Kg	SA33-0.5B SA33009-0.5B SA33-10B SA33-20B SA33-33B SA156-0.5B SA156-10B SA156-30B SA156-35B SA156-45B SA157-0.5B SA157009-0.5B SA52-15B SA52-28B
PB (prep blank)	Total organic carbon	40 mg/Kg	SA156-30B SA156-35B SA156-45B SA157-0.5B SA157009-0.5B SA52-15B SA52-28B SA52-43B SA149-22B SA149-32B SA149-45B SA149009-45B
ICB/CCB	Total organic carbon	116.0 mg/Kg	All samples in SDG R0906024
ICB/CCB	Chloride	0.092 mg/L	SA33-20B SA33-33B
ICB/CCB	Chloride	0.077 mg/L	SA157-0.5B SA157009-0.5B SA149-22B SA149-32B SA149-45B SA149009-45B
ICB/CCB	Chloride	0.103 mg/L	SA33009-0.5B SA33-10B

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Chloride	0.079 mg/L	SA156-0.5B SA156-10B SA156-35B SA156-45B SA52-15B SA52-28B
ICB/CCB	Chloride	0.076 mg/L	SA156-30B SA52-43B
ICB/CCB	Sulfate	0.149 mg/L	SA33-33B SA156-0.5B SA156-10B SA52-28B

Sample concentrations were compared to concentrations detected in the method blanks as required by the QAPP. No sample data was qualified with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA33-33B	Total organic carbon	140 mg/Kg	300U mg/Kg
SA156-30B	Total organic carbon	260 mg/Kg	290U mg/Kg
SA156-45B	Total organic carbon	170 mg/Kg	290U mg/Kg
SA149-22B	Total organic carbon	290 mg/Kg	290U mg/Kg

Samples FB080309-SO (from SDG R0904279) and FB082809-SO (from SDG R0904894) were identified as field blanks. No contaminant concentrations were found in these blanks with the following exceptions:

Field Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
FB080309-SO	8/3/09	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Total organic carbon Chloride Nitrate as N pH Total phosphorus Sulfate Surfactants	3.0 mg/L 3.0 mg/L 0.113 mg/L 1.2 mg/L 3.9 mg/L 0.65 mg/L 6.48 units 0.015 mg/L 1.6 mg/L 0.043 mg/L	SA156-0.5B SA156-10B SA156-30B SA156-35B SA156-45B

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	SA33-0.5B SA33009-0.5B SA33-10B SA33-20B SA33-33B SA157-0.5B SA157009-0.5B SA52-15B SA52-28B SA52-43B SA149-22B SA149-32B SA149-45B SA149009-45B

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
SA156-0.5B	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Surfactants	204 mg/Kg 204 mg/Kg 1.27 mg/Kg 2.2 mg/Kg	204J+ mg/Kg 204J+ mg/Kg 1.27J+ mg/Kg 2.2J+ mg/Kg
SA156-10B	Alkalinity, total Alkalinity, bicarbonate Nitrate as N Surfactants	224 mg/Kg 221 mg/Kg 5.45 mg/Kg 0.8 mg/Kg	224J+ mg/Kg 221J+ mg/Kg 5.45J+ mg/Kg 2.1U mg/Kg
SA156-30B	Alkalinity, total Alkalinity, bicarbonate Total organic carbon Nitrate as N	177 mg/Kg 169 mg/Kg 260 mg/Kg 0.74 mg/Kg	177J+ mg/Kg 169J+ mg/Kg 290U mg/Kg 0.74J+ mg/Kg
SA156-35B	Alkalinity, total Alkalinity, bicarbonate Nitrate as N	151 mg/Kg 151 mg/Kg 1.71 mg/Kg	151J+ mg/Kg 151J+ mg/Kg 1.71J+ mg/Kg
SA156-45B	Total organic carbon Chloride Nitrate as N	170 mg/Kg 276 mg/Kg 4.77 mg/Kg	290U mg/Kg 276J+ mg/Kg 4.77J+ mg/Kg
SA33-0.5B	Nitrate as N	10.9 mg/Kg	10.9J+ mg/Kg
SA33009-0.5B	Nitrate as N	11.3 mg/Kg	11.3J+ mg/Kg
SA33-10B	Nitrate as N	9.93 mg/Kg	9.93J+ mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA33-20B	Nitrate as N	2.39 mg/Kg	2.39J+ mg/Kg
SA33-33B	Total organic carbon Nitrate as N	140 mg/Kg 1.51 mg/Kg	300U mg/Kg 1.51J+ mg/Kg
SA157-0.5B	Nitrate as N	1.05 mg/Kg	1.05J+ mg/Kg
SA157009-0.5B	Nitrate as N	1.08 mg/Kg	1.08J+ mg/Kg
SA52-15B	Nitrate as N	9.60 mg/Kg	9.60J+ mg/Kg
SA52-28B	Nitrate as N	6.30 mg/Kg	6.30J+ mg/Kg
SA52-43B	Nitrate as N	30.5 mg/Kg	30.5J+ mg/Kg
SA149-22B	Total organic carbon Nitrate as N	290 mg/Kg 0.89 mg/Kg	290U mg/Kg 0.89J+ mg/Kg
SA149-45B	Nitrate as N	1.75 mg/Kg	1.75J+ mg/Kg
SA149009-45B	Nitrate as N	1.58 mg/Kg	1.58J+ 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.

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 with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
LCS (All samples in SDG R0906024)	Perchlorate	83 (85-115)	-	-	J- (all detects) UJ (all non-detects)	P
LCS (All samples in SDG R0906024)	Perchlorate	122 (85-115)	-	-	J+ (all detects)	P

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)	Compound	Flag	A or P
SA33009-0.5B	Dichloroacetate	118 (90-115)	Chlorate	J+ (all detects)	A
SA156-35B	Dichloroacetate	116 (90-115)	Chlorate	J+ (all detects)	A
SA52-15B	Dichloroacetate	116 (90-115)	Chlorate	J+ (all detects)	A
SA149-32B	Dichloroacetate	116 (90-115)	Chlorate	J+ (all 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 R0906024	All analytes reported below the PQL.	J (all detects)	A

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 SA33-0.5B and SA33009-0.5B, samples SA157-0.5B and SA157009-0.5B, and samples SA149-45B and SA149009-45B were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA33-0.5B	SA33009-0.5B				
Alkalinity, total	170 mg/Kg	170 mg/Kg	0 (≤50)	-	-	-
Alkalinity, bicarbonate	166 mg/Kg	166 mg/Kg	0 (≤50)	-	-	-
Alkalinity, carbonate	4 mg/Kg	4 mg/Kg	-	0 (≤20)	-	-
Chloride	397 mg/Kg	396 mg/Kg	0 (≤50)	-	-	-
Nitrate as N	10.9 mg/Kg	11.3 mg/Kg	4 (≤50)	-	-	-
pH	8.22 units	8.24 units	0 (≤50)	-	-	-
Sulfate	1320 mg/Kg	1440 mg/Kg	9 (≤50)	-	-	-
Surfactants	1.6 mg/Kg	1.4 mg/Kg	-	0.2 (≤2.0)	-	-
Hexavalent chromium	1.03 mg/Kg	2.42 mg/Kg	-	1.39 (≤0.40)	J (all detects)	A
Hexavalent chromium	1.00 mg/Kg	2.29 mg/Kg	-	1.29 (≤0.40)	J (all detects)	A
Total organic carbon	1700 mg/Kg	1720 mg/Kg	1 (≤50)	-	-	-
Total phosphorus	816 mg/Kg	861 mg/Kg	5 (≤50)	-	-	-
Chlorate	44600 ug/Kg	55900 ug/Kg	22 (≤50)	-	-	-
Perchlorate	126000 ug/Kg	169000 ug/Kg	29 (≤50)	-	-	-

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA157-0.5B	SA157009-0.5B				
Alkalinity, total	443 mg/Kg	462 mg/Kg	4 (≤50)	-	-	-

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA157-0.5B	SA157009-0.5B				
Alkalinity, bicarbonate	416 mg/Kg	436 mg/Kg	5 (≤50)	-	-	-
Alkalinity, carbonate	27 mg/Kg	26 mg/Kg	-	1 (≤22)	-	-
Chloride	4.2 mg/Kg	4.9 mg/Kg	-	0.7 (≤2.2)	-	-
Nitrate as N	1.05 mg/Kg	1.08 mg/Kg	-	0.03 (≤0.54)	-	-
pH	9.14 units	9.21 units	1 (≤50)	-	-	-
Sulfate	43.2 mg/Kg	43.4 mg/Kg	0 (≤50)	-	-	-
Surfactants	1.1 mg/Kg	0.7 mg/Kg	-	0.4 (≤2.2)	-	-
Hexavalent chromium	0.19U mg/Kg	1.99 mg/Kg	-	1.8 (≤0.43)	J (all detects) UJ (all non-detects)	A
Hexavalent chromium	0.19U mg/Kg	1.99 mg/Kg	-	1.8 (≤0.43)	J (all detects) UJ (all non-detects)	A
Total organic carbon	720 mg/Kg	870 mg/Kg	-	150 (≤300)	-	-
Total phosphorus	928 mg/Kg	923 mg/Kg	1 (≤50)	-	-	-
Perchlorate	77 ug/Kg	67 ug/Kg	-	10 (≤55)	-	-

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA149-45B	SA149009-45B				
Alkalinity, total	464 mg/Kg	393 mg/Kg	17 (≤50)	-	-	-
Alkalinity, bicarbonate	449 mg/Kg	380 mg/Kg	17 (≤50)	-	-	-
Alkalinity, carbonate	15 mg/Kg	13 mg/Kg	-	2 (≤25)	-	-
Chloride	84.7 mg/Kg	57.5 mg/Kg	38 (≤50)	-	-	-
Nitrate as N	1.75 mg/Kg	1.58 mg/Kg	-	0.17 (≤0.64)	-	-
pH	7.94 units	7.95 units	0 (≤50)	-	-	-

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA149-45B	SA149009-45B				
Sulfate	353 mg/Kg	250 mg/Kg	34 (≤50)	-	-	-
Total organic carbon	540 mg/Kg	530 mg/Kg	-	10 (≤290)	-	-
Total phosphorus	585 mg/Kg	617 mg/Kg	5 (≤50)	-	-	-
Chlorate	6260 ug/Kg	3680 ug/Kg	52 (≤50)	-	J (all detects)	A
Perchlorate	3670 ug/Kg	2220 ug/Kg	49 (≤50)	-	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Data Qualification Summary - SDG R0906024

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0906024	SA33-0.5B SA33009-0.5B SA33-10B SA33-20B SA33-33B SA156-0.5B SA156-10B SA156-30B SA156-35B SA156-45B SA157-0.5B SA157009-0.5B SA52-15B SA52-28B SA52-43B SA149-22B SA149-32B SA149-45B SA149009-45B	Perchlorate	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0906024	SA33-0.5B SA33009-0.5B SA33-10B SA33-20B SA33-33B SA156-0.5B SA156-10B SA156-30B SA156-35B SA156-45B SA157-0.5B SA157009-0.5B SA52-15B SA52-28B SA52-43B SA149-22B SA149-32B SA149-45B SA149009-45B	Perchlorate	J+ (all detects)	P	Laboratory control samples (%R) (l)
R0906024	SA33009-0.5B SA156-35B SA52-15B SA149-32B	Chlorate	J+ (all detects)	A	Surrogate spikes (%R) (s)

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0906024	SA33-0.5B SA33009-0.5B SA33-10B SA33-20B SA33-33B SA156-0.5B SA156-10B SA156-30B SA156-35B SA156-45B SA157-0.5B SA157009-0.5B SA52-15B SA52-28B SA52-43B SA149-22B SA149-32B SA149-45B SA149009-45B	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)
R0906024	SA33-0.5B SA33009-0.5B	Hexavalent chromium	J (all detects)	A	Field duplicates (Difference) (fd)
R0906024	SA157-0.5B SA157009-0.5B	Hexavalent chromium	J (all detects) UJ (all non-detects)	A	Field duplicates (Difference) (fd)
R0906024	SA149-45B SA149009-45B	Chlorate	J (all detects)	A	Field duplicates (RPD) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R0906024

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906024	SA33-33B	Total organic carbon	300U mg/Kg	A	bl
R0906024	SA156-30B	Total organic carbon	290U mg/Kg	A	bl
R0906024	SA156-45B	Total organic carbon	290U mg/Kg	A	bl
R0906024	SA149-22B	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 R0906024

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906024	SA156-0.5B	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Surfactants	204J+ mg/Kg 204J+ mg/Kg 1.27J+ mg/Kg 2.2J+ mg/Kg	A	bf
R0906024	SA156-10B	Alkalinity, total Alkalinity, bicarbonate Nitrate as N Surfactants	224J+ mg/Kg 221J+ mg/Kg 5.45J+ mg/Kg 2.1U mg/Kg	A	bf
R0906024	SA156-30B	Alkalinity, total Alkalinity, bicarbonate Total organic carbon Nitrate as N	177J+ mg/Kg 169J+ mg/Kg 290U mg/Kg 0.74J+ mg/Kg	A	bf
R0906024	SA156-35B	Alkalinity, total Alkalinity, bicarbonate Nitrate as N	151J+ mg/Kg 151J+ mg/Kg 1.71J+ mg/Kg	A	bf
R0906024	SA156-45B	Total organic carbon Chloride Nitrate as N	290U mg/Kg 276J+ mg/Kg 4.77J+ mg/Kg	A	bf
R0906024	SA33-0.5B	Nitrate as N	10.9J+ mg/Kg	A	bf
R0906024	SA33009-0.5B	Nitrate as N	11.3J+ mg/Kg	A	bf
R0906024	SA33-10B	Nitrate as N	9.93J+ mg/Kg	A	bf
R0906024	SA33-20B	Nitrate as N	2.39J+ mg/Kg	A	bf
R0906024	SA33-33B	Total organic carbon Nitrate as N	300U mg/Kg 1.51J+ mg/Kg	A	bf
R0906024	SA157-0.5B	Nitrate as N	1.05J+ mg/Kg	A	bf
R0906024	SA157009-0.5B	Nitrate as N	1.08J+ mg/Kg	A	bf
R0906024	SA52-15B	Nitrate as N	9.60J+ mg/Kg	A	bf
R0906024	SA52-28B	Nitrate as N	6.30J+ mg/Kg	A	bf

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906024	SA52-43B	Nitrate as N	30.5J+ mg/Kg	A	bf
R0906024	SA149-22B	Total organic carbon Nitrate as N	290U mg/Kg 0.89J+ mg/Kg	A	bf
R0906024	SA149-45B	Nitrate as N	1.75J+ mg/Kg	A	bf
R0906024	SA149009-45B	Nitrate as N	1.58J+ mg/Kg	A	bf

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234J6
SDG #: R0906024
Laboratory: Columbia Analytical Services

Date: 1-10-10 (4)
Page: 1 of 1
Reviewer: CR
2nd Reviewer: [illegible]

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), ~~Dissolved Hexavalent Chromium (EPA Method 218.6)~~, 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~~ A	Sampling dates: 10/20/09 - 10/21/09
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	SW	
IV	Surrogate Spikes	SW	
V	Matrix Spike/Matrix Spike Duplicates	A	MS/D
VI.	Duplicates	A	Dup
VII.	Laboratory control samples	SW	LCS/D
VIII.	Sample result verification	N	
IX.	Overall assessment of data	A	
X.	Field duplicates	SW	(1,2), (11,12), (18,19)
XI	Field blanks	SW	FB=FB082809-SO (R0904894), FB080309-SO (R0904279)

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: 30.1

1	SA33-0.5B	11	SA157-0.5B	21	SA149009-45BMSD	31	PBS
2	SA33009-0.5B	12	SA157009-0.5B	22	SA149009-45BDUP	32	
3	SA33-10B	13	SA52-15B	23		33	
4	SA33-20B	14	SA52-28B	24		34	
5	SA33-33B	15	SA52-43B	25		35	
6	SA156-0.5B	16	SA149-22B	26		36	
7	SA156-10B	17	SA149-32B	27		37	
8	SA156-30B	18	SA149-45B	28		38	
9	SA156-35B	19	SA149009-45B	29		39	
10	SA156-45B	20	SA149009-45BMS	30		40	

Notes: _____

LDC #: 22234J6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: CR
2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1-19	Soil	[✓ 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]
6-12		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:2022		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

Comments:

LDC #: 22234I6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CR
2nd 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?

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/Kg **Associated Samples: 1-9**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Alk., Total	9												
Alk., Bicarb.	9												
Cl	1.3												

Conc. units: mg/Kg **Associated Samples: 10-19**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Alk., Total	11	0.5											
Alk., Bicarb.	11												
Cl	1.1												

Conc. units: mg/Kg **Associated Samples: 1-14**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
T-P	1.1												

LDC #: 22234I6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CE
2nd 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?

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/Kg **Associated Samples: 8-19**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			8	10	16							
TOC	40			See ICB/CCB	See ICB/CCB	See ICB/CCB							

Conc. units: mg/Kg **Associated Samples: All ~~Soil~~**

Analyte	Blank ID	Maximum ICB/CCB (mg/Kg)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			5	8	10	16						
TOC		116.0		140 / 300	260 / 290	170 / 290	290 / 290						

Conc. units: mg/Kg **Associated Samples: 4, 5**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.092											

Conc. units: mg/Kg **Associated Samples: 11, 12, 16-19**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.077											

VALIDATION FINDINGS WORKSHEET
Blanks

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?

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/Kg **Associated Samples: 2, 3**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.103											

Conc. units: mg/Kg **Associated Samples: 6, 7, 9, 10, 13, 14**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.079											

Conc. units: mg/Kg **Associated Samples: 8, 15**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.076											

Conc. units: mg/Kg **Associated Samples: 5-7, 14**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
SO4		0.149											

LDC #: 22234J6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

METHOD: Inorganics, Method See Cover

Y N N/A 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 Reason Code: bf

Sampling date: 8/3/09 ~~Soil factor~~ applied 10X except TOC 1X

Field blank type: (circle one) Field Blank / Rinsate / Other: FB Associated Samples: 6-10

Analyte	Blank ID	Sample Identification									
	FB080309-SO (SDG# R0904279)	Action Level	6	7	8	9	10				
Total alkalinity	3.0	300	204 J+	224 J+	177 J+	151 J+					
Bicarbonate alkalinity	3.0	300	204 J+	221 J+	169 J+	151 J+					
Ammonia as N	0.113	11.3	1.27 J+								
TOC (average)	1.2				260 / 290		170 / 290				
Cl	3.9	390					276 J+				
Nitrate as N	0.65	65		5.45 J+	0.74 J+	1.71 J+	4.77 J+				
pH (pH Units)	6.48										
Total Phosphorus	0.015										
~~TDS~~	~~22~~	Not report in this SDG									
Sulfate	1.6										
Surfactants	0.043	4.3	2.2 J+	0.8 / 2.1							

LDC #: 22234J6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JR
2nd Reviewer: [illegible]

METHOD: Inorganics, Method See Cover
Y N N/A 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 Reason Code: bf
Sampling date: 8/28/09 Soil factor applied 10X except TOC 1X
Field blank type: (circle one) Field Blank / Rinsate / Other: FB Associated Samples: 1-5, 11-19

Analyte	Blank ID	Sample Identification														
	FB082809-SO (SDG# R0904894)	Action Level	1	2	3	4	5	11	12	13	14	15	16	18	19	
Total alkalinity	1.9															
Bicarbonate alkalinity	1.9															
Ammonia as N	0.033															
TOC (average)	0.2						140 / 300						290 / 290			
Cl	1.2															
Nitrate as N	0.68	68	10.9 J+	11.3 J+	9.93 J+	2.39 J+	1.51 J+	1.05 J+	1.08 J+	9.60 J+	6.30 J+	30.5 J+	0.89 J+	1.75 J+	1.58 J+	
pH (pH Units)	5.88															
Total P	0.008															
Sulfate	1.4															

LDC #: 22234J6
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: CR
2nd 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 Was a laboratory control sample (LCS) analyzed for each matrix in this SDG?

Y (N) N/A Were all LCS percent recoveries (%R) within the control limits of ~~80-120%~~ (85-115% for Method 300.0)?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	LCS ID	Matrix	Analyte	%R (limits)	Associated Samples	Qualifications
	LCS	Soil	ClO4	83 (85-115)	All Soil	J-/UJ/P (2)
	LCS	↓	↓	~~122~~ 122 ↓	↓	J+ det/P ↓

Comments:

LDC #: 22234J6
SDG #: See cover

VALIDATION FINDINDS WORKSHEET
Surrogate Recovery

Page: 1 of 1
Reviewer: CR
2nd Reviewer: [illegible]

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".
Y N N/A Were surrogates spiked into all samples and blanks?
Y N N/A Did all surrogate recoveries (%R) meet the QC limits?

#	Date	Lab ID/Reference	Column	Surrogate Compound	%R (Limits)	Associated Samples	Qualifications
		C103		DCA	118 (90-115)	2	J+ det+ LA (s)
					116 ( )	9	
					116 ( )	13	
					116 ( )	17	
					( )		
					( )		
					( )		
					( )		
					( )		
					( )		
					( )		
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					( )		
					( )		
					( )		
					( )		

Letter Designation	Surrogate Compound	Recovery QC Limits (Soil)	Recovery QC Limits (Water)	Comments
A	Dichloroacetate			
B				

LDC#: 22234J6
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: 2
2nd Reviewer: 1

Inorganics, Method See Cover

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Analyte	Concentration (mg/Kg) 1	Concentration (mg/Kg) 2	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Total Alkalinity	170	170	0			
Bicarbonate Alkalinity	166	166	0			
Carbonate Alkalinity	4	4		0	(≤20)	
Chloride	397	396	0			
Nitrate as N	10.9	11.3	4			
pH (pH Units)	8.22	8.24	0			
Sulfate	1320	1440	9			
Surfactants	1.6	1.4		0.2	(≤2.0)	
Hexavalent Chromium	1.03	2.42		1.39	(≤0.40)	Jdet/A (fd)
Hexavalent Chromium	1.00	2.29		1.29	(≤0.40)	Jdet/A (fd)
TOC	1700	1720	1			
Total Phosphorus	816	861	5			
Chlorate (ug/Kg)	44600	55900	22			
Perchlorate (ug/Kg)	126000	169000	29			

V:\FIELD DUPLICATES\FD_inorganic\22234J6.wpd

Analyte	Concentration (mg/Kg) 11	Concentration (mg/Kg) 12	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Total Alkalinity	443	462	4			
Bicarbonate Alkalinity	416	436	5			
Carbonate Alkalinity	27	26		1	(≤22)	

LDC#: 22234J6
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer:

Inorganics, Method See Cover

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Analyte	Concentration (mg/Kg) 11	Concentration (mg/Kg) 12	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Chloride	4.2	4.9		0.7	(≤2.2)	
Nitrate as N	1.05	1.08		0.03	(≤0.54)	
pH (pH Units)	9.14	9.21	1			
Sulfate	43.2	43.4	0			
Surfactants	1.1	0.7		0.4	(≤2.2)	
Hexavalent Chromium	0.19U	1.99		1.8	(≤0.43)	J/UJ/A (fd)
Hexavalent Chromium	0.19U	1.99		1.8	(≤0.43)	J/UJ/A (fd)
TOC	720	870		150	(≤300)	
Total Phosphorus	928	923	1			
Perchlorate (ug/Kg)	77	67		10	(≤55)	

Analyte	Concentration (mg/Kg) 18	Concentration (mg/Kg) 19	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Total Alkalinity	464	393	17			
Bicarbonate Alkalinity	449	380	17			
Carbonate Alkalinity	15	13		2	(≤25)	
Chloride	84.7	57.5	38			
Nitrate as N	1.75	1.58		0.17	(≤0.64)	
pH (pH Units)	7.94	7.95	0			
Sulfate	353	250	34			
TOC	540	530		10	(≤290)	

LDC#: 22234J6
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer: [signature]

Inorganics, Method See Cover

(Y) N NA Were field duplicate pairs identified in this SDG?
(Y) N NA Were target analytes detected in the field duplicate pairs?

Analyte	Concentration (mg/Kg)		RPD (≤50)	Difference	Limits	Qualification (Parent only)
	18	19				
Total Phosphorus	585	617	5			
Chlorate (ug/Kg)	6260	3680	52			Jdet/A (fd)
Perchlorate (ug/Kg)	3670	2220	49			

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 23 through October 30, 2009

LDC Report Date: December 29, 2009

Matrix: Water

Parameters: Wet Chemistry

Validation Level: Stage 4

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906095

Sample Identification

M-141B
M-141009B
PB102309-A3
M-139B
M-145B
M-144B
M-146B
M-138B
M-138009B
M-148B
M-137B
EB103009-GWA4
EB103009-GWA4RE
PB102309-A3MS
PB102309-A3MSD
PB102309-A3DUP

Introduction

This data review covers 16 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 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 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 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
EB103009-GWA4	Hexavalent chromium	25 & 25.25 hours	24 hours	J- (all detects) UJ (all non-detects)	P
EB103009-GWA4RE	Nitrite as N	105 hours	48 hours	J- (all detects) R (all non-detects)	A
M-141009B	Hexavalent chromium	29 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.

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)	Total dissolved solids	6 mg/L	M-141B M-141009B PB102309-A3 M-139B M-145B M-144B M-146B

Method Blank ID	Analyte	Concentration	Associated Samples
PB (prep blank)	Sulfate	0.13 mg/L	M-141009B PB102309-A3 M-139B M-145B M-144B M-146B M-138B M-138009B M-148B
PB (prep blank)	Chloride	0.09 mg/L	PB102309-A3
ICB/CCB	Chloride Sulfate	0.090 mg/L 0.192 mg/L	PB102309-A3
ICB/CCB	Sulfate	0.127 mg/L	M-141B
ICB/CCB	Sulfate	0.128	M-141009B M-139B M-145B M-144B M-146B M-138B M-138009B M-148B
ICB/CCB	Sulfate	0.126 mg/L	M-137B

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
PB102309-A3	Total dissolved solids Chloride Sulfate	9 mg/L 0.9 mg/L 1.5 mg/L	10U mg/L 2.0U mg/L 2.0U mg/L

Samples EB103009-GWA4 and EB103009-GWA4RE were identified as equipment blanks. No contaminant concentrations were found in these blanks with the following exceptions:

Equipment Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
EB103009-GWA4	10/30/09	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Total organic carbon Chloride Conductivity Nitrate as N pH Surfactants	1.5 mg/L 1.5 mg/L 0.348 mg/L 0.2 mg/L 0.8 mg/L 1.09 umhos/cm 0.67 mg/L 7.98 units 0.013 mg/L	M-137B

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-137B	Ammonia as N Conductivity Nitrate as N	0.038 mg/L 1.163 umhos/cm 3.45 mg/L	0.050U mg/L 1.163J+ umhos/cm 3.45J+ mg/L

Sample FB080409-GW (from SDG R0904290) 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
FB080409-GW	8/4/09	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Total organic carbon Chloride pH Total phosphorus Sulfate	1.9 mg/L 1.9 mg/L 0.035 mg/L 0.2 mg/L 1.3 mg/L 5.89 units 0.014 mg/L 0.9 mg/L	M-144B M-146B

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-144B	Ammonia as N Total organic carbon Total phosphorus	0.021 mg/L 0.8 mg/L 0.023 mg/L	0.050U mg/L 1.0U mg/L 0.050U mg/L
M-146B	Total organic carbon Total phosphorus	0.8 mg/L 0.039 mg/L	1.0U mg/L 0.050U mg/L

Samples PB100209-A2 (from SDG R0905636) and PB102309-A3 were identified as pump blanks. No contaminant concentrations were found in these blanks 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-141B M-141009B M-139B M-145B M-148B
PB100209-A2	10/2/09	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Chloride Conductivity pH Total phosphorus	1.1 mg/L 1.1 mg/L 0.025 mg/L 0.9 mg/L 1.84 umhos/cm 6.49 units 0.007 mg/L	M-144B M-146B

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-141B	Ammonia as N	1.95 mg/L	1.95J+ mg/L
M-141009B	Ammonia as N	0.054 mg/L	0.054J+ mg/L
M-139B	Ammonia as N Total organic carbon Nitrate as N	1.10 mg/L 0.5 mg/L 3.66 mg/L	1.10J+ mg/L 1.0U mg/L 3.66J+ mg/L
M-145B	Ammonia as N Nitrate as N	0.191 mg/L 2.90 mg/L	0.191J+ mg/L 2.90J+ mg/L
M-148B	Ammonia as N Nitrate as N	0.011 mg/L 6.37 mg/L	0.050U mg/L 6.37J+ mg/L
M-144B	Ammonia as N Total phosphorus	0.021 mg/L 0.023 mg/L	0.050U mg/L 0.050U mg/L
M-146B	Total phosphorus	0.039 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) and relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
LCS (EB103009-GWA4)	Nitrite as N	87 (90-110)	-	-	J- (all detects) UJ (all non-detects)	P

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 R0906095	All analytes reported below the PQL.	J (all detects)	A

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
EB103009-GWA4RE	Nitrite as N	X	A

Data flags are summarized at the end of this report if data has been qualified.

X. Field Duplicates

Samples M-141B and M-141009B and samples M-138B and M-138009B were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-141B	M-141009B				
Ammonia as N	1.95 mg/L	0.054 mg/L	-	1.896 (≤0.050)	J (all detects)	A
Alkalinity, total	260 mg/L	260 mg/L	0 (≤30)	-	-	-
Alkalinity, bicarbonate	260 mg/L	260 mg/L	0 (≤30)	-	-	-
Bromide	2.5 mg/L	2.6 mg/L	-	0.1 (≤1.0)	-	-
Chloride	999 mg/L	994 mg/L	1 (≤30)	-	-	-
Conductivity	9500 umhos/cm	9620 umhos/cm	1 (≤30)	-	-	-
Hexavalent chromium	11.0 mg/L	11.1 mg/L	1 (≤30)	-	-	-
Nitrate as N	31.1 mg/L	30.8 mg/L	1 (≤30)	-	-	-
Nitrite as N	0.155 mg/L	0.159 mg/L	3 (≤30)	-	-	-
pH	6.99 units	7.04 units	1 (≤30)	-	-	-
Sulfate	2210 mg/L	2600 mg/L	16 (≤30)	-	-	-

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-141B	M-141009B				
Surfactants	0.014 mg/L	0.016 mg/L	-	0.002 (≤0.020)	-	-
Total dissolved solids	9560 mg/L	9480 mg/L	1 (≤30)	-	-	-
Total organic carbon	3.2 mg/L	3.3 mg/L	-	0.1 (≤1.0)	-	-
Total phosphorus	0.027 mg/L	0.026 mg/L	-	0.001 (≤0.050)	-	-
Chlorate	2330000 ug/L	2270000 ug/L	3 (≤30)	-	-	-

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-138B	M-138009B				
Ammonia as N	0.007U mg/L	0.073 mg/L	-	0.066 (≤0.050)	J (all detects) UJ (all non-detects)	A
Alkalinity, total	347 mg/L	342 mg/L	1 (≤30)	-	-	-
Alkalinity, bicarbonate	347 mg/L	342 mg/L	1 (≤30)	-	-	-
Chloride	146 mg/L	148 mg/L	1 (≤30)	-	-	-
Conductivity	3500 mg/L	3490 mg/L	0 (≤30)	-	-	-
Hexavalent chromium	0.050 umhos/cm	0.050 umhos/cm	0 (≤30)	-	-	-
Nitrate as N	2.20 mg/L	2.16 mg/L	2 (≤30)	-	-	-
Nitrite as N	0.008 mg/L	0.007U mg/L	-	0.001 (≤0.010)	-	-
pH	7.48 mg/L	7.49 mg/L	0 (≤30)	-	-	-
Sulfate	1400 units	1380 units	1 (≤30)	-	-	-
Surfactants	0.005 mg/L	0.007 mg/L	-	0.002 (≤0.020)	-	-
Total dissolved solids	2810 mg/L	2850 mg/L	1 (≤30)	-	-	-
Total organic carbon	1.5 mg/L	1.6 mg/L	-	0.1 (≤1.0)	-	-

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	M-138B	M-138009B				
Total phosphorus	0.031 mg/L	0.030 mg/L	-	0.001 (≤0.050)	-	-
Total suspended solids	6.3 mg/L	7.1 mg/L	12 (≤30)	-	-	-
Chlorate	16800 ug/L	16800 ug/L	0 (≤30)	-	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Data Qualification Summary - SDG R0906095

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0906095	EB103009-GWA4 M-141009B	Hexavalent chromium	J- (all detects) UJ (all non-detects)	P	Technical holding times (h)
R0906095	EB103009-GWA4RE	Nitrite as N	J- (all detects) R (all non-detects)	A	Technical holding times (h)
R0906095	EB103009-GWA4	Nitrite as N	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0906095	M-141B M-141009B PB102309-A3 M-139B M-145B M-144B M-146B M-138B M-138009B M-148B M-137B EB103009-GWA4 EB103009-GWA4RE	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)
R0906095	EB103009-GWA4RE	Nitrite as N	X	A	Overall assessment of data (o)
R0906095	M-141B M-141009B	Ammonia as N	J (all detects)	A	Field duplicates (Difference) (fd)
R0906095	M-138B M-138009B	Ammonia as N	J (all detects) UJ (all non-detects)	A	Field duplicates (Difference) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R0906095

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906095	PB102309-A3	Total dissolved solids Chloride Sulfate	10U mg/L 2.0U mg/L 2.0U mg/L	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Equipment Blank Data Qualification Summary - SDG R0906095

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906095	M-137B	Ammonia as N Conductivity Nitrate as N	0.050U mg/L 1.163J+ umhos/cm 3.45J+ mg/L	A	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Field Blank Data Qualification Summary - SDG R0906095

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906095	M-144B	Ammonia as N Total organic carbon Total phosphorus	0.050U mg/L 1.0U mg/L 0.050U mg/L	A	bf
R0906095	M-146B	Total organic carbon Total phosphorus	1.0U mg/L 0.050U mg/L	A	bf

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Pump Blank Data Qualification Summary - SDG R0906095

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906095	M-141B	Ammonia as N	1.95J+ mg/L	A	bp
R0906095	M-141009B	Ammonia as N	0.054J+ mg/L	A	bp
R0906095	M-139B	Ammonia as N Total organic carbon Nitrate as N	1.10J+ mg/L 1.0U mg/L 3.66J+ mg/L	A	bp
R0906095	M-145B	Ammonia as N Nitrate as N	0.191J+ mg/L 2.90J+ mg/L	A	bp
R0906095	M-148B	Ammonia as N Nitrate as N	0.050U mg/L 6.37J+ mg/L	A	bp
R0906095	M-144B	Ammonia as N Total phosphorus	0.050U mg/L 0.050U mg/L	A	bp
R0906095	M-146B	Total phosphorus	0.050U mg/L	A	bp

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Filter Blank Data Qualification Summary - SDG R0906095

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 4

LDC #: 22234L6
SDG #: R0906095
Laboratory: Columbia Analytical Services

Date: 12-29-09
Page: 1 of 1
Reviewer: CR
2nd Reviewer: ✓

METHOD: (Analyte) Alkalinity (SM2320B), Ammonia-N (EPA Method 350.1), Bromide, Chloride, Nitrate-N, ~~Nitrite-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), Hexavalent Chromium (EPA SW846 Method 7199), pH (EPA SW846 Method 9040B/~~9045D~~), Surfactants (SM5540C), ~~Perchlorate (EPA Method 314.0)~~, Total Phosphorus (EPA Method 365.1), TDS (SM2540C), TSS (SM2540D), TOC (9060), Nitrite-N (353.2)

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: 10/23-10/30/09
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	SW	
IV	Surrogate Spikes	A	
V	Matrix Spike/Matrix Spike Duplicates	A	MS/D
VI.	Duplicates	A	DUP
VII.	Laboratory control samples	SW	LCS/D
VIII.	Sample result verification	A	
IX.	Overall assessment of data	SW	
X.	Field duplicates	SW	(1,2), (8,9)
XI	Field blanks	SW	EB=12, 13, PumpBlank=3, FB=FB080409-GW (SDG# R0904790) FilterBlank=~~mw-38-FILT~~, FilBG092509-A2 (SDG# R0905462)

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate (~~SDG# R0902586~~); TB = Trip blank; EB = Equipment blank

(See below)

Validated Samples: water

1	M-141B	11	M-137B	21	PBW	31	
2	M-141009B	12	EB103009-GWA4	22		32	
3	PB102309-A3	13	EB103009-GWA4RE	23		33	
4	M-139B	14	PB102309-A3MS	24		34	
5	M-145B	15	PB102309-A3MSD	25		35	
6	M-144B	16	PB102309-A3DUP	26		36	
7	M-146B	17		27		37	
8	M-138B	18		28		38	
9	M-138009B	19		29		39	
10	M-148B	20		30		40	

Notes: PumpBlank = PB100209-A2 (SDG# R0906636)

LDC #: 2223446
SDG #: see cover

VALIDATION FINDINGS CHECKLIST

Reviewer: CR
2nd Reviewer: VV

Method: Inorganics (EPA Method see cover)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.		✓		
Cooler temperature criteria was met.	✓			
II. Calibration				
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)	✓			
Were balance checks performed as required? (Level IV only)	✓			
III. Blanks				
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. Matrix spike/Matrix spike duplicates - not Duplicates				
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) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of ≤ CRDL(≤ 2X CRDL for soil) was used for samples that were ≤ 5X the CRDL, including when only one of the duplicate sample values were < 5X the CRDL.	✓			
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% (85-115% for Method 300.0) QC limits?		✓		
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	

LDC #: 22234L6
SDG #: See cover

VALIDATION FINDINGS CHECKLIST

Reviewer: CR
2nd Reviewer: V

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 assessment of data				
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.	✓			
Target analytes were detected in the field blanks.		✓		

LDC #: 22234L6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer:
2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1-12	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~~
13		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:14-16		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

Comments:

LDC #: 22234G
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Page: 1 of 1
Reviewer: CR
2nd reviewer: [illegible]

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?

Method:	7199	218.6	NO2-N			
Parameters:	Cr6+	Cr6+	353.2			
Technical holding time:	24hrs	unpreserved = 24hrs	48hrs			

Sample ID	Sampling date	Analysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier
12	10/23/09 11:10	10/31/09 12:16	(25hrs)				J-/UJ/P (h)
↓	↓	↓ 12:26	(25.25hrs)				
13	↓			11/3/09 20:09	(105hrs)		J-/R/A*
2	10/23/09 10:00		10/24/09 15:05	(29hrs)			J-/UJ/P

* Reanlysis

LDC #: 22234L6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: GR
2nd Reviewer: [illegible]

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?
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:** 1-7

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/L)			3									
TDS	6			9 / 10									

Conc. units: mg/L **Associated Samples:** 2-10

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/L)			No Qualifiers									
SO4	0.13												

Conc. units: mg/L **Associated Samples:** 3

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/L)			3									
Cl	0.09	0.090		0.9 / 2.0									
SO4		0.192		1.5 / 2.0									

Conc. units: mg/L **Associated Samples:** 1

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/L)			No Qualifiers									
SO4		0.127											

LDC #: 22234L6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CR
2nd Reviewer: h

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?

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: 2, 4-10**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/L)			No Qualifiers									
SO4		0.128											

Conc. units: mg/L **Associated Samples: 11**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/L)			No Qualifiers									
SO4		0.126											

LDC #: 22234L6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: CR
2nd Reviewer: [signature]

METHOD: Inorganics, Method See Cover

(Y) N N/A 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

Reason Code: be

Sampling date: 10/30/09 Soil factor applied NA

Field blank type: (circle one) Field Blank / Rinsate / Other: (EB)

Associated Samples: 11

Analyte	Blank ID	Sample Identification									
	12	Action Level	11								
Total Alkalinity	1.5										
Bicarbonate Alkalinity	1.5										
Ammonia as N	0.348	3.48	0.038 / 0.050								
TOC (average)	0.2										
Chloride	0.8										
Conductivity (umhos/cm)	1.09	10.9	1.163 J+								
Nitrate as Nitrogen	0.67	6.7	3.45 J+								
pH (pH Units)	7.98										
Surfactants	0.013										

LDC #: 22234L6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: CR
2nd Reviewer: [illegible]

METHOD: Inorganics, Method See Cover

(Y) N N/A 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

Reason Code: bf

Sampling date: 8/4/09 Soil factor applied NA

Field blank type: (circle one) (Field Blank) / Rinsate / Other: FB

Associated Samples: 6, 7

Analyte	Blank ID	Sample Identification								
	FB080409-GW (SDG#: R0904290)	Action Level	6	7						
Total Alkalinity	1.9									
Bicarbonate Alkalinity	1.9									
Ammonia as N	0.035		0.021 / 0.050							
TOC (average)	0.2		0.8 / 1.0	0.8 / 1.0						
Chloride	1.3									
pH (pH Units)	5.89									
Total Phosphorus	0.014		0.023 / 0.050	0.039 / 0.050						
Sulfate	0.9									

LDC #: 22234L6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: CR
2nd Reviewer: W

METHOD: Inorganics, Method See Cover

Y N N/A 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

Reason Code: bp

Sampling date: 10/23/09 Soil factor applied NA

Field blank type: (circle one) Field Blank / Rinsate / Other: Pump Blank Associated Samples: 1, 2, 4, 5, 10

Analyte	Blank ID	Sample Identification								
	3	Action Level	1	2	4	5	10			
Total Alkalinity	1.1									
Bicarbonate Alkalinity	1.1									
Ammonia as N	2.60	26.0	1.95 J+	0.054 J+	1.10 J+	0.191 J+	0.011 / 0.050			
TOC (average)	0.2				0.5 / 1.0					
Chloride	0.9									
Conductivity (umhos/cm)	3.83	38.3								
Nitrate as Nitrogen	0.69	6.9			3.66 J+	2.90 J+	6.37 J+			
pH (pH Units)	5.79									
TDS	9									
SO4	1.5									
ClO_3 (ug/L)	23	230								

LDC #: 22234L6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: CR
2nd Reviewer:

METHOD: Inorganics, Method See Cover
(Y) N N/A 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: 10/2/09 Soil factor applied NA
Field blank type: (circle one) Field Blank / Rinsate / Other (Pump Blank) Associated Samples: 6, 7

Reason Code: bp

Analyte	Blank ID	Sample Identification								
	PB100209-A2 (SDG#R0905636)	Action Level	6	7						
Total Alkalinity	1.1									
Bicarbonate Alkalinity	1.1									
Ammonia as N	0.025		0.021 / 0.050							
Chloride	0.9									
Conductivity (umhos/cm)	1.84	18.4								
pH (pH Units)	6.49									
Total Phosphorus	0.007		0.023 / 0.050	0.039 / 0.050						

LDC #: 22223H6
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: CR
2nd 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 Was a laboratory control sample (LCS) analyzed for each matrix in this SDG?

Y (N) N/A Were all LCS percent recoveries (%R) within the control limits of 80-120% (85-115% for Method 300.0)?

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	LCS ID	Matrix	Analyte	%R (limits)	Associated Samples	Qualifications
	LCS	water	NO2-N	87 (90-110)	12	J-/UJ/P (1)

Comments:

LDC #: 22234L6
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: CR
2nd Reviewer: [illegible]

METHOD: Inorganics, Method 353.2

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		13	NO_2-N		$ X (o) /A

Comments:

LDC#: 22234L6
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer: [signature]

Inorganics, Method See Cover

(Y)N NA Were field duplicate pairs identified in this SDG?
(Y)N NA Were target analytes detected in the field duplicate pairs?

Analyte	Concentration (mg/L) 1	Concentration (mg/L) 2	RPD (≤30)	Difference	Limits	Qualification (Parent only)
Ammonia as N	1.95	0.054		1.896	(≤0.050)	Jdet/A (fd)
Total Alkalinity	260	260	0			
Bicarbonate Alkalinity	260	260	0			
Bromide	2.5	2.6		0.1	(≤1.0)	
Chloride	999	994	1			
Conductivity (umhos/cm)	9500	9620	1			
Hexavalent Chromium	11.0	11.1	1			
Nitrate as N	31.1	30.8	1			
Nitrite as N	0.155	0.159	3			
pH (pH Units)	6.99	7.04	1			
Sulfate	2210	2600	16			
Surfactants	0.014	0.016		0.002	(≤0.020)	
TDS	9560	9480	1			
TOC, Average	3.2	3.3		0.1	(≤1.0)	
Total Phosphorus	0.027	0.026		0.001	(≤0.050)	
Chlorate (ug/L)	2330000	2270000	3			

LDC#: 22234L6
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: CR
2nd Reviewer: W

Inorganics, Method See Cover

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Analyte	Concentration (mg/L)		RPD (≤30)	Difference	Limits	Qualification (Parent only)
	8	9				
Ammonia as N	0.007U	0.073		0.066	(≤0.050)	J/UJ/A (fd)
Total Alkalinity	347	342	1			
Bicarbonate Alkalinity	347	342	1			
Chloride	146	148	1			
Conductivity (umhos/cm)	3500	3490	0			
Hexavalent Chromium	0.050	0.050	0			
Nitrate as N	2.20	2.16	2			
Nitrite as N	0.008	0.007U		0.001	(≤0.010)	
pH (pH Units)	7.48	7.49	0			
Sulfate	1400	1380	1			
Surfactants	0.005	0.007		0.002	(≤0.020)	
TDS	2810	2850	1			
TOC, Average	1.5	1.6		0.1	(≤1.0)	
Total Phosphorus	0.031	0.030		0.001	(≤0.050)	
TSS	6.3	7.1	12			
Chlorate (ug/L)	16800	16800	0			

LDC #: 2223416
SDG #: see cover

Validatin Findings Worksheet
Initial and Continuing Calibration Calculation Verification

Reviewer: SR
2nd Reviewer:

Method: Inorganics, Method see cover

The correlation coefficient (r) for the calibration of NH_3N was recalculated. Calibration date: 11/13/09

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

$$\%R = \frac{\text{Found} \times 100}{\text{True}}$$

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

Type of analysis	Analyte	Standard	Conc. (ug/l)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial calibration	NH_3N	s1	0	11542	1.0000	0.9999	Y
		s2	0.01	103066			
		s3	0.02	218582			
		s4	0.05	478010			
		s5	0.1	938886			
		s6	0.2	1766170			
		s7	0.5	4174432			
		s8	1	8288506			
		s9	2	16582717			
Calibration verification	TOC	CCV	15	15.129	101	-	
Calibration verification	Cr^{6+}	CCV	0.5	0.4988	100	-	
Calibration verification	T-P	CCV	0.45	0.4314	96	-	

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.

LDC #: 22345

SDG #: Seecover

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Page: 1 of 1
Reviewer: CR
2nd Reviewer: CR

METHOD: Inorganics, Method Seecover

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$\%R = \frac{Found}{True} \times 100$ 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:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$ Where, S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated %R / RPD	Reported %R / RPD	Acceptable (Y/N)
LCS	Laboratory control sample	TP	0.807	0.800	101	101	Y
14	Matrix spike sample	ClO_3	(SSR-SR) 194	200	97	97	↓
16	Duplicate sample	↓	23	21	9	9	↓

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 #: 22234L6
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
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".

Y N N/A Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments?
Y N N/A Are all detection limits below the CRQL?

Compound (analyte) results for Alk. reported with a positive detect were recalculated and verified using the following equation:

Concentration = $Alk = \frac{V_{Titrant} \times N_{Titrant} \times 50{,}000}{V_{sample}}$

Recalculation: $Alk = \frac{2.25mL(0.02N)(50{,}000)}{20mL} = 113 mg/L$

#	Sample ID	Analyte	Reported Concentration (mg/L)	Calculated Concentration (mg/L)	Acceptable (Y/N)
	4	Alk, Total	113	113	Y
		Alk, Bicarb	113	113	
		NH_3-N	1.10	1.10	
		Br	0.8	0.8	
		TOC	0.5	0.5	
		Cl	312	312	
		Cr6+	0.0010	0.090	
		Cond (umhos/cm)	3680	3680	
		NO_3-N	3.66	3.66	
		pH (pH units)	7.44	7.44	
		T-P	0.024	0.024	
		TDS	288	288	
		TSS	125	125	
		SO_4	1150	1150	
		ClO_3 (ug/L)	15700	15700	

Note:

LDC #: 22231L6
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: CP
2nd reviewer: LA

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 Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments?
Y N N/A Are all detection limits below the CRQL?

Compound (analyte) results for Cl reported with a positive detect were recalculated and verified using the following equation:

Concentration = Recalculation:

Cl = 0.0262707(Area) + 0.080741

40 (0.0262707(165,558) + 0.080741)
= 177 mg/L

#	Sample ID	Analyte	Reported Concentration (mg/L)	Calculated Concentration (mg/L)	Acceptable (Y/N)
	5	Alk, Total	150	150	Y
		Alk, Bicarb	150	150	
		NH_3-N	0.191	0.191	
		TOC	2.4	2.4	
		Cl	177	177	
		Cr6+	0.009	0.009	
		Cond (umhos/cm)	1820	1820	
		NO_3-N	2.90	2.90	
		NO_2-N	0.033	0.033	
		pH (pH units)	7.44	7.44	
		T-P	0.041	0.041	
		TDS	1350	1350	
		TSS	3.7	3.7	
		SO_4	526	526	
		ClO_4 (ug/L)	715	715	N

Note:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 26 through October 27, 2009

LDC Report Date: January 13, 2010

Matrix: Soil/Water

Parameters: Wet Chemistry

Validation Level: Stage 4

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906123

Sample Identification

SA34-0.5B
SA34-10B
SA34-20B
SA34-31B
SA34-34B
EB102709-SO1A3
SA140-0.5B
SA140-10B
SA140009-10B
SA140-20B
SA140-30B
SA140-40B
RSAP7-0.5B
RSAP7-14B
RSAP7-25B
RSAP7-41B
RSAQ7-0.5B
RSAQ7-10B
RSAQ7-38B
RSAP7-0.5BMS
RSAP7-0.5BMSD
RSAP7-0.5BDUP
RSAQ7-38BMS
RSAQ7-38BMSD
RSAQ7-38BDUP

Introduction

This data review covers 24 soil samples and 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 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 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/Kahn and EPA SW 846 Method 9060 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.

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 Leaching Until Analysis	Required Holding Time From Sample Leaching Until Analysis	Flag	A or P
EB102709-SO1A3	Hexavalent chromium	24.5 & 24.25 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.

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
ICB/CCB	Sulfate	0.058 mg/L	All water samples in SDG R0906123
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate Chloride	10 mg/Kg 10 mg/Kg 1.1 mg/Kg	SA34-0.5B SA34-10B SA34-20B SA34-31B
ICB/CCB	Alkalinity, total Alkalinity, bicarbonate	0.5 mg/L 0.5 mg/L	SA34-0.5B SA34-10B SA34-20B SA34-31B

Method Blank ID	Analyte	Concentration	Associated Samples
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate	15 mg/Kg 15 mg/Kg	SA34-34B SA140-0.5B SA140-10B SA140009-10B SA140-20B SA140-30B SA140-40B RSAP7-0.5B RSAP7-14B
PB (prep blank)	Alkalinity, total Alkalinity, bicarbonate Chloride	12 mg/Kg 12 mg/Kg 1.2 mg/Kg	RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-10B RSAQ7-38B
PB (prep blank)	Total organic carbon	40 mg/Kg	SA34-10B SA34-20B SA34-31B SA34-34B SA140-0.5B SA140-10B SA140009-10B SA140-20B SA140-30B SA140-40B RSAP7-0.5B RSAP7-14B RSAP7-25B RSAP7-41B
PB (prep blank)	Total phosphorus	1.0 mg/Kg	SA140-30B SA140-40B RSAP7-0.5B RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-10B RSAQ7-38B
ICB/CCB	Total organic carbon	116.0 mg/Kg	All soil samples in SDG R0906123
ICB/CCB	Nitrite as N	0.0092 mg/L	SA34-0.5B SA34-10B SA34-20B SA34-31B SA34-34B SA140-0.5B SA140-10B SA140009-10B SA140-20B SA140-30B SA140-40B RSAP7-0.5B RSAP7-14B

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Total phosphorus	0.0078 mg/L	SA140009-10B SA140-20B
ICB/CCB	Sulfate	0.074 mg/L	SA34-0.5B SA34-10B SA34-20B
ICB/CCB	Chloride	0.114 mg/L	SA140-30B SA140-40B RSAP7-0.5B RSAP7-14B
ICB/CCB	Chloride	0.073 mg/L	SA34-34B SA140-0.5B SA140-10B SA140009-10B SA140-20B
ICB/CCB	Chloride	0.075 mg/L	RSAP7-25B RSAQ7-0.5B
ICB/CCB	Chloride	0.074 mg/L	RSAQ7-10B
ICB/CCB	Chloride	0.103 mg/L	RSAP7-41B RSAQ7-38B
ICB/CCB	Sulfate	0.157 mg/L	RSAP7-14B RSAQ7-38B

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
SA34-34B	Total organic carbon	210 mg/Kg	300U mg/Kg
SA140-20B	Total organic carbon Nitrite as N	230 mg/Kg 0.09 mg/Kg	280U mg/Kg 0.11U mg/Kg
SA140-30B	Total organic carbon	200 mg/Kg	300U mg/Kg
RSAP7-41B	Total organic carbon	160 mg/Kg	290U mg/Kg

Sample EB102709-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
EB102709-SO1A3	10/27/09	Chloride pH Surfactants	1.1 mg/L 6.71 units 0.028 mg/L	SA140-0.5B SA140-10B SA140009-10B SA140-20B SA140-30B SA140-40B RSAP7-0.5B RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-10B RSAQ7-38B

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
SA140-0.5B	Surfactants	0.7 mg/Kg	2.2U mg/Kg
RSAQ7-0.5B	Surfactants	0.8 mg/Kg	2.2U 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 R0906123

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
SA34-0.5B	Nitrate as N	1.46 mg/Kg	1.46J+ mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA34-10B	Nitrate as N	1.95 mg/Kg	1.95J+ mg/Kg
SA34-20B	Nitrate as N	1.30 mg/Kg	1.30J+ mg/Kg
SA34-31B	Nitrate as N	6.35 mg/Kg	6.35J+ mg/Kg
SA34-34B	Total organic carbon Nitrate as N	210 mg/Kg 2.72 mg/Kg	300U mg/Kg 2.72J+ mg/Kg
SA140-0.5B	Nitrate as N	1.28 mg/Kg	1.28J+ mg/Kg
SA140-10B	Nitrate as N	1.40 mg/Kg	1.40J+ mg/Kg
SA140009-10B	Nitrate as N	1.37 mg/Kg	1.37J+ mg/Kg
SA140-20B	Total organic carbon Nitrate as N	230 mg/Kg 1.20 mg/Kg	280U mg/Kg 1.20J+ mg/Kg
SA140-30B	Total organic carbon Nitrate as N	200 mg/Kg 1.12 mg/Kg	300U mg/Kg 1.12J+ mg/Kg
SA140-40B	Nitrate as N	5.86 mg/Kg	5.86J+ mg/Kg
RSAP7-0.5B	Nitrate as N	1.98 mg/Kg	1.98J+ mg/Kg
RSAP7-14B	Nitrate as N	1.99 mg/Kg	1.99J+ mg/Kg
RSAP7-25B	Nitrate as N	1.04 mg/Kg	1.04J+ mg/Kg
RSAP7-41B	Total organic carbon Nitrate as N	160 mg/Kg 13.1 mg/Kg	290U mg/Kg 13.1J+ mg/Kg
RSAQ7-0.5B	Nitrate as N	1.79 mg/Kg	1.79J+ mg/Kg
RSAQ7-10B	Nitrate as N	2.68 mg/Kg	2.68J+ mg/Kg
RSAQ7-38B	Nitrate as N	15.5 mg/Kg	15.5J+ 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
RSAP7-0.5BMS (All soil samples in SDG R0906123)	Sulfate	63 (75-125)	-	-	J- (all detects) UJ (all non-detects)	A
RSAQ7-38BMS (All soil samples in SDG R0906123)	Total phosphorus	145 (75-125)	-	-	J+ (all detects)	A
RSAQ7-38BMS (All soil samples in SDG R0906123)	Sulfate	65 (75-125)	-	-	J- (all detects) UJ (all non-detects)	A

V. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (Limits)	Difference (Limits)	Flag	A or P
RSAQ7-38BDUP (All soil samples in SDG R0906123)	Sulfate	24 (≤20)	-	J (all detects) UJ (all non-detects)	A

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 with the following exceptions:

LCS ID (Associated Samples)	Analyte	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
LCS (SA34-34B SA140-0.5B SA140-10B SA140009-10B SA140-20B SA140-30B SA140-40B RSAP7-14B)	Bromide	113 (90-110)	-	-	J+ (all detects)	P

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)	Compound	Flag	A or P
SA34-0.5B	Dichloroacetate	82 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	A
SA34-10B	Dichloroacetate	83 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	A
SA34-31B	Dichloroacetate	88 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	A
SA34-34B	Dichloroacetate	88 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	A
SA140009-10B	Dichloroacetate	89 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	A
SA140-40B	Dichloroacetate	86 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	A
RSAP7-41B	Dichloroacetate	89 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	A
RSAQ7-38B	Dichloroacetate	88 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	A

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 R0906123	All analytes reported below the PQL.	J (all detects)	A

IX. Overall Assessment

Data flags are summarized at the end of this report if data has been qualified.

X. Field Duplicates

Samples SA140-10B and SA140009-10B were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

Analyte	Concentration		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA140-10B	SA140009-10B				
Alkalinity, total	251 mg/Kg	227 mg/Kg	10 (≤50)	-	-	-
Alkalinity, bicarbonate	247 mg/Kg	227 mg/Kg	8 (≤50)	-	-	-
Alkalinity, carbonate	4 mg/Kg	3U mg/Kg	-	1 (≤22)	-	-
Chloride	4.6 mg/Kg	5.0 mg/Kg	-	0.4 (≤2.2)	-	-
Nitrate as N	1.40 mg/Kg	1.37 mg/Kg	-	0.03 (≤0.55)	-	-
pH	7.67 units	7.74 units	1 (≤50)	-	-	-
Sulfate	716 mg/Kg	949 mg/Kg	28 (≤50)	-	-	-
Total organic carbon	360 mg/Kg	370 mg/Kg	-	10 (≤300)	-	-
Total phosphorus	753 mg/Kg	771 mg/Kg	2 (≤50)	-	-	-
Perchlorate	135 ug/Kg	104 ug/Kg	-	31 (≤55)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Data Qualification Summary - SDG R0906123

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0906123	EB102709-SO1A3	Hexavalent chromium	J- (all detects) UJ (all non-detects)	P	Technical holding times (h)
R0906123	SA34-0.5B SA34-10B SA34-20B SA34-31B SA34-34B SA140-0.5B SA140-10B SA140009-10B SA140-20B SA140-30B SA140-40B RSAP7-0.5B RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-10B RSAQ7-38B	Sulfate	J- (all detects) UJ (all non-detects)	A	Matrix spike analysis (%R) (m)
R0906123	SA34-0.5B SA34-10B SA34-20B SA34-31B SA34-34B SA140-0.5B SA140-10B SA140009-10B SA140-20B SA140-30B SA140-40B RSAP7-0.5B RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-10B RSAQ7-38B	Total phosphorus	J+ (all detects)	A	Matrix spike analysis (%R) (m)

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0906123	SA34-0.5B SA34-10B SA34-20B SA34-31B SA34-34B SA140-0.5B SA140-10B SA140009-10B SA140-20B SA140-30B SA140-40B RSAP7-0.5B RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-10B RSAQ7-38B	Sulfate	J (all detects) UJ (all non-detects)	A	Duplicate sample analysis (RPD) (ld)
R0906123	SA34-34B SA140-0.5B SA140-10B SA140009-10B SA140-20B SA140-30B SA140-40B RSAP7-14B	Bromide	J+ (all detects)	P	Laboratory control samples (%R) (l)
R0906123	SA34-0.5B SA34-10B SA34-31B SA34-34B SA140009-10B SA140-40B RSAP7-41B RSAQ7-38B	Chlorate	J- (all detects) UJ (all non-detects)	A	Surrogate spikes (%R) (s)
R0906123	SA34-0.5B SA34-10B SA34-20B SA34-31B SA34-34B EB102709-SO1A3 SA140-0.5B SA140-10B SA140009-10B SA140-20B SA140-30B SA140-40B RSAP7-0.5B RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-10B RSAQ7-38B	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 R0906123

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906123	SA34-34B	Total organic carbon	300U mg/Kg	A	bl
R0906123	SA140-20B	Total organic carbon Nitrite as N	280U mg/Kg 0.11U mg/Kg	A	bl
R0906123	SA140-30B	Total organic carbon	300U mg/Kg	A	bl
R0906123	RSAP7-41B	Total organic carbon	290U mg/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Equipment Blank Data Qualification Summary - SDG R0906123

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906123	SA140-0.5B	Surfactants	2.2U mg/Kg	A	be
R0906123	RSAQ7-0.5B	Surfactants	2.2U mg/Kg	A	be

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Wet Chemistry - Field Blank Data Qualification Summary - SDG R0906123

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906123	SA34-0.5B	Nitrate as N	1.46J+ mg/Kg	A	bf
R0906123	SA34-10B	Nitrate as N	1.95J+ mg/Kg	A	bf
R0906123	SA34-20B	Nitrate as N	1.30J+ mg/Kg	A	bf
R0906123	SA34-31B	Nitrate as N	6.35J+ mg/Kg	A	bf
R0906123	SA34-34B	Total organic carbon Nitrate as N	300U mg/Kg 2.72J+ mg/Kg	A	bf
R0906123	SA140-0.5B	Nitrate as N	1.28J+ mg/Kg	A	bf
R0906123	SA140-10B	Nitrate as N	1.40J+ mg/Kg	A	bf

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0906123	SA140009-10B	Nitrate as N	1.37J+ mg/Kg	A	bf
R0906123	SA140-20B	Total organic carbon Nitrate as N	280U mg/Kg 1.20J+ mg/Kg	A	bf
R0906123	SA140-30B	Total organic carbon Nitrate as N	300U mg/Kg 1.12J+ mg/Kg	A	bf
R0906123	SA140-40B	Nitrate as N	5.86J+ mg/Kg	A	bf
R0906123	RSAP7-0.5B	Nitrate as N	1.98J+ mg/Kg	A	bf
R0906123	RSAP7-14B	Nitrate as N	1.99J+ mg/Kg	A	bf
R0906123	RSAP7-25B	Nitrate as N	1.04J+ mg/Kg	A	bf
R0906123	RSAP7-41B	Total organic carbon Nitrate as N	290U mg/Kg 13.1J+ mg/Kg	A	bf
R0906123	RSAQ7-0.5B	Nitrate as N	1.79J+ mg/Kg	A	bf
R0906123	RSAQ7-10B	Nitrate as N	2.68J+ mg/Kg	A	bf
R0906123	RSAQ7-38B	Nitrate as N	15.5J+ mg/Kg	A	bf

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 4

LDC #: 22234M6
SDG #: R0906123
Laboratory: Columbia Analytical Services

Date: 1-12-10
Page: 1 of 1
Reviewer: CR2
2nd Reviewer: W

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), ~~Dissolved Hexavalent Chromium (EPA Method 218.6)~~, 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: 10/26/09 - 10/27/09
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	SW	
IV	Surrogate Spikes	SW	
V	Matrix Spike/Matrix Spike Duplicates	SW	MS/D
VI.	Duplicates	SW	DUP
VII.	Laboratory control samples	SW	LCS/D
VIII.	Sample result verification	A	
IX.	Overall assessment of data	A	
X.	Field duplicates	SW	(8,9)
XI	Field blanks	SW	EB=6 FB=FB082809-SO (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: all soil except 6=water

1	SA34-0.5B	11	SA140-30B	21	RSAP7-0.5BMSD	31	PBW
2	SA34-10B	12	SA140-40B	22	RSAP7-0.5BDUP	32	PBS
3	SA34-20B	13	RSAP7-0.5B	23	RSAQ7-38BMS	33	
4	SA34-31B	14	RSAP7-14B	24	RSAQ7-38BMSD	34	
5	SA34-34B	15	RSAP7-25B	25	RSAQ7-38BDUP	35	
6	EB102709-SO1A3	16	RSAP7-41B	26		36	
7	SA140-0.5B	17	RSAQ7-0.5B	27		37	
8	SA140-10B	18	RSAQ7-10B	28		38	
9	SA140009-10B	19	RSAQ7-38B	29		39	
10	SA140-20B	20	RSAP7-0.5BMS	30		40	

Notes:

LDC #: 22234M6
SDG #: see cover

VALIDATION FINDINGS CHECKLIST

Reviewer: CR
2nd Reviewer: VF

Method: Inorganics (EPA Method see cover)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.		✓		
Cooler temperature criteria was met.	✓			
II. Calibration				
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)	✓			
Were balance checks performed as required? (Level IV only)	✓			
III. Blanks				
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. Matrix spike/Matrix spike duplicates/Duplicates				
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) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of ≤ CRDL(≤ 2X CRDL for soil) was used for samples that were ≤ 5X the CRDL, including when only one of the duplicate sample values were < 5X the CRDL.		✓		
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% (85-115% for Method 300.0) QC limits?		✓		
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	

LDC #: 22223M6
SDG #: See cover

VALIDATION FINDINGS CHECKLIST

Reviewer: CR
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 assessment of data				
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.		✓		
Target analytes were detected in the field blanks.		✓		

LDC #: 22234 M 6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Page: 1 of 1
Reviewer: CE
2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1-19	W/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$_4$]
6,13-19		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: 20		[✓ 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$_4$]
21		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$_4$]
22		[✓ 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$_4$]
23		[✓ 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$_4$]
24		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$_4$]
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$_4$]
		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 #: 22234M6
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Page: 1 of 1
Reviewer: CR
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?

Method:		7199					
Parameters:		Cr6+					
Technical holding time:		24hrs					
Sample ID	Sampling date	Analysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier
6	10/27/09 09:33	10/28/09 09:56	(24.5hrs)				J-/UJ/P (h)
↓	↓	↓ 09:45	(24.25hrs)				↓

LDC #: 22234M6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: SR
2nd Reviewer: V

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?
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: All Water**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/L)			No Qualifiers									
SO4		0.058											

Conc. units: mg/Kg **Associated Samples: 1-4**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Alk., Total	10	0.5											
Alk., Bicarb.	10	0.5											
Cl	1.1												

Conc. units: mg/Kg **Associated Samples: 5, 7-14**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Alk., Total	15												
Alk., Bicarb.	15												

LDC #: 22234M6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CR
2nd 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?

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/Kg **Associated Samples: 15-19**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Alk., Total	12												
Alk., Bicarb.	12												
Cl	1.2												

Conc. units: mg/Kg **Associated Samples: 2-5, 7-16**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			5	10	11	16						
TOC	40			210 / 300	230 / 280	200 / 300	160 / 290						

Conc. units: mg/Kg **Associated Samples: 11-19**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
T-P	1.0												

Conc. units: mg/Kg **Associated Samples: All Soil**

Analyte	Blank ID	Maximum ICB/CCB (mg/Kg)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			5	10	11	16						
TOC		116.0		See PB	See PB	See PB	See PB						

LDC #: 22234M6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: CR
2nd Reviewer: M

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?
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/Kg **Associated Samples: 1-5, 7-14**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			10									
NO2-N		0.0092		0.09 / 0.11									

Conc. units: mg/Kg **Associated Samples: 9, 10**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
T-P		0.0078											

Conc. units: mg/Kg **Associated Samples: 1-3**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
SO4		0.074											

Conc. units: mg/Kg **Associated Samples: 11-14**

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.114											

LDC #: 22234M6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: AR
2nd 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?
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/Kg **Associated Samples:** 5, 7-10

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.073											

Conc. units: mg/Kg **Associated Samples:** 15, 17

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.075											

Conc. units: mg/Kg **Associated Samples:** 18

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.074											

Conc. units: mg/Kg **Associated Samples:** 16, 19

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
Cl		0.103											

LDC #: 22234M6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer:
2nd 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?

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/Kg **Associated Samples:** 14, 19

Analyte	Blank ID	Maximum ICB/CCB (mg/L)	Blank Action Limit	Sample Identification									
	PB (mg/Kg)			No Qualifiers									
SO4		0.157											

LDC #: 22234M6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: CR
2nd Reviewer: [illegible]

METHOD: Inorganics, Method See Cover
Y N N/A 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 Reason Code: be
Sampling date: 10/27/09 Soil factor applied 10X
Field blank type: (circle one) Field Blank / Rinsate / Other: EB Associated Samples: 7-19

Analyte	Blank ID	Sample Identification									
	6	Action Level	7	17							
Cl	1.1										
pH (pH Units)	6.71										
Surfactants	0.028	2.8	0.7 / 2.2	0.8 / 2.2							

LDC #: 22234M6
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: QR
2nd Reviewer:

METHOD: Inorganics, Method See Cover
Y N N/A 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 Reason Code: bf
Sampling date: 8/28/09 Soil factor applied 10X except TOC 1X
Field blank type: (circle one) Field Blank / Rinsate / Other: Associated Samples: All Soil

Analyte	Blank ID	Sample Identification																		
	FB082809-SO (SDG# R0904894)	Action Level	1	2	3	4	5	7	8	9	10	11	12	13	14	15	16	17	18	19
Total alkalinity	1.9																			
Bicarbonate alkalinity	1.9																			
Ammonia as N	0.033																			
TOC (average)	0.2						210 / 300				230 / 280	200 / 300					160 / 290			
Cl	1.2																			
Nitrate as N	0.68	68	1.46 J+	1.95 J+	1.30 J+	6.35 J+	2.72 J+	1.28 J+	1.40 J+	1.37 J+	1.20 J+	1.12 J+	5.86 J+	1.98 J+	1.99 J+	1.04 J+	13.1 J+	1.79 J+	2.68 J+	15.5 J+
pH (pH Units)	5.88																			
Total P	0.008																			
Sulfate	1.4																			

LDC #: 22234M6
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike Analysis

Page: 1 of 1
Reviewer: SR
2nd Reviewer: [illegible]

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 Was a matrix spike analyzed for each matrix in this SDG?

Y N N/A Were matrix spike percent recoveries (%R) within the control limits of 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:

Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
	20	soil	SO4	63	All soil	J- /UJ/A (m)
	23	soil	T-Phosphorus	145	All soil	J+ det/A (m)
			SO4	65	↓	J- /UJ/A ↓

Comments:

LDC #: 22234M6
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Duplicate Analysis

Reviewer: CR
2nd 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 Was a duplicate sample analyzed for each matrix in this SDG?

Y N N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water and ≤ 35% for soil samples (≤ 10% for Method 300.0)? If no, see qualification below. A control limit of ±CRDL (±2X CRDL for soil) was used for samples that were ≤5X the CRDL, including when only one of the duplicate sample values were ≤5X the CRDL. If field blanks were used for laboratory duplicates, see overall assessment.

LEVEL IV ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Duplicate ID	Matrix	Analyte	RPD (Limits)	Associated Samples	Qualifications
	25	Soil	SO4	24 (≤20)	All Soil	J/UJ/A (CH)

Comments:

LDC #: 22234M6
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: CR
2nd Reviewer: [illegible]

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 Was a laboratory control sample (LCS) analyzed for each matrix in this SDG?

Y (N) N/A Were all LCS percent recoveries (%R) within the control limits of ~~80-120%~~ (85-115% for Method 300.0)?

LEVEL IV ONLY:

(Y) N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	LCS ID	Matrix	Analyte	%R (limits)	Associated Samples	Qualifications
	LCS	Soil	Br	113 (90-110)	5,7-12,14	J+ det/P (L)

Comments:

LDC #: 22654M6
SDG #: see cover

VALIDATION FINDINDS WORKSHEET
Surrogate Recovery

Page: 1 of 1
Reviewer: CR
2nd Reviewer: [illegible]

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".
(Y) N N/A Were surrogates spiked into all samples and blanks?
Y (N) N/A Did all surrogate recoveries (%R) meet the QC limits?

#	Date	Lab ID/Reference	Column	Surrogate Compound	%R (Limits)	Associated Samples	Qualifications
		C103		DCA	82 (90-115)	1	J-/UJ/A(5)
					83 ( )	2	
					88 ( )	4	
					88 ( )	5	
					89 ( )	9	
					86 ( )	12	
					89 ( )	16	
					88 ( )	19	
					( )		
					( )		
					( )		
					( )		
					( )		
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					( )		
					( )		
					( )		
					( )		
					( )		
					( )		
					( )		

Letter Designation	Surrogate Compound	Recovery QC Limits (Soil)	Recovery QC Limits (Water)	Comments
A	Dichloroacetate			
B				

LDC#: 22234M6
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: LR
2nd Reviewer: W

Inorganics, Method See Cover

Y N NA Were field duplicate pairs identified in this SDG?
Y N NA Were target analytes detected in the field duplicate pairs?

Analyte	Concentration (mg/Kg)		RPD (≤50)	Difference	Limits	Qualification (Parent only)
	128	129				
Total Alkalinity	251	227	10			
Bicarbonate Alkalinity	247	227	8			
Carbonate Alkalinity	4	3U		1	(≤22)	
Chloride	4.6	5.0		0.4	(≤2.2)	
Nitrate as N	1.40	1.37		0.03	(≤0.55)	
pH (pH Units)	7.67	7.74	1			
Sulfate	716	949	28			
TOC	360	370		10	(≤300)	
Total Phosphorus	753	771	2			
Perchlorate (ug/Kg)	135	104		31	(≤55)	

LDC #: 22234M6
SDG #: see cover

Validatin Findings Worksheet
Initial and Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer: CR
2nd Reviewer: [illegible]

Method: Inorganics, Method see cover

The correlation coefficient (r) for the calibration of SO4 was recalculated.Calibration date: 10/26/09

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found X 100 / True

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

Type of analysis	Analyte	Standard	Conc. (mg/L ~~ug/l~~)	Area	Recalculated r or r^2	Reported r or r^2	Acceptable (Y/N)
Initial calibration	SO4	s1	0.1	11637	*0.999799*	0.999799	Y
		s2	0.2	26529			
		s3	0.5	65634			
		s4	1	128729			
		s5	2	265742			
		s6	5	657511			
		s7	8	1071153			
		s8	10	1358462			
Calibration verification	Cl	ICV	3	Found (mg/L) 2.955	99	—	
Calibration verification	Surfactants	CCV	0.3	0.2957	99	—	
Calibration verification	Cr6+	CCV	0.5	0.4904	98	—	

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.

LDC #: 22234M26
SDG #: seecover

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: GR
2nd Reviewer: [illegible]

METHOD: Inorganics, Method seecover

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

%R = Found / True x 100 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 = |S-D| / (S+D)/2 x 100 Where, S = Original sample concentration
D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	Recalculated %R / RPD	Reported %R / RPD	Acceptable (Y/N)
LCS	Laboratory control sample	SO_4	19.5	20.0	98	97	Y
23	Matrix spike sample	NH_3-N	(SSR-SR) 6.17	5.94	96	96	
25	Duplicate sample	NO_3-N	15.5	15.8	2	2	

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 #: 22234M6
SDG #: seecaer

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 2
Reviewer: CP
2nd reviewer: [illegible]

METHOD: Inorganics, Method Seecaer

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y)	N	N/A	Have results been reported and calculated correctly?
Y	N	N/A	Are results within the calibrated range of the instruments?
Y	N	N/A	Are all detection limits below the CRQL?

Compound (analyte) results for Alk reported with a positive detect were recalculated and verified using the following equation:

Concentration = $\frac{V_{titrant}(N_{titrant})(50{,}000)}{V_{sample}}$

Alk = $\frac{V_{titrant}(N_{titrant})(50{,}000)}{V_{sample}}$

Carb. Alk = 2(Phenolphthalein Alk)

Bicarb = Total Alk − 2(Phen. Alk)

Recalculation:

Total Alk = $\frac{3.89\,mL(0.02N)(50{,}000)(100mL)}{100mL(1g)(0.92)}$ = 423 mg/kg

Phen. Alk = 1mL(0.02N)(50,000)/100 mL = 10.0 mg/L

Carb. Alk = 2(Phen Alk) = 2(10.0 mg/L)/0.92 = 22 mg/kg

Bicarb = Total − 2(Phen) = (389 − 20)/0.92 = 401 mg/kg

#	Sample ID	Analyte	Reported Concentration (mg/kg)	Calculated Concentration (mg/kg)	Acceptable (Y/N)
	13	Alk, Total	423	423	Y
		Alk, Bicarbonate	401	401	
		Alk, Carbonate	22	22	
		Cl	61.6	616	
		NO3-N	1.98	1.98	
		SO4	274	274	
		T-Phosphorus	782	782	
		TOC	440	440	
		pH (pH units)	9.11	9.11	Y

Note: _____

LDC #: 22234M6
SDG #: seecaer

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 2 of 2
Reviewer: CA
2nd reviewer: LA

METHOD: Inorganics, Method seecaer

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Have results been reported and calculated correctly?
Y N N/A Are results within the calibrated range of the instruments?
Y N N/A Are all detection limits below the CRQL?

Compound (analyte) results for Cl reported with a positive detect were recalculated and verified using the following equation:

Concentration = $\frac{(4.73\times10^{-6}(\text{Area})+0.09727)(\text{PrepFactor})(DF)}{\%\ \text{Solid}}$

Recalculation: $\frac{(4.73\times10^{-6}(696268)+0.09727)(10)(10)}{0.811} = 418\ mg/kg$

#	Sample ID	Analyte	Reported Concentration (mg/kg)	Calculated Concentration (mg/kg)	Acceptable (Y/N)
	19	Alk., Total	184	184	
		Alk., Bicarb	184	184	
		Br	1.8	1.8	
		Cl	418	418	
		NO3-N	15.5	15.5	
		SO4	5040	5040	
		T-Phosphorus	216	216	
		TOC	360	360	
		pH (pH units)	7.95	7.95	

Note:

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Data Validation Reports
LDC #22234

TPH as Extractables

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: August 4 through August 5, 2009

LDC Report Date: January 1, 2010

Matrix: Soil

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0904329

Sample Identification

SA146-0.5B
SA146-10B
SA146-25B
SA146009-25B
SA146-40B
SA146-55B
SA147-0.5B
SA147-10B
SA147-25B
SA147009-25B
SA147-40B
SA147-56B
RSAU5-0.5B
RSAU5-10B
RSAU5-40B
RSAU5-55B

Introduction

This data review covers 16 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 FB080309-SO (from SDG R0904279) was identified as a field blank. No total petroleum hydrocarbons as extractable contaminants were found in this blank.

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

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 R0904329	All compounds reported below the PQL.	J (all detects)	A

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 SA146-25B and SA146009-25B and samples SA147-25B and SA147009-25B 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 R0904329

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0904329	SA146-0.5B SA146-10B SA146-25B SA146009-25B SA146-40B SA146-55B SA147-0.5B SA147-10B SA147-25B SA147009-25B SA147-40B SA147-56B RSAU5-0.5B RSAU5-10B RSAU5-40B RSAU5-55B	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 R0904329

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 R0904329

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234A8
SDG #: R0904329
Laboratory: Columbia Analytical Services

Date: 12/26/09
Page: 1 of 1
Reviewer: JVG
2nd Reviewer: V

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: 8/04 - 05/09
IIa.	Initial calibration	A	
IIb.	Calibration verification/ICV	A	CCV/ICV ≤ 20%
III.	Blanks	A	
IVa.	Surrogate recovery	A	
IVb.	Matrix spike/Matrix spike duplicates	N	client spec
IVc.	Laboratory control samples	A	LCS/D
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	D_1 = 3,4 D_2 = 9,10
X.	Field blanks	ND	FB = FB080309-50 (R0904279)

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

ND = No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: soil

1	SA146-0.5B	11	SA147-40B	21	92829-MB	31	
2	SA146-10B	12	SA147-56B	22	93315-	32	
3	SA146-25B D_1	13	RSAU5-0.5B	23		33	
4	SA146009-25B D_1	14	RSAU5-10B	24		34	
5	SA146-40B	15	RSAU5-40B	25		35	
6	SA146-55B	16	RSAU5-55B	26		36	
7	SA147-0.5B	17		27		37	
8	SA147-10B	18		28		38	
9	SA147-25B D_2	19		29		39	
10	SA147009-25B D_2	20		30		40	

Notes: _____

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 6, 2009

LDC Report Date: January 1, 2010

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Stage 4

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905693

Sample Identification

EB100609-SO1A4
SA138-0.5B
SA138-10B
SA138009-10B
SA138-30B
SA138-45B
SA103-0.5B
SA103-10B
SA103009-10B
SA103-25B
SA103-35B
RSAR5-0.5B
RSAR5-10B
RSAR5-25B
RSAR5-40B
RSAS5-0.5B
RSAS5-10B
RSAS5-25B
RSAS5-36B
RSAS5009-36B
RSAR5-40BMS
RSAR5-40BMSD

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 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.

Sample EB100609-SO1A4 was identified as an equipment blank. No total petroleum hydrocarbons as extractable contaminants were found in this blank.

Sample FB080309-SO (from SDG R0904279) was identified as a field blank. No total petroleum hydrocarbons as extractable contaminants were found in this blank.

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

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 R0905693	All compounds reported below the PQL.	J (all detects)	A

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

Samples SA138-10B and SA138009-10B, samples SA103-10B and SA103009-10B, and samples RSAS5-36B and RSAS5009-36B were identified as field duplicates. No total petroleum hydrocarbons as extractables were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA138-10B	SA138009-10B				
Diesel range organics	610000	630000	3 (≤50)	-	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG R0905693

SDG	Sample	Compound	Flag	A or P	Reason
R0905693	EB100609-SO1A4 SA138-0.5B SA138-10B SA138009-10B SA138-30B SA138-45B SA103-0.5B SA103-10B SA103009-10B SA103-25B SA103-35B RSAR5-0.5B RSAR5-10B RSAR5-25B RSAR5-40B RSAS5-0.5B RSAS5-10B RSAS5-25B RSAS5-36B RSAS5009-36B	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 R0905693

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 R0905693

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 R0905693

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 4

LDC #: 22234D8
SDG #: R0905693
Laboratory: Columbia Analytical Services

Date: 12/28/09
Page: 1 of 1
Reviewer: JVC
2nd Reviewer: V

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: 10/06/09
IIa.	Initial calibration	A	
IIb.	Calibration verification/ICV	A	cal/ical < 20 %
III.	Blanks	A	
IVa.	Surrogate recovery	A	
IVb.	Matrix spike/Matrix spike duplicates	A	
IVc.	Laboratory control samples	A	LCS/D
V.	Target compound identification	A	
VI.	Compound Quantitation and CRQLs	A	
VII.	System Performance	A	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	SW	D1 = 3,4 D2* = 8,9 D3* = 19,20
X.	Field blanks	ND	EB = 1 FB = FB080309-S0 (R0904279)

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

1	EB100609-SO1A4	W	11	SA103-35B	S	21	RSAR5-40BMS	S	31	97853 - MB
2	SA138-0.5B	S	12	RSAR5-0.5B		22	RSAR5-40BMSD		32	98060 -
3	SA138-10B	D1	13	RSAR5-10B		23			33	
4	SA138009-10B	D1	14	RSAR5-25B		24			34	
5	SA138-30B		15	RSAR5-40B		25			35	
6	SA138-45B		16	RSAS5-0.5B		26			36	
7	SA103-0.5B		17	RSAS5-10B		27			37	
8	SA103-10B	D2	18	RSAS5-25B		28			38	
9	SA103009-10B	D2	19	RSAS5-36B	D3	29			39	
10	SA103-25B		20	RSAS5009-36B	D3	30			40	

Notes: _____

LDC #: 22234 D8
SDG #: Sy Creek

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: VB
2nd Reviewer: LA

Method: ____GC ____HPLC

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
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?	M	✓		
Did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	W		✓	
Were the RT windows properly established?	✓			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 20%.0 or percent recoveries 80-120%?	✓			
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?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Surrogate spikes				
Were all surrogate %R within the QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	✓			
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
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?			✓	

LDC #: 22234 D8
SDG #: 2nd Cnsr

VALIDATION FINDINGS CHECKLIST

Reviewer: SVG
2nd Reviewer: VW

Validation Area	Yes	No	NA	Findings/Comments
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 and dry weight factors 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 #: 22234 DS
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: JVC
2nd reviewer:

METHOD: ___ GC ___ HPLC

Y N N/A Were field duplicate pairs identified in this SDG?
Y N N/A Were target compounds detected in the field duplicate pairs?

Compound	Concentration (mg/kg)		%RPD Limit ≤50	Qualification
	3	4		Parent only / All Samples
DRO	610 000	630 000	3	

Compound	Concentration ( )		%RPD Limit_____	Qualification
				Parent only / All Samples

Compound	Concentration ( )		%RPD Limit_____	Qualification
				Parent only / All Samples

Compound	Concentration ( )		%RPD Limit_____	Qualification
				Parent only / All Samples

LDC #: 22234 D8
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG
2nd Reviewer:

METHOD: GC ✓ HPLC ____

The calibration Factor (CF), average CF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

CF = A/C
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 the CF
X = Mean of the CFs

#	Standard ID	Calibration Date	Compound	Reported CF (1000 std)	Recalculated CF (1000 std)	Reported Average CF (initial)	Recalculated Average CF (initial)	Reported %RSD	Recalculated %RSD
1	ICAL	10/14/09	DRO	8.387 e5	8.387 e5	8.887 e5	8.887 e5	8.07	8.12
2	ICAL	10/14/09		1.167 e6	1.167 e6	1.158 e6	1.158 e6	3.03	3.05
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 #: 22234 D8
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: JM
2nd Reviewer:

METHOD: GC ✓ HPLC_____

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

#	Standard ID	Calibration Date	Compound	Average CF(ical)/ CCV Conc.	Reported CF/Conc. CCV	Recalculated CF/Conc. CCV	Reported %D	Recalculated %D
1	CCV 3	10/15/09	DRO	888.654 e3	924.103 e3	924 103	4.0	4.0
2	CCV 7	10/22/09		1.158 e6	1.134 e6	1134 401	2.1	2.0
3	CCV 8	10/22/09			1.199 e6	1199317	3.5	3.6
4	CCV 9	10/23/09	↓	↓	1.167 e6	1166 898	0.8	0.8

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 #: 22234 D8
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: JV
2nd reviewer:

METHOD: ✓ GC ___ HPLC

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: #1

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
o-TPH	ZB-5	10	85.21	85	85	0

Sample ID:

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

Sample ID:

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

LDC #: 27234 D8
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: JV6
2nd Reviewer: [illegible]

METHOD: __ GC __ HPLC

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA Where SSC = Spiked sample concentration SC = Sample concentration
SA = Spike added
RPD =(((SSCMS - SSCMSD) * 2) / (SSCMS + SSCMSD))*100 MS = Matrix spike MSD = Matrix spike duplicate

MS/MSD samples: 21/22

Compound	Spike Added (ug/kg)		Sample Conc. (ug/kg)	Spike Sample Concentration (ug/kg)		Matrix spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	--	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)											
Diesel (8015)	419000	419000	0	303000	342000	72	72	82	82	12	12
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 Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22234 D8
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

Page: 1 of 1
Reviewer: JV6
2nd Reviewer: AV

METHOD: ✓ GC __HPLC

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 = | LCS - LCSD | * 2/(LCS + LCSD)

Where: SSC = Spiked sample concentration
SA = Spike added
SC = Concentration
LCS = Laboratory control sample percent recovery
LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: 97853 LCS/D

Compound	Spike Added (ug/L)		Spiked Sample Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)										
Diesel (8015)	503	503	396	433	79	79	86	86	9	9
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.

LDC #: 22334 D8
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Reviewer: JV
2nd Reviewer: V

METHOD: ✓ GC ___ HPLC

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds within 10% of the reported results?

Concentration= $\frac{(A)(Fv)(Df)}{(RF)(Vs \text{ or } Ws)(\%S/100)}$

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

Example:

Sample ID. #3 Compound Name DRO

Concentration = $\frac{(1643752572)\ (4\ ml)}{(1.158e6)\ (10\ g)\ (0.928)} = 611843$

$\approx$ 610000 ug/kg

=

#	Sample ID	Compound	Reported Concentrations ( )	Recalculated Results Concentrations ( )	Qualifications

Comments: _____

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 7 through October 8, 2009

LDC Report Date: January 1, 2010

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905744

Sample Identification

RSAP5-0.5B
RSAP5-10B
RSAP5009-10B
RSAP5-25B
RSAP5-39B
SA192-0.5B
SA192-10B
SA192-25B
SA192-39B
EB100809-SO1A3
SA130-0.5B
SA130-10B
SA130-25B
SA130-43B
RSAP6-0.5B
RSAP6-10B
RSAP6-25B
RSAP6-44B
SA192-10BMS
SA192-10BMSD

Introduction

This data review covers 19 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 EB100809-SO1A3 was identified as an equipment blank. No total petroleum hydrocarbons as extractable contaminants were found in this blank.

Samples FB080309-SO (from SDG R0904279) and FB082809-SO (from SDG R0904894) were identified as field blanks. No total petroleum hydrocarbons as extractable contaminants were found in these blanks with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB082809-SO	8/28/09	Diesel range organics	110 ug/L	SA130-0.5B SA130-10B SA130-25B SA130-43B RSAP6-0.5B RSAP6-10B RSAP6-25B RSAP6-44B

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 with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
RSAP5-39B	ortho-Terphenyl	163 (55-116)	TPH as extractables	J+ (all detects)	P

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) 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 R0905744	All compounds reported below the PQL.	J (all detects)	A

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 RSAP5-10B and RSAP5009-10B 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 R0905744

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905744	RSAP5-39B	TPH as extractables	J+ (all detects)	P	Surrogate recovery (%R) (s)
R0905744	RSAP5-0.5B RSAP5-10B RSAP5009-10B RSAP5-25B RSAP5-39B SA192-0.5B SA192-10B SA192-25B SA192-39B EB100809-SO1A3 SA130-0.5B SA130-10B SA130-25B SA130-43B RSAP6-0.5B RSAP6-10B RSAP6-25B RSAP6-44B	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 R0905744

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 R0905744

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 R0905744

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234E8
SDG #: R0905744
Laboratory: Columbia Analytical Services

Date: 12/24/09
Page: 1 of 1
Reviewer: JM
2nd Reviewer: [signature]

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: 10/07-08/09
IIa.	Initial calibration	A	
IIb.	Calibration verification/ICV	A	CCV/ICV ≤ 20%
III.	Blanks	A	
IVa.	Surrogate recovery	SW	
IVb.	Matrix spike/Matrix spike duplicates	A	
IVc.	Laboratory control samples	A	LCS
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	D = 2, 3
X.	Field blanks	SW	*EB = 10 FB = *FB080309-SO (R0904274) ↓ = FB082809-SO (R0904854)

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet

*ND = No compounds detected
R = Rinsate
FB = Field blank

D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples: Soil + Water

1	RSAP5-0.5B	S	11	SA130-0.5B	S	21	98286-MB	31	
2	RSAP5-10B	D	12	SA130-10B		22	98361-1	32	
3	RSAP5009-10B	D	13	SA130-25B		23		33	
4	RSAP5-25B		14	SA130-43B		24		34	
5	RSAP5-39B		15	RSAP6-0.5B		25		35	
6	SA192-0.5B		16	RSAP6-10B		26		36	
7	SA192-10B		17	RSAP6-25B		27		37	
8	SA192-25B		18	RSAP6-44B		28		38	
9	SA192-39B		19	SA192-10BMS		29		39	
10	EB100809-SO1A3	W	20	SA192-10BMSD		30		40	

Notes: _____

LDC #: 22234 E8
SDG #: Sq Cmpx

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 1 of 1
Reviewer: CW
2nd Reviewer: L

METHOD: ✓ **GC** __ **HPLC**

Y N N/A Were field blanks identified in this SDG?

Y N N/A Were target compounds detected in the field blanks?

Blank units: ug/L **Associated sample units:** ug/Kg

Sampling date: 8/28/09

Field blank type: (circle one) Field Blank / Trip Blank / Atmospheric Blank / Ambient Blank
Rinsate / Equipment Rinsate / Equipment Blank / Source Blank / Other:_____

Associated Samples: 11 - 18 (ND)

Compound	Blank ID	Blank ID	Sample Identification							
	FB182809-S0									
DRO	110									
CRQL										

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:_____

Compound	Blank ID	Blank ID	Sample Identification							
CRQL										

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".

LDC #: 22234 E8
SDG #: Su Cree

VALIDATION FINDINDS WORKSHEET
Surrogate Recovery

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: ✓ GC ___ HPLC
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".
Y N N/A Were surrogates spiked into all samples and blanks?
Y (N) N/A Did all surrogate recoveries (%R) meet the QC limits?

#	Sample ID	Detector/ Column	Surrogate Compound	%R (Limits)	Qualifications
	5	ZB-5	H	163 (55-116)	J+ det / P (5)
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

	Surrogate Compound		Surrogate Compound		Surrogate Compound		Surrogate Compound		
A	Chlorobenzene (CBZ)	G	Octacosane	M	Benzo(e)Pyrene	S	1-Chloro-3-Nitrobenzene	Y	Tetrachloro-m- xylene
B	4-Bromofluorobenzene (BFB)	H	Ortho-Terphenyl	N	Terphenyl-D14	T	3,4-Dinitrotoluene		
C	a,a,a-Trifluorotoluene	I	Fluorobenzene (FBZ)	O	Decachlorobiphenyl (DCB)	U	Tripentyltin		
D	Bromochlorobenene	J	n-Triacontane	P	1-methylnaphthalene	V	Tri-n-propyltin		
E	1,4-Dichlorobutane	K	Hexacosane	Q	Dichlorophenyl Acetic Acid (DCAA)	W	Tributyl Phosphate		
F	1,4-Difluorobenzene (DFB)	L	Bromobenzene	R	4-Nitrophenol	X	Triphenyl Phosphate		

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 9 through October 12, 2009

LDC Report Date: January 1, 2010

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905829

Sample Identification

SA39-0.5B
SA39-10B
SA39-25B
SA39-41B
SA137-0.5B
SA137-15B
SA137-31B
SA137-31BRE
EB101209-SO1A3
RSAR7-0.5B
RSAR7-9B
RSAR7009-9B
RSAR7-20B
RSAR7-34B
RSAO7-9B
RSAO7-19B
RSAO7-29B
RSAO7-47B
SA39-25BMS
SA39-25BMSD

Introduction

This data review covers 19 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.

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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
SA137-31BRE	TPH as extractables	23	14	J- (all detects) UJ (all non-detects)	A

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. 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 EB101209-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 R0905829

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 with the following exceptions:

Sample	Surrogate	%R (Limits)	Compound	Flag	A or P
SA137-31B	ortho-Terphenyl	50 (55-116)	TPH as extractables	J- (all detects) UJ (all non-detects)	A

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 R0905829	All compounds reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

VII. System Performance

Raw data were not reviewed for this SDG.

VIII. 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
SA137-31BRE	TPH as extractables	X	A

Data flags are summarized at the end of this report if data has been qualified.

IX. Field Duplicates

Samples RSAR7-9B and RSAR7009-9B were identified as field duplicates. No total petroleum hydrocarbons as extractables were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAR7-9B	RSAR7009-9B				
Oil range organics	39000	39000	-	0 (≤43000)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG R0905829

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905829	SA137-31BRE	TPH as extractables	J- (all detects) UJ (all non-detects)	A	Technical holding times (h)
R0905829	SA137-31B	TPH as extractables	J- (all detects) UJ (all non-detects)	A	Surrogate recovery (%R) (s)
R0905829	SA39-0.5B SA39-10B SA39-25B SA39-41B SA137-0.5B SA137-15B SA137-31B SA137-31BRE EB101209-SO1A3 RSAR7-0.5B RSAR7-9B RSAR7009-9B RSAR7-20B RSAR7-34B RSAO7-9B RSAO7-19B RSAO7-29B RSAO7-47B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0905829	SA137-31BRE	TPH as extractables	X	A	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG R0905829

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 R0905829

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 R0905829

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234F8
SDG #: R0905829
Laboratory: Columbia Analytical Services

Date: 12/21/09
Page: 1 of 1
Reviewer: JVG
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	SW	Sampling dates: 10/09 - 12/09
IIa.	Initial calibration	A	
IIb.	Calibration verification/ICV	A	CCV/ICV ≤ 20 %
III.	Blanks	A	
IVa.	Surrogate recovery	SW	
IVb.	Matrix spike/Matrix spike duplicates	A	
IVc.	Laboratory control samples	A	LCS/D
V.	Target compound identification	N	
VI.	Compound Quantitation and CRQLs	N	
VII.	System Performance	N	
VIII.	Overall assessment of data	SW	
IX.	Field duplicates	SW	D = 11, 12
X.	Field blanks	SW	EB = 9 FB = FB082809-SO (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: Soil + Water

1	1	SA39-0.5B	S	11	RSAR7-9B	D	S	21	1	98683-MB	31	
2	1	SA39-10B		12	RSAR7009-9B	D		22	✓	99786-	32	
3	1	SA39-25B		13	RSAR7-20B			23	✓	98361-	33	
4	1	SA39-41B		14	RSAR7-34B			24			34	
5	1	SA137-0.5B		15	RSAO7-9B			25			35	
6	1	SA137-15B		16	RSAO7-19B			26			36	
7	1	SA137-31B		17	RSAO7-29B			27			37	
8	✓	SA137-31BRE		18	RSAO7-47B			28			38	
9	3	EB101209-SO1A3	W	19	SA39-25BMS			29			39	
10	1	RSAR7-0.5B	S	20	SA39-25BMSD			30			40	

Notes:

LDC #: 22234 F8
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Page: 1 of 1
Reviewer: JK
2nd Reviewer: [illegible]

All circled dates have exceeded the technical holding times.
Y N N/A Were all cooler temperatures within validation criteria?

METHOD: /GC __ HPLC

Sample ID	Matrix	Preserved	Sampling Date	Extraction date	Analysis date	Total # of Days	Qualifier
8	S	N	10/09/09	11/03/09	11/05/09	23	J-/MJ/A (h)

TECHNICAL HOLDING TIME CRITERIA

VOLATILES:
- Water unpreserved: Aromatic within 7 days, non-aromatic within 14 days of sample collection.
- Water preserved: Both within 14 days of sample collection.
- Soils: Both within 14 days of sample collection.

EXTRACTABLES:
- Water: Extracted within 7 days, analyzed within 40 days.
- Soil: Extracted within 14 days, analyzed within 40 days.

LDC #: 22234#8
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 1 of 1
Reviewer: JVC
2nd Reviewer: [illegible]

METHOD: __ GC __ HPLC

Y N N/A Were field blanks identified in this SDG?
Y N N/A Were target compounds detected in the field blanks?

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 8/28/09
Field blank type: (circle one) Field Blank / Trip Blank / Atmospheric Blank / Ambient Blank
Rinsate / Equipment Rinsate / Equipment Blank / Source Blank / Other:

Associated Samples: All Soils

Compound	Blank ID	Blank ID	Sample Identification							
	FB082809-SO									
DRO	110		(All results either ND or > FB)							
CRQL										

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: _____

Compound	Blank ID	Blank ID	Sample Identification							
CRQL										

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".

LDC #: 22234 F8
SDG #: Sw Cmor

VALIDATION FINDINDS WORKSHEET
Surrogate Recovery

Page: 1 of 1
Reviewer: DVG
2nd Reviewer:

METHOD: ✓ GC ___ HPLC

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".

Y N N/A Were surrogates spiked into all samples and blanks?

Y N N/A Did all surrogate recoveries (%R) meet the QC limits?

#	Sample ID	Detector/ Column	Surrogate Compound	%R (Limits)	Qualifications
	7	ZB-5	#	50 (55-116)	J-/NJ/A (S)
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
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				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

	Surrogate Compound		Surrogate Compound		Surrogate Compound		Surrogate Compound		
A	Chlorobenzene (CBZ)	G	Octacosane	M	Benzo(e)Pyrene	S	1-Chloro-3-Nitrobenzene	Y	Tetrachloro-m- xylene
B	4-Bromofluorobenzene (BFB)	H	Ortho-Terphenyl	N	Terphenyl-D14	T	3,4-Dinitrotoluene		
C	a,a,a-Trifluorotoluene	I	Fluorobenzene (FBZ)	O	Decachlorobiphenyl (DCB)	U	Tripentyltin		
D	Bromochlorobenene	J	n-Triacontane	P	1-methylnaphthalene	V	Tri-n-propyltin		
E	1,4-Dichlorobutane	K	Hexacosane	Q	Dichlorophenyl Acetic Acid (DCAA)	W	Tributyl Phosphate		
F	1,4-Difluorobenzene (DFB)	L	Bromobenzene	R	4-Nitrophenol	X	Triphenyl Phosphate		

LDC #: 22234F8
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: / **GC** __ **HPLC**

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Compound Name	Finding	Associated Samples	Qualifications
	All TCL	Outside H.T.	8	X/A (o)

Comments: _____

OVRNew.wpd

LDC #: 22234 F8
SDG #: Su Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: DVG
2nd reviewer: [signature]

METHOD: ✓ GC __ HPLC
Y N N/A Were field duplicate pairs identified in this SDG?
Y N N/A Were target compounds detected in the field duplicate pairs?

Compound	Concentration (ug/kg)		%RPD	Qualification
	11	12	Limit ____	Parent only / All Samples
ORO	39000	39000	0 (≤ 43000D)	-

Compound	Concentration ( )		%RPD	Qualification
			Limit ____	Parent only / All Samples

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 13 through October 15, 2009

LDC Report Date: January 1, 2010

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905882

Sample Identification

RSAN8-0.5B
RSAN8-10B
RSAN8-20B
RSAN8-28B
EB101409-SO1A3
SA178-0.5B
SA178-10B
SA178-17B
SA178-25B
SA178-43B
SA141-14B
SA141009-14B
SA141-24B
SA141-30B
SA141-24BMS
SA141-24BMSD

Introduction

This data review covers 15 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 EB101409-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 R0905882

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. Although the MS/MSD relative percent difference (RPD) was not within QC limits for one compound, the MS/MSD percent recoveries (%R) were within QC limits and no data were qualified.

c. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Although the LCS/LCSD relative percent difference (RPD) was not within QC limits for one compound, the LCS/LCSD percent recoveries (%R) were within QC limits and no data were qualified.

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 R0905882	All compounds reported below the PQL.	J (all detects)	A

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 SA141-14B and SA141009-14B 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 R0905882

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905829	RSAN8-0.5B RSAN8-10B RSAN8-20B RSAN8-28B EB101409-SO1A3 SA178-0.5B SA178-10B SA178-17B SA178-25B SA178-43B SA141-14B SA141009-14B SA141-24B SA141-30B	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 R0905882

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 R0905882

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 R0905882

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234G8
SDG #: R0905882
Laboratory: Columbia Analytical Services

Date: 12/24/09
Page: 1 of 1
Reviewer: JVB
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: 10/13-15/09
IIa.	Initial calibration	A	
IIb.	Calibration verification/ICV	A	CCV/ICV ≤ 20%
III.	Blanks	A	
IVa.	Surrogate recovery	A	
IVb.	Matrix spike/Matrix spike duplicates	SW	
IVc.	Laboratory control samples	SW	LCS/D
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	D = 11, 12
X.	Field blanks	SW	*EB = 5 FB = FB082809-SO (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: Soil + Water

1	RSAN8-0.5B	S	11	SA141-14B	D S	21	98914-MB	31	
2	RSAN8-10B		12	SA141009-14B	D	22	98678-	32	
3	RSAN8-20B		13	SA141-24B		23		33	
4	RSAN8-28B		14	SA141-30B		24		34	
5	EB101409-SO1A3	W	15	SA141-24BMS		25		35	
6	SA178-0.5B	S	16	SA141-24BMSD		26		36	
7	SA178-10B		17			27		37	
8	SA178-17B		18			28		38	
9	SA178-25B		19			29		39	
10	SA178-43B		20			30		40	

Notes: _____

LDC #: 22234G8
SDG #: Sa Cruz

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: SVG
2nd Reviewer: LA

METHOD: GC __ HPLC
Y N N/A Were field blanks identified in this SDG?
Y N N/A Were target compounds detected in the field blanks?
Blank units: ug/L Associated sample units: ug/kg
Sampling date: 8/28/09
Field blank type: (circle one) Field Blank / Trip Blank / Atmospheric Blank / Ambient Blank
Rinsate / Equipment Rinsate / Equipment Blank / Source Blank / Other:

Associated Samples: All soils (ND)

Compound	Blank ID	Blank ID	Sample Identification							
	FB082809-50									
DRO	ND									
CRQL										

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:

Compound	Blank ID	Blank ID	Sample Identification							
CRQL										

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".

LDC #: 22234G8
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET

Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: DVG
2nd Reviewer:

METHOD: ✓ GC __ HPLC

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?

[✓ Y] N N/A Was an MS/MSD analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

Y [✓ N] N/A Were the MS/MSD percent recoveries (%R) and relative percent differences (RPD) within QC limits?

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	15/16	DRO	( )	( )	31 (30)	13	No qual
			( )	( )	( )		(%R in)
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		

LDC #: 22234G8
SDG #: See Cvr

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: JVG
2nd Reviewer:

METHOD: ✓ GC ___ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG?

~~Y~~ [✓ N] N/A Were the LCS percent recoveries (%R) and relative percent differences (RPD) within the QC limits?

Level IV/D Only

Y N [✓ N/A] Was an LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

#	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	98914-LCS/D	DRO	( )	( )	35 (30)	All soils + 98914-MB	No qual (%R in)
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 13, 2009

LDC Report Date: January 1, 2010

Matrix: Soil

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905885

Sample Identification

RSAN8-10BSPLP2
RSAN8-10BSPLP3

Samples in this SDG underwent SPLP extraction

Introduction

This data review covers 2 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.

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

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 R0905885	All compounds reported below the PQL.	J (all detects)	A

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 R0905885

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905885	RSAN8-10BSPLP2 RSAN8-10BSPLP3	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 R0905885

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 R0905885

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234H8
SDG #: R0905885
Laboratory: Columbia Analytical Services

Date: 12/23/09
Page: 1 of 1
Reviewer: JVK
2nd Reviewer: [illegible]

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: 10/13/09
IIa.	Initial calibration	A	
IIb.	Calibration verification/ICV	A	CCV/ICV ≤ 20 %D
III.	Blanks	A	
IVa.	Surrogate recovery	A	
IVb.	Matrix spike/Matrix spike duplicates	N	client spec
IVc.	Laboratory control samples	A	LCS/D
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	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:

PSA Soil

1	RAN8-10BSPLP2	11	99300-MB	21		31	
2	RAN8-10BSPLP3	12	SPLP2-BLK	22		32	
3		13	SPLP3-BLK	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: _____

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: October 16 through October 19, 2009

LDC Report Date: January 1, 2010

Matrix: Soil/Water

Parameters: Total Petroleum Hydrocarbons as Extractables

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905963

Sample Identification

SA142-20.5B
SA142009-20.5B
SA142-30.5B
SA142-51B
EB101909-SO1A3
SA157-10B
SA157-25B
SA157-44B
SA171-5B
SA171-15B
SA171-30B
SA171-41B

Introduction

This data review covers 11 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 EB101909-SO1A3 was identified as an equipment blank. No total petroleum hydrocarbons as extractable contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Compound	Concentration	Associated Samples
EB101909-SO1A3	10/19/09	Diesel range organics	170 ug/L	SA157-10B SA157-25B SA157-44B SA171-5B SA171-15B SA171-30B SA171-41B

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 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 R0905963

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

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

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 R0905963	All compounds reported below the PQL.	J (all detects)	A

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 SA142-20.5B and SA142009-20.5B 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 R0905963

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905963	SA146-0.5B SA146-10B SA146-25B SA146009-25B SA146-40B SA146-55B SA147-0.5B SA147-10B SA147-25B SA147009-25B SA147-40B SA147-56B RSAU5-0.5B RSAU5-10B RSAU5-40B RSAU5-55B	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 R0905963

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 R0905963

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 R0905963

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234I8
SDG #: R0905963
Laboratory: Columbia Analytical Services

Date: 12/23/09
Page: 1 of 1
Reviewer: SG
2nd Reviewer: LA

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: 10/16 - 19/09
IIa.	Initial calibration	A	
IIb.	Calibration verification/ICV	A	CCV/ICV ≤ 20%
III.	Blanks	A	
IVa.	Surrogate recovery	A	
IVb.	Matrix spike/Matrix spike duplicates	N	Client spec
IVc.	Laboratory control samples	A	LCS/D
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	D = 1, 2
X.	Field blanks	SW	EB = 5 FB = FB082809-SO (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: Soil + Water

1	SA142-20.5B	S	11	SA171-30B	S	21	98945-MB	31	
2	SA142009-20.5B		12	SA171-41B		22	99085-1	32	
3	SA142-30.5B		13			23		33	
4	SA142-51B		14			24		34	
5	EB101909-SO1A3	W	15			25		35	
6	SA157-10B	S	16			26		36	
7	SA157-25B		17			27		37	
8	SA157-44B		18			28		38	
9	SA171-5B		19			29		39	
10	SA171-15B		20			30		40	

Notes: _____

LDC #: 22234 I

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JVG

2nd Reviewer:

METHOD: ___ GC ___ HPLC

Y N N/A Were field blanks identified in this SDG?

Y N N/A Were target compounds detected in the field blanks?

Blank units: ug/L **Associated sample units:** ug/kg

Sampling date: 10/19/09

Field blank type: (circle one) Field Blank / Trip Blank / Atmospheric Blank / Ambient Blank
Rinsate / Equipment Rinsate / (Equipment Blank) / Source Blank / Other:

Associated Samples: 6 - 12 (ND)

Compound	Blank ID	Blank ID	Sample Identification							
	5									
DRO	170									
CRQL										

Blank units: ug/L **Associated sample units:** ug/kg

Sampling date: 8/28/09

Field blank type: (circle one) (Field Blank) / Trip Blank/ Atmospheric Blank/ Ambient Blank
Rinsate / Equipment Rinsate / Equipment Blank / Source Blank / Other:

Associated Samples: All soils (ND)

Compound	Blank ID	Blank ID	Sample Identification							
	FB082809-SO									
DRO	110									
CRQL										

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 20 through October 21, 2009
LDC Report Date:	January 1, 2010
Matrix:	Soil
Parameters:	Total Petroleum Hydrocarbons as Extractables
Validation Level:	Stage 2B
Laboratory:	Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906024

Sample Identification

SA33-0.5B
SA33009-0.5B
SA33-10B
SA33-20B
SA33-33B
SA156-0.5B
SA156-10B
SA156-30B
SA156-35B
SA156-45B
SA157-0.5B
SA157009-0.5B
SA33-20BMS
SA33-20BMSD

Introduction

This data review covers 14 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.

Samples FB080309-SO (from SDG R0904279) and FB082809-SO (from SDG R0904894) were identified as field blanks. No total petroleum hydrocarbons as extractable contaminants were found in these blanks with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB082809-SO	8/28/09	Diesel range organics	110 ug/L	SA33-0.5B SA33009-0.5B SA33-10B SA33-20B SA33-33B SA157-0.5B SA157009-0.5B

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 R0906024	All compounds reported below the PQL.	J (all detects)	A

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 SA33-0.5B and SA33009-0.5B and samples SA157-0.5B and SA157009-0.5B were identified as field duplicates. No total petroleum hydrocarbons as extractables were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA33-0.5B	SA33009-0.5B				
Diesel range organics	41000U	34000	-	7000 (≤41000)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Total Petroleum Hydrocarbons as Extractables - Data Qualification Summary - SDG R0906024

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0906024	SA33-0.5B SA33009-0.5B SA33-10B SA33-20B SA33-33B SA156-0.5B SA156-10B SA156-30B SA156-35B SA156-45B SA157-0.5B SA157009-0.5B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Total Petroleum Hydrocarbons as Extractables - Laboratory Blank Data Qualification Summary - SDG R0906024

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 R0906024

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234J8
SDG #: R0906024
Laboratory: Columbia Analytical Services

Date: 12/23/09
Page: 1 of 1
Reviewer: SW
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: 10/20-21/09
IIa.	Initial calibration	A	
IIb.	Calibration verification/ICV	A	CCV/ICV ≤ 20 %
III.	Blanks	A	
IVa.	Surrogate recovery	A	
IVb.	Matrix spike/Matrix spike duplicates	A	
IVc.	Laboratory control samples	A	LCS/D
V.	Target compound identification	N	
VI.	Compound Quantitation and CRQLs	N	
VII.	System Performance	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	SW	D_1 = 1, 2 D_2* = 11, 12
X.	Field blanks	SW	FB = *FB080309-SO (R0904274) FB082809-SO (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: Soil

1	SA33-0.5B D_1	11 ✓	SA157-0.5B D_2	21	98945-MB	31	
2	SA33009-0.5B D_1	12	SA157009-0.5B D_2	22 ✓	99053- ↓	32	
3	SA33-10B	13	SA33-20BMS	23		33	
4	SA33-20B	14	SA33-20BMSD	24		34	
5	SA33-33B	15		25		35	
6	SA156-0.5B	16		26		36	
7	SA156-10B	17		27		37	
8 ✓	SA156-30B	18		28		38	
9 ✓	SA156-35B	19		29		39	
10 ✓	SA156-45B	20		30		40	

Notes: _____

LDC #: 22239J8
SDG #: Sequoia

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 1 of 1
Reviewer: VG
2nd Reviewer: [illegible]

METHOD: __GC __HPLC

(Y) N N/A Were field blanks identified in this SDG?
Y N N/A Were target compounds detected in the field blanks?

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 8/28/09
Field blank type: (circle one) Field Blank / Trip Blank / Atmospheric Blank / Ambient Blank
Rinsate / Equipment Rinsate / Equipment Blank / Source Blank / Other:

Associated Samples: 1-5, 11, 12

Compound	Blank ID	Blank ID	Sample Identification							
	FB-082809-SO									
DRO	110		All results either ND or > FB							
CRQL										

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: _____

Compound	Blank ID	Blank ID	Sample Identification							
CRQL										

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".

LDC #: 22234 J8
SDG #: Sq Creek

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: JVG
2nd reviewer:

METHOD: ✓ GC ___ HPLC

Y N N/A Were field duplicate pairs identified in this SDG?

Y N N/A Were target compounds detected in the field duplicate pairs?

Compound	Concentration (ug/kg)		%RPD Limit_____	Qualification Parent only / All Samples
	1	2		
DRO	41000 Y	34000	7000 (≤ 41000 D)	-

Compound	Concentration ( )		%RPD Limit _____	Qualification Parent only / All Samples

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Collection Date:	October 26 through October 27, 2009
LDC Report Date:	January 15, 2010
Matrix:	Soil/Water
Parameters:	Total Petroleum Hydrocarbons as Extractables
Validation Level:	Stage 4
Laboratory:	Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0906123

Sample Identification

SA34-0.5B
SA34-10B
SA34-20B
SA34-31B
SA34-34B
EB102709-SO1A3
RSAP7-0.5B
RSAP7-14B
RSAP7-25B
RSAP7-41B
RSAQ7-0.5B
RSAQ7-10B
RSAQ7-38B
RSAP7-0.5BMS
RSAP7-0.5BMSD
RSAQ7-38BMS
RSAQ7-38BMSD

Introduction

This data review covers 16 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.

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 EB102709-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 R0906123

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

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 R0906123	All compounds reported below the PQL.	J (all detects)	A

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 R0906123

SDG	Sample	Compound	Flag	A or P	Reason
R0906123	SA34-0.5B SA34-10B SA34-20B SA34-31B SA34-34B EB102709-SO1A3 RSAP7-0.5B RSAP7-14B RSAP7-25B RSAP7-41B RSAQ7-0.5B RSAQ7-10B RSAQ7-38B	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 R0906123

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 R0906123

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 R0906123

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 4

LDC #: 22234M8
SDG #: R0906123
Laboratory: Columbia Analytical Services

Date: 1/13/10
Page: 1 of 1
Reviewer: JVL
2nd Reviewer: V

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: 10/26-27/09
IIa.	Initial calibration	A	
IIb.	Calibration verification/ICV	A	CCV/ICV ≤ 20%
III.	Blanks	A	
IVa.	Surrogate recovery	A	
IVb.	Matrix spike/Matrix spike duplicates	A	
IVc.	Laboratory control samples	A	LCS/D
V.	Target compound identification	A	
VI.	Compound Quantitation and CRQLs	A	
VII.	System Performance	A	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X.	Field blanks	SW	EB = 6 FB = FB082809-SO (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: Soil + Water

1	SA34-0.5B	S	11	RSAQ7-0.5B	S	21	99295-MB	31	
2	SA34-10B		12	RSAQ7-10B		22	99450-	32	
3	SA34-20B		13	RSAQ7-38B		23	99786-	33	
4	SA34-31B		14	RSAP7-0.5BMS		24		34	
5	SA34-34B		15	RSAP7-0.5BMSD		25		35	
6	EB102709-SO1A3	W	16	RSAQ7-38BMS		26		36	
7	RSAP7-0.5B	S	17	RSAQ7-38BMSD		27		37	
8	RSAP7-14B		18			28		38	
9	RSAP7-25B		19			29		39	
10	RSAP7-41B		20			30		40	

Notes: _____

LDC #: 22234 M8
SDG #: Lu Cor

VALIDATION FINDINGS CHECKLIST

Reviewer: JVG
2nd Reviewer:

Method: ✓ GC ____ HPLC

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
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?	✓			
IV. Continuing calibration				
Was a continuing calibration analyzed daily?	✓			
Were all percent differences (%D) ≤ 20%.0 or percent recoveries 80-120%?	✓			
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?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
VI. Surrogate spikes				
Were all surrogate %R within the QC limits?	✓			
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			✓	
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	✓			
Was a MS/MSD analyzed every 20 samples of each matrix?	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	✓			
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
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?			✓	

LDC #: 22234 M6
SDG #: Ly Cmy

VALIDATION FINDINGS CHECKLIST

Reviewer: JVG
2nd Reviewer: V

Validation Area	Yes	No	NA	Findings/Comments
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 and dry weight factors 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 #: 22234 M8
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 1 of 1
Reviewer: JVB
2nd Reviewer: L

METHOD: __ GC __ HPLC

Y N N/A Were field blanks identified in this SDG?

Y N N/A Were target compounds detected in the field blanks?

Blank units: ug/L **Associated sample units:** ug/Kg

Sampling date: 8/28/09

Field blank type: (circle one) Field Blank / Trip Blank / Atmospheric Blank / Ambient Blank

Rinsate / Equipment Rinsate / Equipment Blank / Source Blank / Other:

Associated Samples: All soils (ND)

Compound	Blank ID	Blank ID	Sample Identification							
	FB082809-SD									
DRO	110									
CRQL										

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: _____

Compound	Blank ID	Blank ID	Sample Identification							
CRQL										

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".

LDC #: 22234 M8
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: JM
2nd Reviewer:

METHOD: GC ✓ HPLC _____

The calibration Factor (CF), average CF, and percent relative standard deviation (%RSD) were recalculated for the compounds identified below using the following calculations:

CF = A/C
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 the CF
X = Mean of the CFs

#	Standard ID	Calibration Date	Compound	Reported CF (000 std)	Recalculated CF (000 std)	Reported Average CF (initial)	Recalculated Average CF (initial)	Reported %RSD	Recalculated %RSD
1	ICAL	10/19/09	DRO	1.167e6	1167172.5	1.158e6	1.158e6	3.03	3.03
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 #: 22234 M8
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: JVG
2nd Reviewer:

METHOD: GC ✓ HPLC_____

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

#	Standard ID	Calibration Date	Compound	Average CF(Ical)/ CCV Conc.	Reported CF/Conc. CCV	Recalculated CF/Conc. CCV	Reported %D	Recalculated %D
1	CCV 23	10/30/09	DRO	1.158 e6	1.115 e6	1.115 e6	3.7	3.7
2	CCV 26	11/02/09			1.084 e6	1.084 e6	6.4	6.4
3	CCV 27	11/02/09			1.094 e6	1.094 e6	5.5	5.5
4	CCV 34	11/05/09	✓		1.168 e6	1.168 e6	0.9	1.8

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 #: 22234 M8
SDG #: Eq Conv

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: SVG
2nd Reviewer: [illegible]

METHOD: GC ✓ HPLC _____

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

Where: ave. CF = initial calibration average CF
CF = continuing calibration CF
A = Area of compound
C = Concentration of compound

#	Standard ID	Calibration Date	Compound	Average CF(Ical)/ CCV Conc.	Reported CF/ Conc. CCV	Recalculated CF/ Conc. CCV	Reported %D	Recalculated %D
1	CCV35	11/05/09	DRO	1.158 e6	1.165 e6	1.165 e6	0.6	0.6
2	CCV37	11/06/09	↓	↓	1.135 e6	1.135 e6	2.0	2.0
3								
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.

LDC #: 22234 M8
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Reviewer: JM
2nd reviewer:

METHOD: ✓ GC __ HPLC

The percent recoveries (%R) of surrogates were recalculated for the compounds identified below using the following calculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found
SS = Surrogate Spiked

Sample ID: #1

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
o-TPH	ZB-5	150	87.13	87	87	0

Sample ID:

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

Sample ID:

Surrogate	Column/Detector	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	

LDC #: 22234M8
SDG #: Sq Cmp

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: VG
2nd Reviewer: [signature]

METHOD: GC ___HPLC

The percent recoveries (%R) and relative percent differences (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below using the following calculation:

%Recovery = 100 * (SSC - SC)/SA

RPD =(({SSCMS - SSCMSD} * 2) / (SSCMS + SSCMSD))*100

Where SSC = Spiked sample concentration; SC = Sample concentration; SA = Spike added; MS = Matrix spike; MSD = Matrix spike duplicate

MS/MSD samples: 14/15

Compound	Spike Added (ug/kg)		Sample Conc. (ug/kg)	Spike Sample Concentration (ug/kg)		Matrix spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	---	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)											
Diesel (8015)	273000	273000	0	213000	238000	78	78	87	87	11	11
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 Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results.

LDC #: 22234M8
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

Page: 1 of 1
Reviewer: JM
2nd Reviewer: [illegible]

METHOD: /GC __HPLC

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 = | LCS - LCSD | * 2/(LCS + LCSD)

Where: SSC = Spiked sample concentration
SA = Spike added
SC = Concentration
LCS = Laboratory control sample percent recovery
LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: 99650 LCS/D

Compound	Spike Added (ug/L)		Spiked Sample Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.
Gasoline (8015)										
Diesel (8015)	503	503	319	350	64	64	70	70	9	9
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.

LDC #: 22234 M8
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: NV
2nd Reviewer: [signature]

METHOD: / GC __ HPLC

Y N N/A Were all reported results recalculated and verified for all level IV samples?
Y N N/A Were all recalculated results for detected target compounds within 10% of the reported results?

Concentration= $\frac{(A)(Fv)(Df)}{(RF)(Vs \text{ or } Ws)(\%S/100)}$

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

Example:

Sample ID._____ Compound Name MD

Concentration = _____

#	Sample ID	Compound	Reported Concentrations ( )	Recalculated Results Concentrations ( )	Qualifications

Comments: _____

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Data Validation Reports
LDC #22234

Dioxins/Dibenzofurans

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: August 4 through August 5, 2009

LDC Report Date: January 1, 2010

Matrix: Soil

Parameters: Dioxins/Dibenzofurans

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0904329

Sample Identification

SA146-0.5B
SA147-0.5B
RSAU5-0.5B

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 8290 for Polychlorinated Dioxins/Dibenzofurans.

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 USEPA Contract Laboratory Program National Functional Guidelines for Polychlorinated Dioxins/Dibenzofurans Data Review (September 2005) 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. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required daily frequency.

Retention time windows were established for all homologues. The chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomer was less than or equal to 25% .

III. Initial Calibration

A five point initial calibration was performed as required by the method.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for unlabeled compounds and less than or equal to 30.0% for labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

IV. Routine Calibration (Continuing)

Routine calibration was performed at the required frequencies.

All of the routine calibration percent differences (%D) between the initial calibration RRF and the routine calibration RRF were less than or equal to 20.0% for unlabeled compounds and less than or equal to 30.0% for labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

V. Blanks

Method blanks were reviewed for each matrix as applicable. No polychlorinated dioxin/dibenzofuran contaminants were found in the method blanks with the following exceptions:

Method Blank ID	Extraction Date	Compound	Concentration	Associated Samples
EQ0900307-01	8/11/09	1,2,3,4,6,7,8-HpCDD OCDD Total HpCDD	0.102 ng/Kg 0.327 ng/Kg 0.266 ng/Kg	All samples in SDG R0904329

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 Concentration	Modified Final Concentration
SA147-0.5B	Total HpCDD	0.873 ng/Kg	0.873U ng/Kg

Sample FB080309-SO (from SDG R0904279) was identified as a field blank. No polychlorinated dioxin/dibenzofuran contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB080309-SO	8/3/09	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,4,6,7,8-HpCDF OCDF Total HpCDD	2.58 pg/L 10.4 pg/L 1.71 pg/L 3.68 pg/L 2.58 pg/L	All samples in SDG R0904329

VI. 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.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VIII. Regional Quality Assurance and Quality Control

Not applicable.

IX. Internal Standards

All internal standard recoveries were within QC limits.

X. Target Compound Identifications

Raw data were not reviewed for this SDG.

XI. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0904329	All compounds reported below the PQL.	J (all detects)	A

All compounds reported as EMPC were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0904329	All compounds reported as estimated maximum possible concentration (EMPC).	JK (all detects)	A

Raw data were not reviewed for this SDG.

XII. System Performance

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
All samples in SDG R0904329	2,3,7,8-TCDF (DB-5)	X	A

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 Dioxins/Dibenzofurans - Data Qualification Summary - SDG R0904329

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0904329	SA146-0.5B SA147-0.5B RSAU5-0.5B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0904329	SA146-0.5B SA147-0.5B RSAU5-0.5B	All compounds reported as EMPC	JK (all detects)	A	Project Quantitation Limit (k)
R0904329	SA146-0.5B SA147-0.5B RSAU5-0.5B	2,3,7,8-TCDF (DB-5)	X	A	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Dioxins/Dibenzofurans - Laboratory Blank Data Qualification Summary - SDG R0904329

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0904329	SA147-0.5B	Total HpCDD	0.873U ng/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Dioxins/Dibenzofurans - Field Blank Data Qualification Summary - SDG R0904329

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 22234A21
SDG #: R0904329
Laboratory: Columbia Analytical Services

Date: 4/31/09
Page: 1 of 1
Reviewer: a
2nd Reviewer: a

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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: 8/4-5/09
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration	A	
IV.	Routine calibration/ICV	A	
V.	Blanks	SW	
VI.	Matrix spike/Matrix spike duplicates	N	client specified
VII.	Laboratory control samples	A	LCS
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	A	
X.	Target compound identifications	N	
XI.	Compound quantitation and CRQLs	SW	
XII.	System performance	N	
XIII.	Overall assessment of data	SW	
XIV.	Field duplicates	N	
XV.	Field blanks	SW	FB080309-SO (R0904279)

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	SA146-0.5B	11	ZB0900307-01	21	P10513	31	P20379
2	SA147-0.5B	12		22	P10528	32	
3	RSAU5-0.5B	13		23	P10499	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: _____

VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

A. 2,3,7,8-TCDD	F. 1,2,3,4,6,7,8-HpCDD	K. 1,2,3,4,7,8-HxCDF	P. 1,2,3,4,7,8,9-HpCDF	U. Total HpCDD
B. 1,2,3,7,8-PeCDD	G. OCDD	L. 1,2,3,6,7,8-HxCDF	Q. OCDF	V. Total TCDF
C. 1,2,3,4,7,8-HxCDD	H. 2,3,7,8-TCDF	M. 2,3,4,6,7,8-HxCDF	R. Total TCDD	W. Total PeCDF
D. 1,2,3,6,7,8-HxCDD	I. 1,2,3,7,8-PeCDF	N. 1,2,3,7,8,9-HxCDF	S. Total PeCDD	X. Total HxCDF
E. 1,2,3,7,8,9-HxCDD	J. 2,3,4,7,8-PeCDF	O. 1,2,3,4,6,7,8-HpCDF	T. Total HxCDD	Y. Total HpCDF

Notes:

LDC #: 22234A2/
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: 9
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 8290)

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 method blank?
Y N N/A Was a method blank analyzed for each matrix?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 8/11/09 **Blank analysis date:** 8/15/09
Conc. units: ng/Kg Associated Samples: MK (6L)

Compound	Blank ID	Sample Identification								
CB09	00307-01	2								
F	0.102									
G	0.327									
H	0.266	0.873/H								

Blank extraction date: _____ **Blank analysis date:** _____
Conc. units: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 22233/A21
SDG #: 2e cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: 9
2nd Reviewer: M

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

(Y) N N/A Were field blanks identified in this SDG?
Blank units: pg/L **Associated sample units:** ng/Kg
Sampling date: 8/3/09
Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: ALL

Compound	Blank ID	Sample Identification								
	FB080309-SO	5X								
F	2.58	0.0129								
G	10.4	0.052								
O	1.71	0.00855								
Q	3.68	0.0184								
U	2.58	0.0129								
CRQL										

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".

LDC #: 22234A-1
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Reviewer: A
2nd Reviewer: M

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were the correct internal standard (IS), quantitation ions and relative response factors (RRF) used to quantitate the compound?
Y N N/A Compound quantitation and CRQLs were adjusted to reflect all sample dilutions and dry weight factors (if necessary).

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		All	ZNDC results (K flag)	all	J+ (K)

Comments: See sample calculation verification worksheet for recalculations

LDC #: 22334A-1
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: Q
2nd Reviewer: M

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		All	2,3,7,8-TCDF on DB-5	All	~~R~~ AX(0)

Comments: _____