Laboratory Data Consultants, Inc.

7750 El Camino Real, Ste. 2L Carlsbad, CA 92009

Phone 760.634.0437 **Web** www.lab-data.com **Fax** 760.634.0439

Northgate Environmental Management, Inc.
1100 Quail Street Ste. 102
Newport Beach, CA 92660
ATTN: Ms. Cindy Arnold

January 4, 2011

SUBJECT: Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada, Data Validation

Dear Ms. Arnold,

Enclosed are the final validation reports for the fraction listed below. These SDGs were received on December 7, 2010. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 24523:

SDG #	Fraction
280-7662-2, 280-8461-1 280-8572-1, 280-8606-1	Semivolatiles, Chlorinated Pesticides, Metals, Perchlorate

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

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

Sincerely,

Erlinda T. Rauto
Operations Manager/Senior Chemist

Stage 2B/4

LDC #24523 (Tronox LLC-Northgate, Henderson NV / Tronox PCS Additional Sampling)

LDC	SDG#	DATE REC'D	(3) DATE DUE	SVOA (8270C)		Pest. (8081A)		As (6020)		Mn (6020)		Mg (6020)		CLO_4 (314.0)																									
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
A	280-7662-2	12/07/10	12/28/10	-	-	-	-	-	-	-	-	-	-	0	1																								
B	280-8461-1	12/07/10	12/28/10	0	11	0	7	-	-	-	-	-	-	-	-																								
B	280-8461-1	12/07/10	12/28/10	0	1	0	1	-	-	-	-	-	-	-	-																								
C	280-8572-1	12/07/10	12/28/10	0	10	-	-	0	4	0	4	0	4	0	3																								
C	280-8572-1	12/07/10	12/28/10	0	2	-	-	0	0	0	0	0	1	0	1																								
D	280-8606-1	12/07/10	12/28/10	2	15	-	-	1	12	-	-	-	-	1	10																								
D	280-8606-1	12/07/10	12/28/10	0	3	-	-	0	3	-	-	-	-	0	2																								
Total	T/LR			2	42	0	8	1	19	0	4	0	5	1	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	99

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

LDC #: 24523
SDG #: 280-7662-1, 280-8641-1, 280-8572-1, 280-8606-1

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_LDC24523_122810.doc
IV. EDD Delivery				
Was the final EDD sent to the client?	X			

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Collection Date:	October 12, 2010
LDC Report Date:	December 21, 2010
Matrix:	Soil
Parameters:	Semivolatiles
Validation Level:	Stage 2B & 4
Laboratory:	TestAmerica, Inc.
Sample Delivery Group (SDG):	280-8461-1

Sample Identification

SSAK4-03-0_01_BPC
SSAK4-03-1_01_BPC
SSAK4-03-2_01_BPC
SSAK4-03-3_01_BPC
SSAL2-04-1_01_BPC
SSAL2-04-2_01_BPC
SSAL2-04-3_01_BPC
SSAL2-04-4_01_BPC
SSAL2-05-1_01_BPC
SSAL2-05-2_01_BPC
SSAL2-05-3_01_BPC
SSAL2-05-4_01_BPC**
SSAK4-03-1_01_BPCMS
SSAK4-03-1_01_BPCMSD
SSAL2-04-3_01_BPCMS
SSAL2-04-3_01_BPCMSD

**Indicates sample underwent Stage 4 review

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 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).

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.

Samples indicated by a double asterisk on the front cover underwent a Stage 4 review. A Stage 2B review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Stage 2B criteria since this review is 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 30.0% for all compounds.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990 .

Average relative response factors (RRF) for all compounds 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) and 25.0% for all other compounds.

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 relative response factors (RRF) were within method and validation criteria.

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
MB 280-36114/1-A	10/17/10	Benzo(b)fluoranthene Dibenzo(a,h)anthracene Di-n-octylphthalate	28.9 ug/Kg 108 ug/Kg 80.8 ug/Kg	All samples in SDG 280-8461-1

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

No field blanks were identified in this SDG.

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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. 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 for samples on which a Stage 4 review was performed. Raw data were not evaluated for the samples reviewed by Stage 2B criteria.

XII. Project Quantitation Limit

All compound quantitation and CRQLs were within validation criteria for samples on which a Stage 4 review was performed.

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-8461-1	All compounds reported below the PQL.	J (all detects)	A

Raw data were not evaluated for the samples reviewed by Stage 2B criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Stage 4 review was performed. Raw data were not evaluated for the samples reviewed by Stage 2B criteria.

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, PCS Additional Sampling, Henderson, Nevada
Semivolatiles - Data Qualification Summary - SDG 280-8461-1

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-8461-1	SSAK4-03-0_01_BPC SSAK4-03-1_01_BPC SSAK4-03-2_01_BPC SSAK4-03-3_01_BPC SSAL2-04-1_01_BPC SSAL2-04-2_01_BPC SSAL2-04-3_01_BPC SSAL2-04-4_01_BPC SSAL2-05-1_01_BPC SSAL2-05-2_01_BPC SSAL2-05-3_01_BPC SSAL2-05-4_01_BPC**	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-8461-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Semivolatiles - Field Blank Data Qualification Summary - SDG 280-8461-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B/4

LDC #: 24523B2a
SDG #: 280-8461-1
Laboratory: Test America

Date: 12/17/10
Page: 1 of 1
Reviewer: JV6
2nd Reviewer: A

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: 10/12/10
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	A	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	A	Not reviewed for Stage 2B validation.
XII.	Compound quantitation/CRQLs	A	Not reviewed for Stage 2B validation.
XIII.	Tentatively identified compounds (TICs)	N	Not reviewed for Stage 2B validation.
XIV.	System performance	A	Not reviewed for Stage 2B validation.
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: ** Indicates sample underwent Stage 4 validation

All SOILS

1	SSAK4-03-0_01_BPC	11	SSAL2-05-3_01_BPC	21	MB 280-36114/1-A	31	
2	SSAK4-03-1_01_BPC	12	SSAL2-05-4_01_BPC**	22		32	
3	SSAK4-03-2_01_BPC	13	SSAK4-03-1_01_BPCMS	23		33	
4	SSAK4-03-3_01_BPC	14	SSAK4-03-1_01_BPCMSD	24		34	
5	SSAL2-04-1_01_BPC	15	SSAL2-04-3_01_BPCMS	25		35	
6	SSAL2-04-2_01_BPC	16	SSAL2-04-3_01_BPCMSD	26		36	
7	SSAL2-04-3_01_BPC	17		27		37	
8	SSAL2-04-4_01_BPC	18		28		38	
9	SSAL2-05-1_01_BPC	19		29		39	
10	SSAL2-05-2_01_BPC	20		30		40	

LDC #: 24523 b2c

VALIDATION FINDINGS CHECKLIST

Reviewer: JVR
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?	✓			

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.
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 #: 24523 B2a

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: JM
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: 10/12/10 **Blank analysis date:** 10/19/20
Conc. units: ug/kg Associated Samples: All (ND)

Compound	Blank ID	Sample Identification								
MB	280-36114/1-A									
GGG	28.9									
KKK	108									
FFF	80.8									

Blank extraction date: _____ **Blank analysis date:** _____
Conc. units: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								

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

LDC #: 24523 B2a

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG
2nd Reviewer: [illegible]

METHOD: GC/MS SVOA (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 (Internal Standard)		Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL	9/21/2010	1,4-Dioxane	(IS1)	0.6263	0.6263	0.6240	0.6240	2.7	2.72
	MSS D		Naphthalene	(IS2)	1.0235	1.0235	1.0743	1.0743	7.3	7.28
			Fluorene	(IS3)	1.2764	1.2764	1.3329	1.3329	10.7	10.66
			Hexachlorobenzene	(IS4)	0.2230	0.2230	0.2407	0.2407	13.0	13.00
			Chrysene	(IS5)	0.9756	0.9756	0.9999	0.9999	4.5	4.52
			Benzo(g,h,i)perylene	(IS6)	1.0065	1.0065	1.0449	1.0449	10.7	10.66

onc IS/Cpd	Area cpd	Area IS
40/50	209359	267408
40/50	1289187	1007644
40/50	1042290	653293
40/50	316061	1133711
40/50	1571420	1288617
40/50	1437432	1142483

Conc	1,4-Dioxane	Naphthalene	Fluorene	Hexachlorob	Chrysene	Benzo(g,h,i)per
4.00	0.5953	0.9988	1.1295		0.9731	0.9113
10.00	0.6339	0.9818	1.2018	0.2074	0.9297	0.9108
20.00	0.6534	1.0217	1.2438	0.2052	0.9634	0.9715
50.00	**0.6263**	**1.0235**	**1.2764**	0.2230	**0.9756**	**1.0065**
80.00	0.6166	1.0910	1.3901	**0.2398**	1.0347	1.0800
120.00	0.6217	1.1365	1.4103	0.2516	1.0304	1.1253
160.00	0.6316	1.1530	1.4687	0.2703	1.0579	1.1489
200.00	0.6134	1.1877	1.5425	0.2876	1.0346	1.2048
X =	0.6240	1.0743	1.3329	0.2407	0.9999	1.0449
S =	0.0170	0.0782	0.1421	0.0313	0.0452	0.1113

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 # 24523B2C

VALIDATION FINDINGS WORSHEET
Continuing Calibration Results Verification

Reviewer: JVG
2nd Reviewer: [signature]

METHOD: GC/MS SVOA (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 = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
Ax = Area of compound
Cx = Concentration of compound
RRF = continuing calibration RRF
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference IS)	Average RRF (Initial RRF)	Reported (CC RRF)	Recalculated (CC RRF)	Reported %D	Recalculated %D
1	D9542	10/19/10	1,4-Dioxane (IS1)	0.6240	0.6602	0.6602	5.8	5.8
			Naphthalene (IS2)	1.0743	1.1062	1.1062	3.0	3.0
			Fluorene (IS3)	1.3329	1.3742	1.3742	3.1	3.1
			Hexachlorobenzene (IS4)	0.2407	0.2808	0.2808	16.6	16.6
			Chrysene (IS5)	0.9999	1.0243	1.0243	2.4	2.4
			Benzo(g,h,i)perylene (IS6)	1.0449	1.1368	1.1368	8.8	8.8

Compound (Reference IS)	Concentration (IS/Cpd)	Area Cpd	Area IS
1,4-Dioxane (IS1)	40/80	434235	328854
Naphthalene (IS2)	40/80	2817624	1273556
Fluorene (IS3)	40/80	2293481	834491
Hexachlorobenzene (IS4)	40/80	764895	1362154
Chrysene (IS5)	40/80	3372481	1646160
Benzo(g,h,i)perylene (IS6)	40/80	3459656	1521664

LDC #: 24573 B2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Page: 1 of 1
Reviewer: DM
2nd reviewer: g

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: 4 | 7

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	100	78.6	79	79	
2-Fluorobiphenyl	↓	75.0	75	75	0
Terphenyl-d14	↓	105.9	106	106	↓
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 #: 24523Bxa

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Page: 1 of 1
Reviewer: JM
2nd Reviewer: e

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: 13/14

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	2360	2780	0	2360	2440	86	86	88	88	3	3
~~Pentachlorophenol~~											
Pyrene	↓	↓	↓	2680	2660	97	97	96	96	4	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 #: 24573B2a

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

Reviewer: JM
2nd Reviewer: e

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

LCS/LCSD samples: LCS 280-36114/2-A

Compound	Spike Added (ug/kg)		Spike Concentration (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol	2590									
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene	2590	NA	2240	NA	87	86.5				
~~Pentachlorophenol~~	↓	↓		↓						
Pyrene	↓	↓	2500	↓	97	97				

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 #: 24573 B2a

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: JMe
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. _____, _____ND

Conc. = $\frac{(\quad)(\quad)(\quad)(\quad)(\quad)}{(\quad)(\quad)(\quad)(\quad)(\quad)}$

=

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Collection Date:	October 13, 2010
LDC Report Date:	December 23, 2010
Matrix:	Soil
Parameters:	Semivolatiles
Validation Level:	Stage 2B & 4
Laboratory:	TestAmerica, Inc.
Sample Delivery Group (SDG):	280-8572-1

Sample Identification

SSAP3-05-1_01_BPC
SSAP3-05-2_01_BPC**
SSAP3-05-3_01_BPC
SSAP3-05-4_01_BPC
SSAP3-05-5_01_BPC
SSAP4-03-1_01_BPC
SSAP4-03-2_01_BPC
SSAP4-03-3_01_BPC
SSAP4-03-4_01_BPC
SSAP4-03-5_01_BPC
SSAP4-03-6_01_BPC
SSAP4-03-7_01_BPC**
SSAP3-05-2_01_BPCMS
SSAP3-05-2_01_BPCMSD

**Indicates sample underwent Stage 4 review

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 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).

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.

Samples indicated by a double asterisk on the front cover underwent a Stage 4 review. A Stage 2B review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Stage 2B criteria since this review is 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 30.0% for all compounds.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990 .

Average relative response factors (RRF) for all compounds 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) and 25.0% for all other compounds.

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 relative response factors (RRF) were within method and validation criteria.

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
MB 280-36401/1-A	10/19/10	Bis(2-ethylhexyl)phthalate	68.8 ug/Kg	All samples in SDG 280-8572-1

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
SSAP3-05-1_01_BPC	Bis(2-ethylhexyl)phthalate	71 ug/Kg	71U ug/Kg
SSAP3-05-3_01_BPC	Bis(2-ethylhexyl)phthalate	75 ug/Kg	75U ug/Kg
SSAP3-05-5_01_BPC	Bis(2-ethylhexyl)phthalate	73 ug/Kg	73U ug/Kg
SSAP4-03-1_01_BPC	Bis(2-ethylhexyl)phthalate	72 ug/Kg	72U ug/Kg
SSAP4-03-2_01_BPC	Bis(2-ethylhexyl)phthalate	76 ug/Kg	76U ug/Kg
SSAP4-03-3_01_BPC	Bis(2-ethylhexyl)phthalate	75 ug/Kg	75U ug/Kg
SSAP4-03-4_01_BPC	Bis(2-ethylhexyl)phthalate	75 ug/Kg	75U ug/Kg
SSAP4-03-5_01_BPC	Bis(2-ethylhexyl)phthalate	69 ug/Kg	69U ug/Kg

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	Surrogate	%R (Limits)	Compound	Flag	A or P
SSAP3-05-4_01_BPC	Nitrobenzene-d5 2-Fluorobiphenyl	43 (50-120) 46 (50-120)	All TCL compounds	J- (all detects) UJ (all nondetects)	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 or MSD relative percent recoveries (%R) were not within QC limits for several 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.

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 for samples on which a Stage 4 review was performed. Raw data were not evaluated for the samples reviewed by Stage 2B criteria.

XII. Project Quantitation Limit

All compound quantitation and CRQLs were within validation criteria for samples on which a Stage 4 review was performed.

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-8572-1	All compounds reported below the PQL.	J (all detects)	A

Raw data were not evaluated for the samples reviewed by Stage 2B criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Stage 4 review was performed. Raw data were not evaluated for the samples reviewed by Stage 2B criteria.

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, PCS Additional Sampling, Henderson, Nevada
Semivolatiles - Data Qualification Summary - SDG 280-8572-1

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-8572-1	SSAP3-05-4_01_BPC	All TCL compounds	J- (all detects) UJ (all nondetects)	A	Surrogate spikes (%R) (s)
280-8572-1	SSAP3-05-1_01_BPC SSAP3-05-2_01_BPC** SSAP3-05-3_01_BPC SSAP3-05-4_01_BPC SSAP3-05-5_01_BPC SSAP4-03-1_01_BPC SSAP4-03-2_01_BPC SSAP4-03-3_01_BPC SSAP4-03-4_01_BPC SSAP4-03-5_01_BPC SSAP4-03-6_01_BPC SSAP4-03-7_01_BPC**	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-8572-1

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
280-8572-1	SSAP3-05-1_01_BPC	Bis(2-ethylhexyl)phthalate	71 ug/Kg	A	bl
280-8572-1	SSAP3-05-3_01_BPC	Bis(2-ethylhexyl)phthalate	75 ug/Kg	A	bl
280-8572-1	SSAP3-05-5_01_BPC	Bis(2-ethylhexyl)phthalate	73 ug/Kg	A	bl
280-8572-1	SSAP4-03-1_01_BPC	Bis(2-ethylhexyl)phthalate	72 ug/Kg	A	bl
280-8572-1	SSAP4-03-2_01_BPC	Bis(2-ethylhexyl)phthalate	76 ug/Kg	A	bl
280-8572-1	SSAP4-03-3_01_BPC	Bis(2-ethylhexyl)phthalate	75 ug/Kg	A	bl
280-8572-1	SSAP4-03-4_01_BPC	Bis(2-ethylhexyl)phthalate	75 ug/Kg	A	bl
280-8572-1	SSAP4-03-5_01_BPC	Bis(2-ethylhexyl)phthalate	69 ug/Kg	A	bl

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Semivolatiles - Field Blank Data Qualification Summary - SDG 280-8572-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B/4

LDC #: 24523C2a
SDG #: 280-8572-1
Laboratory: Test America

Date: 12/17/10
Page: 1 of 1
Reviewer: SW
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	X	Sampling dates: 10/13/10
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	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	A	Not reviewed for Stage 2B validation.
XII.	Compound quantitation/CRQLs	A	Not reviewed for Stage 2B validation.
XIII.	Tentatively identified compounds (TICs)	N	Not reviewed for Stage 2B validation.
XIV.	System performance	A	Not reviewed for Stage 2B validation.
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: ** Indicates sample underwent Stage 4 validation

1	SSAP3-05-1_01_BPC	11	SSAP4-03-6_01_BPC	21	MB 280-36401/1-A	31	
2	SSAP3-05-2_01_BPC**	12	SSAP4-03-7_01_BPC**	22		32	
3	SSAP3-05-3_01_BPC	13	SSAP3-05-2_01_BPCMS	23		33	
4	SSAP3-05-4_01_BPC	14	SSAP3-05-2_01_BPCMSD	24		34	
5	SSAP3-05-5_01_BPC	15		25		35	
6	SSAP4-03-1_01_BPC	16		26		36	
7	SSAP4-03-2_01_BPC	17		27		37	
8	SSAP4-03-3_01_BPC	18		28		38	
9	SSAP4-03-4_01_BPC	19		29		39	
10	SSAP4-03-5_01_BPC	20		30		40	

LDC #: 24522C2a

VALIDATION FINDINGS CHECKLIST

Reviewer: JVR
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 #: 24573C29

VALIDATION FINDINGS CHECKLIST

Reviewer: JVB
2nd Reviewer: [illegible]

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.
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 #: 24523C2a

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: JVG
2nd Reviewer: e

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: 10/19/10 **Blank analysis date:** 10/27/10
Conc. units: ug/Kg Associated Samples: All (b l)

Compound	Blank ID	Sample Identification								
MB	280-36401/1-A	1	3	5	6	7	8	9	10	
EEE	68.8	71/4	75/4	73/4	72/4	76/4	75/4	75/4	69/4	

Blank extraction date: _____ **Blank analysis date:** _____
Conc. units: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								

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

LDC #: 24523C2c

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

Reviewer: DK
2nd Reviewer: [illegible]

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

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

X 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
		4	NBZ	43 (50-120)	J- /UJ /A (S)
			FBP	46 (50-120)	
				( )	
				( )	
		10	NBZ	41 (50-120)	No qual (only 1 BNA surrogate)
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
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				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

* QC limits are advisory

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

LDC #: 45323C2a

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: MG
2nd Reviewer: e

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
		3/14	several compounds	outside limits for %R			7	No grade (either MS/MSD or LCS in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	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 #: 45m3C2a

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

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

METHOD: GC/MS SVOA (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 (IS)		Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL	10/21/2010	1,4-Dioxane	(IS1)	0.5276	0.5276	0.5398	0.5399	4.8	4.82
	MSS Y		Naphthalene	(IS2)	1.0330	1.0330	1.0263	1.0263	3.0	3.00
			Fluorene	(IS3)	1.2852	1.2852	1.2599	1.2599	1.7	1.65
			Hexachlorobenzene	(IS4)	0.2387	0.2387	0.2392	0.2392	2.5	2.55
			bis(2eh)phthalate	(IS5)	see r2 calculations					
			Benzo(g,h,i)perylene	(IS6)	0.9867	0.9867	0.9702	0.9702	7.6	7.64

Conc IS/Cpd	Area cpd	Area IS
40/50	173342	262843
40/50	1363100	1055622
40/50	1029593	640883
40/50	328282	1100046
40/50	1620175	1227402
40/50	1454460	1179220

Conc	1,4-Dioxane	Naphthalene	Fluorene	Hexachlorob	bis(2eh)phthalat	Benzo(g,h,i)per
4.00	0.5556	1.0630	1.2369		r2	0.8201
10.00	0.5952	1.0515	1.2647	0.2338		0.9115
20.00	0.5481	1.0484	1.2425	0.2301		0.9507
50.00	**0.5276**	**1.0330**	**1.2852**	**0.2387**		**0.9867**
80.00	0.5258	1.0388	1.2718	0.2376		1.0052
120.00	0.5245	1.0037	1.2880	0.2459		1.0260
160.00	0.5153	0.9954	1.2542	0.2414		1.0226
200.00	0.5268	0.9765	1.2360	0.2469		1.0388
X =	0.5399	1.0263	1.2599	0.2392	0.0000	0.9702
S =	0.0260	0.0307	0.0208	0.0061	#DIV/0!	0.0741

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 # 24523C2G

VALIDATION FINDINGS WORSHEET
Continuing Calibration Results Verification

Reviewer: JVG
2nd Reviewer: [illegible]

METHOD: GC/MS SVOA (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 = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (IS)	Average RRF (Initial RRF)	Reported (CC RRF)	Recalculated (CC RRF)	Reported %D	Recalculated %D
1	Y6355	10/26/10	1,4-Dioxane (IS1)	0.5398	0.5392	0.5392	0.1	0.1
			Naphthalene (IS2)	1.0263	1.0725	1.0725	4.5	4.5
			Fluorene (IS3)	1.2599	1.3482	1.3482	7.0	7.0
			Hexachlorobenzene (IS4)	0.2392	0.2512	0.2512	5.0	5.0
			bis(2eh)phthalate (IS5)	80.0000	87.2000	87.2021	9.0	9.0
			Benzo(g,h,i)perylene (IS6)	0.9702	1.0552	1.0552	8.8	8.8
2	Y6398	10/27/10	1,4-Dioxane (IS1)	0.5398	0.5567	0.5567	3.1	3.1
			Naphthalene (IS2)	1.0263	1.0773	1.0773	5.0	5.0
			Fluorene (IS3)	1.2599	1.3403	1.3403	6.4	6.4
			Hexachlorobenzene (IS4)	0.2392	0.2475	0.2475	3.5	3.5
			bis(2eh)phthalate (IS5)	80.0000	82.8000	82.8223	3.5	3.5
			Benzo(g,h,i)perylene (IS6)	0.9702	1.0683	1.0683	10.1	10.1

Compound (Reference IS)	Concentration (IS/Cpd)	Area Cpd	Area IS	Area Cpd	Area IS
1,4-Dioxane (IS1)	40/80	353421	327749	403624	362489
Naphthalene (IS2)	40/80	2773828	1293189	3039462	1410695
Fluorene (IS3)	40/80	2148006	796645	2278429	849996
Hexachlorobenzene (IS4)	40/80	681621	1356747	707315	1428925
bis(2eh)phthalate (IS5)	40/80	2078020	1522166	2043853	1578240
Benzo(g,h,i)perylene (IS6)	40/80	3150993	1493061	3137961	1468679

		m	b	Response Ratio*40	Conc
CCV1	bis(2eh)phthala	0.6407	0.0493	1.365173049	87.20209517
CCV2	bis(2eh)phthala	0.6407	0.0493	1.295020402	82.82234509

LDC #: 45222C2A

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Page: 1 of 1
Reviewer: JVL
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: # 7

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	100	74.6	75	75	0
2-Fluorobiphenyl		77.9	78	78	
Terphenyl-d14		103.4	103	103	
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 #: 24573C2a

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: JM
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: 13/14

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	2720	2700	0	2280	2070	84	84	77	77	10	10
~~Pentachlorophenol~~	↓	↓	↓								
Pyrene	↓	↓	↓	2640	2570	97	97	93	93	5	5

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 #: 24523C2a

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Page: 1 of 1
Reviewer: NG
2nd Reviewer: e

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: LCS 280- 36401/2-A

Compound	Spike Added (ug/kg)		Spike Concentration (ug/kg)		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	2670	NA	2770	NA	85	85				
~~Pentachlorophenol~~	↑	↓		↓						
Pyrene	↑	↓	2570	↓	96	96				

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 #: 45220C2a

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: JV
2nd reviewer: [illegible]

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. _____, NJ

Conc. = ( )( )( )( )( ) / ( )( )( )( )( )

=

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Collection Date:	October 14, 2010
LDC Report Date:	December 21, 2010
Matrix:	Soil/Water
Parameters:	Semivolatiles
Validation Level:	Stage 2B & 4
Laboratory:	TestAmerica, Inc.
Sample Delivery Group (SDG):	280-8606-1

Sample Identification

SSAR6-06-0_01_BPC	SSAR6-06-0_01_BPCMS
SSAR6-06-1_01_BPC	SSAR6-06-0_01_BPCMSD
SSAR6-06-2_01_BPC	
SSAR6-06-3_01_BPC	
SSAR6-06-4_01_BPC**	
SSAR6-06-4_01_BPC_FD	
SSAR6-06-5_01_BPC	
SSAR6-06-6_01_BPC	
SSAR6-06-7_01_BPC	
SSAR6-06-8_01_BPC	
SSAR6-06-9_01_BPC	
SSAR6-06-10_01_BPC**	
SA94-11_01_BPC	
SA94-12_01_BPC	
SA94-13_01_BPC	
SSAL4-04-2_01_BPC	
SSAL4-04-3_01_BPC	
SSAL4-04-4_01_BPC**	
EB-10142010_1	
EB-10142010_2	

**Indicates sample underwent Stage 4 review

Introduction

This data review covers 20 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 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).

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.

Samples indicated by a double asterisk on the front cover underwent a Stage 4 review. A Stage 2B review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Stage 2B criteria since this review is 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 30.0% for all compounds.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990 .

Average relative response factors (RRF) for all compounds 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) and 25.0% for all other compounds.

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 relative response factors (RRF) were within method and validation criteria.

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
MB 280-36377/1-A	10/19/10	Bis(2-ethylhexyl)phthalate	2.07 ug/L	All water samples in SDG 280-8606-1
MB 280-36476/1-A	10/19/10	Bis(2-ethylhexyl)phthalate	66.0 ug/Kg	All soil samples in SDG 280-8606-1

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
EB-10142010_1	Bis(2-ethylhexyl)phthalate	2.1 ug/L	2.1U ug/L
EB-10142010_2	Bis(2-ethylhexyl)phthalate	2.1 ug/L	2.1U ug/L
SSAR6-06-0_01_BPC	Bis(2-ethylhexyl)phthalate	97 ug/Kg	97U ug/Kg
SSAR6-06-1_01_BPC	Bis(2-ethylhexyl)phthalate	87 ug/Kg	87U ug/Kg
SSAR6-06-2_01_BPC	Bis(2-ethylhexyl)phthalate	110 ug/Kg	110U ug/Kg
SSAR6-06-3_01_BPC	Bis(2-ethylhexyl)phthalate	80 ug/Kg	80U ug/Kg
SSAR6-06-4_01_BPC**	Bis(2-ethylhexyl)phthalate	94 ug/Kg	94U ug/Kg
SSAR6-06-4_01_BPC_FD	Bis(2-ethylhexyl)phthalate	78 ug/Kg	78U ug/Kg
SSAR6-06-5_01_BPC	Bis(2-ethylhexyl)phthalate	84 ug/Kg	84U ug/Kg
SSAR6-06-6_01_BPC	Bis(2-ethylhexyl)phthalate	81 ug/Kg	81U ug/Kg
SSAR6-06-7_01_BPC	Bis(2-ethylhexyl)phthalate	80 ug/Kg	80U ug/Kg
SSAR6-06-8_01_BPC	Bis(2-ethylhexyl)phthalate	81 ug/Kg	81U ug/Kg
SSAR6-06-9_01_BPC	Bis(2-ethylhexyl)phthalate	80 ug/Kg	80U ug/Kg
SSAR6-06-10_01_BPC**	Bis(2-ethylhexyl)phthalate	80 ug/Kg	80U ug/Kg
SA94-11_01_BPC	Bis(2-ethylhexyl)phthalate	77 ug/Kg	77U ug/Kg
SA94-12_01_BPC	Bis(2-ethylhexyl)phthalate	81 ug/Kg	81U ug/Kg
SA94-13_01_BPC	Bis(2-ethylhexyl)phthalate	91 ug/Kg	91U ug/Kg

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
SSAL4-04-2_01_BPC	Bis(2-ethylhexyl)phthalate	79 ug/Kg	79U ug/Kg
SSAL4-04-3_01_BPC	Bis(2-ethylhexyl)phthalate	77 ug/Kg	77U ug/Kg
SSAL4-04-4_01_BPC**	Bis(2-ethylhexyl)phthalate	75 ug/Kg	75U ug/Kg

Samples EB-10142010_1 and EB-10142010_2 were identified as equipment blanks. No semivolatile contaminants were found in these blanks with the following exceptions:

Equipment Blank ID	Sampling Date	Compound	Concentration	Associated Samples
EB-10142010_1	10/14/10	Bis(2-ethylhexyl)phthalate	2.1 ug/L	SSAR6-06-0_01_BPC SSAR6-06-1_01_BPC SSAR6-06-2_01_BPC SSAR6-06-3_01_BPC SSAR6-06-4_01_BPC** SSAR6-06-4_01_BPC_FD SSAR6-06-5_01_BPC SSAR6-06-6_01_BPC SSAR6-06-7_01_BPC SSAR6-06-8_01_BPC SSAR6-06-9_01_BPC SSAR6-06-10_01_BPC**
EB-10142010_2	10/14/10	Bis(2-ethylhexyl)phthalate	2.1 ug/L	SA94-11_01_BPC SA94-12_01_BPC SA94-13_01_BPC

Sample concentrations were compared to concentrations detected in the equipment 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 relative percent differences (RPD) were not within QC limits for several compounds, the MS/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.

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 for samples on which a Stage 4 review was performed. Raw data were not evaluated for the samples reviewed by Stage 2B criteria.

XII. Project Quantitation Limit

All compound quantitation and CRQLs were within validation criteria for samples on which a Stage 4 review was performed with the following exceptions:

Sample	Compound	Finding	Flag	A or P
SSAR6-06-0_01_BPC SSAR6-06-4_01_BPC_FD	Benzo(b)fluoranthene Benzo(k)fluoranthene	Due to lack of resolution between these compounds in the samples, the laboratory performed the quantitation using the total peak area.	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P

The reported results for the compounds listed above are biased high. The actual values of these compounds are lower than the values reported by the laboratory.

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-8606-1	All compounds reported below the PQL.	J (all detects)	A

Raw data were not evaluated for the samples reviewed by Stage 2B criteria.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable for samples on which a Stage 4 review was performed. Raw data were not evaluated for the samples reviewed by Stage 2B criteria.

XV. Overall Assessment

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

XVI. Field Duplicates

Samples SSAR6-06-4_01_BPC** and SSAR6-06-4_01_BPC_FD 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
	SSAR6-06-4_01_BPC**	SSAR6-06-4_01_BPC_FD				
Benzo(b)fluoranthene	340U	34	-	306 (≤340)	-	-
Benzo(g,h,i)perylene	22	23	-	1 (≤350)	-	-
Bis(2-ethylhexyl)phthalate	94	78	-	16 (≤350)	-	-
Di-n-butylphthalate	57	32	-	25 (≤350)	-	-
Pyrene	14	19	-	5 (≤350)	-	-

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Semivolatiles - Data Qualification Summary - SDG 280-8606-1

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-8606-1	SSAR6-06-0_01_BPC SSAR6-06-4_01_BPC_FD	Benzo(b)fluoranthene Benzo(k)fluoranthene	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P	Project Quantitation Limit (q)
280-8606-1	SSAR6-06-0_01_BPC SSAR6-06-1_01_BPC SSAR6-06-2_01_BPC SSAR6-06-3_01_BPC SSAR6-06-4_01_BPC** SSAR6-06-4_01_BPC_FD SSAR6-06-5_01_BPC SSAR6-06-6_01_BPC SSAR6-06-7_01_BPC SSAR6-06-8_01_BPC SSAR6-06-9_01_BPC SSAR6-06-10_01_BPC** SA94-11_01_BPC SA94-12_01_BPC SA94-13_01_BPC SSAL4-04-2_01_BPC SSAL4-04-3_01_BPC SSAL4-04-4_01_BPC** EB-10142010_1 EB-10142010_2	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-8606-1

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
280-8606-1	EB-10142010_1	Bis(2-ethylhexyl)phthalate	2.1U ug/L	A	bl
280-8606-1	EB-10142010_2	Bis(2-ethylhexyl)phthalate	2.1U ug/L	A	bl
280-8606-1	SSAR6-06-0_01_BPC	Bis(2-ethylhexyl)phthalate	97U ug/Kg	A	bl
280-8606-1	SSAR6-06-1_01_BPC	Bis(2-ethylhexyl)phthalate	87U ug/Kg	A	bl
280-8606-1	SSAR6-06-2_01_BPC	Bis(2-ethylhexyl)phthalate	110U ug/Kg	A	bl
280-8606-1	SSAR6-06-3_01_BPC	Bis(2-ethylhexyl)phthalate	80U ug/Kg	A	bl
280-8606-1	SSAR6-06-4_01_BPC**	Bis(2-ethylhexyl)phthalate	94U ug/Kg	A	bl
280-8606-1	SSAR6-06-4_01_BPC_FD	Bis(2-ethylhexyl)phthalate	78U ug/Kg	A	bl
280-8606-1	SSAR6-06-5_01_BPC	Bis(2-ethylhexyl)phthalate	84U ug/Kg	A	bl

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
280-8606-1	SSAR6-06-6_01_BPC	Bis(2-ethylhexyl)phthalate	81U ug/Kg	A	bl
280-8606-1	SSAR6-06-7_01_BPC	Bis(2-ethylhexyl)phthalate	80U ug/Kg	A	bl
280-8606-1	SSAR6-06-8_01_BPC	Bis(2-ethylhexyl)phthalate	81U ug/Kg	A	bl
280-8606-1	SSAR6-06-9_01_BPC	Bis(2-ethylhexyl)phthalate	80U ug/Kg	A	bl
280-8606-1	SSAR6-06-10_01_BPC**	Bis(2-ethylhexyl)phthalate	80U ug/Kg	A	bl
280-8606-1	SA94-11_01_BPC	Bis(2-ethylhexyl)phthalate	77U ug/Kg	A	bl
280-8606-1	SA94-12_01_BPC	Bis(2-ethylhexyl)phthalate	81U ug/Kg	A	bl
280-8606-1	SA94-13_01_BPC	Bis(2-ethylhexyl)phthalate	91U ug/Kg	A	bl
280-8606-1	SSAL4-04-2_01_BPC	Bis(2-ethylhexyl)phthalate	79U ug/Kg	A	bl
280-8606-1	SSAL4-04-3_01_BPC	Bis(2-ethylhexyl)phthalate	77U ug/Kg	A	bl
280-8606-1	SSAL4-04-4_01_BPC**	Bis(2-ethylhexyl)phthalate	75U ug/Kg	A	bl

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Semivolatiles - Equipment Blank Data Qualification Summary - SDG 280-8606-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B/4

LDC #: 24523D2a
SDG #: 280-8606-1
Laboratory: Test America

Date: 12/17/10
Page: 1 of 1
Reviewer: SVG
2nd Reviewer: [illegible]

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: 10/14/10
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	%D 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	A	LCS/D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	A	Not reviewed for Stage 2B validation.
XII.	Compound quantitation/CRQLs	SW	Not reviewed for Stage 2B validation.
XIII.	Tentatively identified compounds (TICs)	N	Not reviewed for Stage 2B validation.
XIV.	System performance	A	Not reviewed for Stage 2B validation.
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D = 5, 6
XVII.	Field blanks	SW	EB = 19, 20

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 ** Indicates sample underwent Stage 4 validation

1	SSAR6-06-0_01_BPC S	11	SSAR6-06-9_01_BPC S	21	SSAR6-06-0_01_BPCMS S	31	MB 280-36476/1-A
2	SSAR6-06-1_01_BPC	12	SSAR6-06-10_01_BPC**	22	SSAR6-06-0_01_BPCMSD	32	MB 280-36377/1-A
3	SSAR6-06-2_01_BPC	13	SA94-11_01_BPC	23		33	
4	SSAR6-06-3_01_BPC	14	SA94-12_01_BPC	24		34	
5	SSAR6-06-4_01_BPC** D	15	SA94-13_01_BPC	25		35	
6	SSAR6-06-4_01_BPC_FD D	16	SSAL4-04-2_01_BPC	26		36	
7	SSAR6-06-5_01_BPC	17	SSAL4-04-3_01_BPC	27		37	
8	SSAR6-06-6_01_BPC	18	SSAL4-04-4_01_BPC**	28		38	
9	SSAR6-06-7_01_BPC	19	EB-10142010_1 W	29		39	
10	SSAR6-06-8_01_BPC	20	EB-10142010_2	30		40	

LDC #: 29523 D2a

VALIDATION FINDINGS CHECKLIST

Reviewer: JVC
2nd Reviewer:

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?	✓			

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.
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 #: 24523 b2a

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: JM
2nd Reviewer: R

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: 10/19/10 **Blank analysis date:** 10/27/10
Conc. units: ug/L Associated Samples: All W (6 l)

Compound	Blank ID	Sample Identification								
MB	280-36377/1-A	19	20							
EEE	2.07	2.1 /u	2.1 /u							

Blank extraction date: 10/19/10 **Blank analysis date:** 10/25/10
Conc. units: ug/kg Associated Samples: All S (6 l)

Compound	Blank ID	Sample Identification								
MB	280-36476/1-A	1	2	3	4	5	6	7	8	9
EEE	66.0	97 /u	87 /u	110 /u	80 /u	94 /u	78 /u	84 /u	81 /u	80 /u

5X
330

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

LDC #: 24523 DK

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 2
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: 10/19/10 **Blank analysis date:** 10/25/10 (bl)
Conc. units: ug/kg Associated Samples: All S

Compound	Blank ID	Sample Identification								
MB	280-36476/1-A	10	11	12	13	14	15	16	17	18
EEE	66.0	81/4	80/4	80/4	77/4	81/4	91/4	79/4	77/4	75/4

Blank extraction date: _____ **Blank analysis date:** _____
Conc. units: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								

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

LDC #: 24523D2c
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 1 of 1
Reviewer: JV6
2nd Reviewer: [illegible]

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

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: 10/14/10
Field blank type: (circle one) Field Blank / Rinsate / Other: EB Associated Samples: 1-12

Compound	Blank ID	Sample Identification								
	19									
~~Diethylphthalate~~ EEE	2.1	All	results	> 5x	EB					
Di-n-butylphthalate										
Bis(2-ethylhexyl)phthalate										
CRQL										

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 10/14/10
Field blank type: (circle one) Field Blank / Rinsate / Other: EB Associated Samples: 13-15

Compound	Blank ID	Sample Identification								
	20									
~~Diethylphthalate~~ EEE	2.1	All	results	> 5x	EB					
Di-n-butylphthalate										
Bis(2-ethylhexyl)phthalate										
CRQL										

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

VALIDATION FINDINGS WORKSHEET

Matrix Spike/Matrix Spike Duplicates

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

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

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

(Y) N N/A — 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	several	compounds)	outside limits	( )	1	No qual
				for %RPD)	( )	( )		(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 #: 24523D29

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Page: 1 of 1
Reviewer: JVB
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 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, 6	GGG, HH# peaks unresolved, result reported as GGG		J/UJ/P (q)

Comments: See sample calculation verification worksheet for recalculations

LDC#:24523D2a

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: SVG
2nd Reviewer: [illegible]

METHOD: GC MS Semivolatiles (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	Concentration (ug/Kg) 5	Concentration (ug/Kg) 6	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Benzo(b)fluoranthene	340U	34		306	(≤340)	
Benzo(g,h,i)perylene	22	23		1	(≤350)	
bis(2-ethylhexyl)phthalate	94	78		16	(≤350)	
Di-n-butyl phthalate	57	32		25	(≤350)	
Pyrene	14	19		5	(≤350)	

LDC #: 24523Dv4

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JVG
2nd Reviewer: [illegible]

METHOD: GC/MS SVOA (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 (IS)	Reported RRF (50 std)	Recalculated RRF (50 std)	Reported Average RRF (Initial)	Recalculated Average RRF (Initial)	Reported %RSD	Recalculated %RSD
1	ICAL	9/28/2010	1,4-Dioxane (IS1)	0.5880	0.5880	0.5957	0.5957	6.6	6.56
	MSS B		Naphthalene (IS2)	1.0327	1.0327	1.0105	1.0105	7.6	7.59
			Fluorene (IS3)	1.2891	1.2891	1.2310	1.2310	8.5	8.52
			Hexachlorobenzene (IS4)	0.2160	0.2160	0.2116	0.2116	4.5	4.46
			bis(2-ethylhexyl)phth (IS5)	see r2 calculations					
			Benzo(a)pyrene (IS6)	1.0568	1.0568	1.0018	1.0018	4.8	4.85

Conc IS/Cpd	Area cpd	Area IS
40/50	146990	199977
40/50	1021776	791575
40/50	744086	461785
40/50	208557	772497
40/50	709742	817425
40/50	1043827	790214

Conc	1,4-Dioxane	Naphthalene	Fluorene	Hexachlorob	bis(2eh)phthal	Benzo(a)py
4.00	0.6881	1.1010	1.3136		r2	0.9222
10.00	0.5921	1.0854	1.3424	0.2234		0.9811
20.00	0.5846	1.0767	1.3105	0.2223		1.0510
50.00	**0.5880**	**1.0327**	**1.2891**	**0.2160**		**1.0568**
80.00	0.5960	1.0027	1.2479	0.2115		1.0469
120.00	0.5860	0.9649	1.1845	0.2063		1.0157
160.00	0.5635	0.9226	1.0835	0.2013		0.9767
200.00	0.5672	0.8983	1.0765	0.2003		0.9636
X =	0.5957	1.0105	1.2310	0.2116	0.0000	1.0018
S =	0.0391	0.0767	0.1049	0.0094	#DIV/0!	0.0486

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 # 24523 D24

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JG
2nd Reviewer: [illegible]

METHOD: GCMS Semivolatiles (EPA SW 846 Method 8270C)

Parameter: bis(2-ethylhexyl) phthalate

Order of regression: Linear

Date	Column	Compound	Points	x area ratio	y conc ratio	RF
28-Sep-10	Vf-5MS	bis(2-ethylhexyl) phthalate	Point 1	0.040456988	0.100	0.4046
			Point 2	0.139427432	0.250	0.5577
			Point 3	0.319337871	0.500	0.6387
			Point 4	0.86826559	1.250	0.6946
			Point 5	1.44506605	2.000	0.7225
			Point 6	2.114757735	3.000	0.7049
			Point 7	2.78197209	4.000	0.6955
			Point 8	3.431946627	5.000	0.6864
						Ave 0.6381

Regression Output: Regression Output:		Reported WLR	
Constant	0.01781	b =	0.04440
Std Err of Y Est	0.04		
R Squared	0.99929	r^2 =	0.99920
No. of Observations	6.00		
Degrees of Freedom	4.00		
		m1 =	0.7097
X Coefficient(s)	0.69768		
Std Err of Coef.	0.01		

LDC # 24577 D2a

VALIDATION FINDINGS WORSHEET
Continuing Calibration Results Verification

Reviewer: JVG
2nd Reviewer: e

METHOD: GC/MS SVOA (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 = (Ax)(Cis)/(Ais)(Cx)

Where:
ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
Ax = Area of compound
Cx = Concentration of compound
Ais = Area of associated internal standard
Cis = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference IS)	Average RRF (Initial RRF)	Reported (CC RRF)	Recalculated (CC RRF)	Reported %D	Recalculated %D
1	B1315	10/25/10	1,4-Dioxane (IS1)	0.596	0.601	0.601	0.9	0.9
			Naphthalene (IS2)	1.011	1.037	1.037	2.6	2.6
			Fluorene (IS3)	1.231	1.299	1.299	5.5	5.5
			Hexachlorobenzene (IS4)	0.212	0.229	0.229	8.4	8.4
			bis(2-ethylhexyl)phth (IS5)	80.000	86.500	86.501	8.1	8.1
			Benzo(a)pyrene (IS6)	1.002	1.072	1.072	7.0	7.0

		CCV1		CCV2	
Compound (Reference IS)	Concentration (IS/Cpd)	Area Cpd	Area IS	Area Cpd	Area IS
1,4-Dioxane (IS1)	40/80	209102	173903		
Naphthalene (IS2)	40/80	1425076	687301		
Fluorene (IS3)	40/80	1029653	396345		
Hexachlorobenzene (IS4)	40/80	305394	665612		
bis(2-ethylhexyl)phth (IS5)	40/80	1032201	686652		
Benzo(a)pyrene (IS6)	40/80	1494660	696926		

	m	b	Response Ratio*40	Conc
bis(2eh)phthala	0.7097	0.0444	1.503237448	86.50123307

LDC #: 24523b2a

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

Page: 1 of 1
Reviewer: JC
2nd reviewer: [illegible]

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: # 5

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	100	88.5	88	88	0
2-Fluorobiphenyl	↓	89.7	90	90	↓
Terphenyl-d14		94.9	95	95	
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 #: 24523 D2A

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: JM
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 = I MSC - MSC I * 2/(MSC + MSDC) MSC = Matrix spike concentration MSDC = Matrix spike duplicate concentration

MS/MSD samples: 21 / 27

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	2840	2870	0	2350	2670	83	83	93	93	13	13
~~Pentachlorophenol~~											
Pyrene	2840	"	65	2700	3050	93	93	104	104	12	12

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 #: 24577b29

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

Page: 1 of 1
Reviewer: JM
2nd Reviewer: R

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: LCS 280 - 36476/2-4

Compound	Spike Added (ug/kg)		Spike Concentration (ug/kg)		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	2660	NA	2320	NA	87	87				
~~Pentachlorophenol~~										
Pyrene			2530		95	95				

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 #: 26577 D24

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: JVG
2nd reviewer: [illegible]

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. #5 , _____:

Conc. = $\left[\frac{(12237)(\quad)(\quad)(\quad)(\quad)(\quad)}{(743187)(\quad)(\quad)(\quad)(\quad)(\quad)} + 0.0444\right] 40$

0.7097

X = 2.704

final conc. = $\frac{(2.704)(1ml)(1000)}{(31.2)(0.925)}$

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification
			= 93.7		
			≈ 94	ug/kg	

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Collection Date:	October 12, 2010
LDC Report Date:	December 21, 2010
Matrix:	Soil
Parameters:	Chlorinated Pesticides
Validation Level:	Stage 2B & 4
Laboratory:	TestAmerica, Inc.
Sample Delivery Group (SDG):	280-8461-1

Sample Identification

SSAL2-04-1_01_BPC
SSAL2-04-2_01_BPC
SSAL2-04-3_01_BPC
SSAL2-04-4_01_BPC
SSAL2-05-1_01_BPC
SSAL2-05-2_01_BPC
SSAL2-05-3_01_BPC
SSAL2-05-4_01_BPC**
SSAL2-04-3_01_BPCMS
SSAL2-04-3_01_BPCMSD

**Indicates sample underwent Stage 4 review

Introduction

This data review covers 10 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).

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.

Samples indicated by a double asterisk on the front cover underwent a Stage 4 review. A Stage 2B review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Stage 2B criteria since this review is 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.

A curve fit, based on the initial calibration, was established for quantitation for all compounds. The coefficient of determination (r^2) was greater than or equal to 0.990 .

Retention time windows were evaluated and considered technically acceptable for samples on which a Stage 4 review was performed. Raw data were not evaluated for the samples on which a Stage 2B review was performed.

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 for samples on which a Stage 4 review was performed. Raw data were not evaluated for the samples on which a Stage 2B review was performed.

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
SSAL2-04-1_01_BPC	RTX-XLB RTI-35S	Decachlorobiphenyl Decachlorobiphenyl	193 (63-124) 189 (63-124)	All TCL compounds except Hexachlorobenzene	J+ (all detects)	A
SSAL2-04-4_01_BPC	RTX-XLB RTI-35S	Decachlorobiphenyl Decachlorobiphenyl	692 (63-124) 692 (63-124)	All TCL compounds except 4,4'-DDE beta-BHC Hexachlorobenzene	J+ (all detects)	A
SSAL2-05-1_01_BPC	RTX-XLB RTI-35S	Decachlorobiphenyl Decachlorobiphenyl	285 (63-124) 315 (63-124)	All TCL compounds except Hexachlorobenzene	J+ (all detects)	A
SSAL2-05-3_01_BPC	RTX-XLB RTI-35S	Decachlorobiphenyl Decachlorobiphenyl	540 (63-124) 528 (63-124)	All TCL compounds except Hexachlorobenzene	J+ (all 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) were not within QC limits for one compound, the LCS 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) 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 for samples on which a Stage 4 review was performed. Raw data were not evaluated for the samples reviewed by Stage 2B criteria.

XII. Project Quantitation Limit

All compound quantitation and CRQLs were within validation criteria for samples on which a Stage 4 review was performed.

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-8461-1	All compounds reported below the PQL.	J (all detects)	A

Raw data were not evaluated for the samples reviewed by Stage 2B criteria.

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, PCS Additional Sampling, Henderson, Nevada
Chlorinated Pesticides - Data Qualification Summary - SDG 280-8461-1

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-8461-1	SSAL2-04-1_01_BPC SSAL2-05-1_01_BPC SSAL2-05-3_01_BPC	All TCL compounds except Hexachlorobenzene	J+ (all detects)	A	Surrogate recovery (%R) (s)
280-8461-1	SSAL2-04-4_01_BPC	All TCL compounds except 4,4'-DDE beta-BHC Hexachlorobenzene	J+ (all detects)	A	Surrogate recovery (%R) (s)
280-8461-1	SSAL2-04-1_01_BPC SSAL2-04-2_01_BPC SSAL2-04-3_01_BPC SSAL2-04-4_01_BPC SSAL2-05-1_01_BPC SSAL2-05-2_01_BPC SSAL2-05-3_01_BPC SSAL2-05-4_01_BPC**	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Chlorinated Pesticides - Laboratory Blank Data Qualification Summary - SDG 280-8461-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Chlorinated Pesticides - Field Blank Data Qualification Summary - SDG 280-8461-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B/4

LDC #: 24523B3a
SDG #: 280-8461-1
Laboratory: Test America

Date: 12/12/10
Page: 1 of 1
Reviewer: JVL
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: 10/12/10
II.	GC/ECD Instrument Performance Check	A	
III.	Initial calibration	A	r ✓
IV.	Continuing calibration/ICV	A	CW/CV ≤ 20 %
V.	Blanks	A	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
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	A	Not reviewed for Stage 2B validation.
XII.	Compound quantitation and reported CRQLs	A	Not reviewed for Stage 2B validation.
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: ** Indicates sample underwent Stage 4 validation

All Soils

1	SSAL2-04-1_01_BPC	11	MB 280-35938/3-A	21		31	
2	SSAL2-04-2_01_BPC	12		22		32	
3	SSAL2-04-3_01_BPC	13		23		33	
4	SSAL2-04-4_01_BPC	14		24		34	
5	SSAL2-05-1_01_BPC	15		25		35	
6	SSAL2-05-2_01_BPC	16		26		36	
7	SSAL2-05-3_01_BPC	17		27		37	
8	SSAL2-05-4_01_BPC**	18		28		38	
9	SSAL2-04-3_01_BPCMS	19		29		39	
10	SSAL2-04-3_01_BPCMSD	20		30		40	

LDC #: 24523 B3a

VALIDATION FINDINGS CHECKLIST

Reviewer: JVG
2nd Reviewer:

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) ≤ 20%.0 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?	✓			

Validation Area	Yes	No	NA	Findings/Comments
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?			✓	
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. Chlordane
B. beta-BHC	J. 4,4'-DDE	R. Endrin aldehyde	Z. Aroclor-1248	HH. Chlordane (Technical)
C. delta-BHC	K. Endrin	S. alpha-Chlordane	AA. Aroclor-1254	II. Arochlor 1262
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ. Arochlor 1268
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	CC. 2,4'-DDD	KK. oxy Chlordane
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. 2,4'-DDE	LL. trans-Nonachlor
G. Heptachlor epoxide	O. 4,4'-DDT	W. Aroclor-1221	EE. 2,4'-DDT	MM. cis-Nonachlor
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF. Hexachlorobenzene	NN.

Notes: _____

LDC #: 24523 B3a

VALIDATION FINDINGS WORKSHEET
Surrogate Spikes

Page: 1 of 2
Reviewer: JV6
2nd Reviewer: e

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	RTX-XLB	B	193 (63-124)	J+ dets / A (all except FF)
			RTI-35S	B	189 ( )	
					( )	
		1 (20x)	RTX-XLB	B	171 ( )	No qual
			RTI-35S	B	147 ( )	
				A	46 (59-115)	
					( )	
		3 (10x)	RTI-35S	B	6 v (63-124)	No qual
					( )	
		4	RTX-XLB	B	69 v ( )	J+ dets / A (All except J, B, FF)
			RTI-35S	B	69 v ( )	
					( )	
		4 (50x)	RTX-XLB	B	707 ( )	No qual
			RTI-35S	B	646 ( )	
			RTX-XLB	A	25 (59-115)	
			RTI-35S	A	0 ( )	
					( )	
		5	RTX-XLB	B	285 (63-124)	J+ dets / A (all except FF)
			RTI-35S	B	315 ( )	
					( )	

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

LDC #: 74523 B3c

VALIDATION FINDINGS WORKSHEET
Surrogate Spikes

Reviewer: JVC
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
		5 (20x)	RTX-XLB	B	317 (63-124)	No qual
			RTI-355	B	314 (↓)	
			↓	A	33 (59-115)	
					( )	
		7	RTX-XLB	B	540 (63-124)	5 + dots /A (all except FF)
			RTI-355	B	528 (·)	
					( )	
		7 (50x)	RTX-XLB	B	523 ( )	No qual
			RTX-355	B	484 ( )	
			RTX-XLB	A	32 (59-115)	
			RTI-355	A	0 (↓)	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	

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

LDC #: 24523 B3a
SDG #: Su Cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: JVG
2nd Reviewer: ⟨initials⟩

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
		9/10	B	55 (58-115)	-27 (58-115)	( )	3	No qual
				( )	( )	( )		(LCS in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC#: 24523B3a

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: JDL
2nd Reviewer: [signature]

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

Calibration Date	Instrument/Column	Compound	Standard	(Y) Response	(X) Concentration	(X2) Concentration	CF
10/22/2010	GCS_C	Hexachorobenzene	1	146588	5	0	29318
			2	339427	10	25	33943
	RTX-XLB		3	791393	25	625	31656
			4	1538507	50	2500	30770
			5	2146282	75	5625	28617
			6	2793606	100	10000	27936
						Ave	30373

Regression Output	*Calculated*		*Reported*	
Constant	c =	0.0000E+00	c =	0.00003
Std Err of Y Est				
Coefficient of Determination (r^2)	r^ 2	0.9998546	r^ 2	0.9997
Degrees of Freedom				
	a =	b =	a =	b =
X Coefficient(s)	3.28384E+04	-5.0331E+01	2.597E-01	2.386E-12
Std Err of Coef.				
Correlation Coefficient		0.999927		

LDC#: 24523B3a

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: DK
2nd Reviewer: q

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

Calibration Date	Instrument/Column	Compound	Standard	(Y) Response	(X) Concentration	CF
10/22/2010	GCS_C	Hexachorobenzene	1	219395	5	43879
			2	507379	10	50738
	RTI-35silms		3	1209105	25	48364
			4	2434317	50	48686
			5	3486824	75	46491
			6	4645627	100	46456
					Ave	47436

Regression Output	*Calculated*	*Reported*
Constant	*38987.705404*	*0.277280*
Std Err of Y Est		
R Squared	*0.999323*	*0.996800*
Degrees of Freedom		
X Coefficient(s)	*46297.05950029*	*48374.000000*
Std Err of Coef.		
Correlation Coefficient	*0.999662*	
Coefficient of Determination (r^2)	*0.999323*	*0.996800*

LDC#: 24523 B3C

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: MC
2nd Reviewer: [illegible]

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

Calibration Date	Instrument/Column	Compound	Standard	(Y) Response	(X) Concentration	(X2) Concentration	CF
10/22/2010	GCS_C	4,4'-DDT	1	114243	4	0	28561
			2	279331	10	100	27933
	RTX-XLB		3	681906	25	625	27276
			4	1364551	50	2500	27291
			5	1916038	75	5625	25547
			6	2498885	100	10000	24989
						Ave	26933

Regression Output	*Calculated*		*Reported*	
Constant	c =	0.0000	c =	*0.00003*
Std Err of Y Est				
Coefficient of Determination (r^2)	r^ 2	0.9998910	r^ 2	*0.9997*
Degrees of Freedom				
	a =	b =	a =	b =
X Coefficient(s)	2.86240E+04	-3.7035E+01	*2.91E-01*	*2.48E-12*
Std Err of Coef.				
Correlation Coefficient		0.999945		

LDC#: 24523 B3a

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Reviewer: SVC
2nd Reviewer: K

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

Calibration Date	Instrument/Column	Compound	Standard	(Y) Response	(X) Concentration	(X2) Concentration	CF
10/22/2010	GCS_C	4,4'-DDT	1	136373	4	0	34093
			2	352297	10	100	35230
	RTI-35silms		3	916740	25	625	36670
			4	1908294	50	2500	38166
			5	2768614	75	5625	36915
			6	3720648	100	10000	37206
						Ave	36380

Regression Output	*Calculated*		*Reported*	
Constant	c =	0.0000	c =	0.00003
Std Err of Y Est				
Coefficient of Determination (r^2)	r^ 2	0.9998694	r^ 2	0.99974
Degrees of Freedom				
	a =	b =	a =	b =
X Coefficient(s)	3.74817E+04	-3.2093E+00	*6.65E-01*	2.26E-13
Std Err of Coef.				
Correlation Coefficient		0.999935		

LDC # 24533B3c

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Calculation Verification

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

METHOD: GC ✓ HPLC____

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

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

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

#	Standard ID	Calibration Date	Compound	CCV Conc	Reported Conc	Recalculated Conc	Reported % D	Recalculated %D
1	064F6401	10/23/2010	HCB RTX-XLB	50	48.6	48.6	2.7	2.7
			4,4'-DDT RTX-XLB	50	49.1	49.2	1.7	1.7
			HCB RTI-35s	50	48.4	48.4	3.3	3.3
			4,4'-DDT RTI-35s	50	47.9	48.1	4.1	3.8
2	077F7701	10/23/2010	HCB RTX-XLB	50	50.1	50.1	0.1	0.1
			4,4'-DDT RTX-XLB	50	52.8	52.8	5.6	5.6
			HCB RTI-35s	50	49.8	49.8	0.3	0.3
			4,4'-DDT RTI-35s	50	51.3	51.5	2.7	3.0

Y = a (X^2) + b X + c

Calculation

CCV1		Area Y	b	a	c	Conc. X	final conc	T = Y-c	(b^2 - 4aT)	( )^ 1/2	(-b+ ()) / 2a	(-b -())/ 2a
HCB	RTX-XLB	1478206	-50.0331	32828	0.0000	48.6330		-1478206	781866932.1	27961.8836	48.6329694	607.50067
4,4'-DDT	RTX-XLB	1317690	-37.0350	28624	0.0000	49.1615		-1317690	624130779.4	24982.6095	49.1614751	723.729034
4,4'-DDT	RTI-35s	1795338	-3.2093	37482	0.0000	48.0971		-1795338	1381832221	37173.0039	48.0971037	11630.998

CCV1		Response	m	c	Conc
HCB	RTI-35s	2325758	48374	0.27728	48.36

CCV2		Y	b	a	c	X	final conc	T = Y-c	(b^2 - 4aT)	( )^ 1/2		(-b -())/ 2a
HCB	RTX-XLB	1518268	-50.0331	32828	0.0000	50.0694		-1518268	773849227.9	27818.1457	50.0693975	606.064242
4,4'-DDT	RTX-XLB	1408021	-37.0350	28624	0.0000	52.7968		-1408021	610749145.1	24713.3394	52.7968217	720.093687
4,4'-DDT	RTI-35s	1922715	-3.2093	37482	0.0000	51.5247		-1922715	1380197057	37151.0034	51.5247176	11627.5704

CCV2		Response	m	c	Conc
HCB	RTI-35s	2397191	48374	0.27728	49.83

LDC #: 24523 B3a

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

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: # 8

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Tetrachloro-m-xylene	RTX-XLB	20	15.8	79	79	0
Tetrachloro-m-xylene	RTI-35S		16.0	80	80	
Decachlorobiphenyl	RTX-XLB		17.5	88	88	
Decachlorobiphenyl	RTI-35S		16.1	81	81	

Sample ID:

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

Sample ID:

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

Sample ID:

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

Notes:

LDC #: 24527B3a

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: OVG
2nd Reviewer: [illegible]

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: 9/10

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
gamma-BHC	17.1	17.1	0	13.85	13.44	81	81	79	79	4	4
4,4'-DDT	↓	↓	↓	15.6	15.5	91	91	91	91	0	0
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 #: 24577B3a

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

Reviewer: ov
2nd Reviewer: e

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: LCS 780 - 35938/2-A

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	16.6	NA	14.4	NA	87	87				
4,4'-DDT	↓	↓	15.7	↓	94	94				
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 #: 24523B3a

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: JVC
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. # 8 FF

Conc. = $\frac{(22.207x)(32838)X^{Y} + (-52833)X}{}$

X = ~~6.83588~~ 6.8358

final conc. = $\frac{(6.8358)(10)}{(31.6)(0.937)}$

= 2.3 ug/kg

#	Sample ID	Compound	Reported Concentration ( )	Calculated Concentration ( )	Qualification

Note:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Collection Date:	October 13, 2010
LDC Report Date:	December 21, 2010
Matrix:	Soil
Parameters:	Metals
Validation Level:	Stage 2B & 4
Laboratory:	TestAmerica, Inc.
Sample Delivery Group (SDG):	280-8572-1

Sample Identification

SSAN2-03-1_01_BPC
SSAN2-03-2_01_BPC
SSAN2-03-3_01_BPC
SSAN2-03-4_01_BPC
SSAP3-05-1_01_BPC
SSAP3-05-2_01_BPC**
SSAP3-05-3_01_BPC
SSAP3-05-4_01_BPC
SSAP3-05-5_01_BPC
SSAP3-05-2_01_BPCMS
SSAP3-05-2_01_BPCMSD

**Indicates sample underwent Stage 4 review

Introduction

This data review covers 11 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 6020 for Metals. The metals analyzed were Arsenic, Magnesium, and Manganese.

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).

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.

Samples indicated by a double asterisk on the front cover underwent a Stage 4 review. A Stage 2B review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Stage 2B criteria since this review is 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 metals contaminants were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Magnesium	0.690 mg/Kg	SSAP3-05-1_01_BPC SSAP3-05-2_01_BPC** SSAP3-05-3_01_BPC SSAP3-05-4_01_BPC SSAP3-05-5_01_BPC
ICB/CCB	Magnesium	3.28 ug/L	SSAP3-05-1_01_BPC SSAP3-05-2_01_BPC** SSAP3-05-3_01_BPC SSAP3-05-4_01_BPC SSAP3-05-5_01_BPC

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

No field blanks were identified in this SDG.

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) 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.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable.

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 for samples on which a Stage 4 review was performed.

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-8572-1	All analytes reported below the PQL.	J (all detects)	A

Raw data were not evaluated for the samples reviewed by Stage 2B criteria.

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, PCS Additional Sampling, Henderson, Nevada
Metals - Data Qualification Summary - SDG 280-8572-1

SDG	Sample	Analyte	Flag	A or P	Reason
280-8572-1	SSAN2-03-1_01_BPC SSAN2-03-2_01_BPC SSAN2-03-3_01_BPC SSAN2-03-4_01_BPC SSAP3-05-1_01_BPC SSAP3-05-2_01_BPC** SSAP3-05-3_01_BPC SSAP3-05-4_01_BPC SSAP3-05-5_01_BPC	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Metals - Laboratory Blank Data Qualification Summary - SDG 280-8572-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Metals - Field Blank Data Qualification Summary - SDG 280-8572-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B/4

LDC #: 24523C4
SDG #: 280-8572-1
Laboratory: Test America Laboratories, Inc.

Date: 12-16-10
Page: 1 of 1
Reviewer: MG
2nd Reviewer: [illegible]

METHOD: Metals (EPA SW 846 Method 6020)

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: 10-13-10
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/MSD
VII.	Duplicate Sample Analysis	N	
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	Not reviewed for Stage 2B validation.
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: ** Indicates sample underwent Stage 4 validation

All Soil

1	SSAN2-03-1_01_BPC	11	SSAP3-05-2_01_BPCMSD	21		31	
2	SSAN2-03-2_01_BPC	12	PBS	22		32	
3	SSAN2-03-3_01_BPC	13		23		33	
4	SSAN2-03-4_01_BPC	14		24		34	
5	SSAP3-05-1_01_BPC	15		25		35	
6	SSAP3-05-2_01_BPC**	16		26		36	
7	SSAP3-05-3_01_BPC	17		27		37	
8	SSAP3-05-4_01_BPC	18		28		38	
9	SSAP3-05-5_01_BPC	19		29		39	
10	SSAP3-05-2_01_BPCMS	20		30		40	

Notes: _____

LDC #: 24523C4

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: MG
2nd Reviewer: ✓

Method: Metals (EPA SW 846 Method 6010B/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. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	✓			
Were %RSD of isotopes in the tuning solution ≤5%?	✓			
III. Calibration				
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) QC limits?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
IV. 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.	✓			
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?	✓			
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?	✓			
VI. 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.	✓			
VII. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	✓			

Validation Area	Yes	No	NA	Findings/Comments
VIII. 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?			✓	
IX. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?	✓			
Were all percent differences (%Ds) < 10%?	✓			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		✓		
X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)				
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?	✓			
If the %Rs were outside the criteria, was a reanalysis performed?			✓	
XI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
XII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
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 analytes were detected in the field duplicates.			✓	
XV. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

LDC #: 24523C4

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

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

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1→4	S	Al, Sb, (As), Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, (Mn), Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
5→9	↓	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, (Mg), Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
QC 10, 11	↓	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, (Mg), Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
Analysis Method		
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
ICP-MS	S	Al, Sb, (As), Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, (Mg), (Mn), Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN⁻, ____

Comments: Mercury by CVAA if performed

LDC #: 24523C4

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Reviewer: MG
2nd Reviewer:

METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)
Soil preparation factor applied: 100x
Sample Concentration units, unless otherwise noted: mg/Kg
Associated Samples: 5-9 (>RL)

Analyte	Maximum PB[a] (mg/Kg)	Maximum PB[a] (ug/L)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qual's.									
Mg	0.690		3.28											

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U".
Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC #: 24523C4

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Page: 1 of 1
Reviewer: MG
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 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)
	ICP (Initial calibration)						
1439 ICV	ICP/MS (Initial calibration)	Mg	4128.00	4000	103	103	Y
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
1603 CCV	ICP/MS (Continuing calibration)	Mg	5083.00	5000	102	102	↓
	CVAA (Continuing calibration)						
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

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 #: 24523C4

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: MG
2nd Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

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)
1506 ICSAB	ICP interference check	Mg	106500.00 (mg/L)	110000 (mg/L)	97	97	Y
1535 LCS	Laboratory control sample	Mg	1844.5 (mg/kg)	2000 (mg/kg)	92	92	
1617 10	Matrix spike	Mg	(SSR-SR) 1581.4 (mg/kg)	1930 (mg/kg)	82	82	
1617 / 1620 10/11	Duplicate	Mg	10828.0 (mg/kg)	11734.7 (mg/kg)	8	8	
1608 / 1611 6	ICP serial dilution	Mg	9246.6 (mg/kg)	9447.5 (mg/kg)	2.2	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 #: 24523C4

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

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

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

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 #6, Mg were recalculated and verified using the following equation:

Concentration = $\frac{(RD)(FV)(Dil)}{(In.\ Vol.)}$

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor

Recalculation:

$$\frac{(18640.00\ \mu g/L)(0.100\ L)(5)}{(1.07\ g)\ (0.942)} = 9246.58\ \mu g/g \text{ or } mg/kg$$

#	Sample ID	Analyte	Reported Concentration (mg/kg)	Calculated Concentration (mg/kg)	Acceptable (Y/N)
1	6	Mg	9300	9200	Y

Note:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Collection Date:	October 14, 2010
LDC Report Date:	December 21, 2010
Matrix:	Soil/Water
Parameters:	Arsenic
Validation Level:	Stage 2B & 4
Laboratory:	TestAmerica, Inc.
Sample Delivery Group (SDG):	280-8606-1

Sample Identification

SSAR6-06-0_01_BPC
SSAR6-06-1_01_BPC
SSAR6-06-2_01_BPC
SSAR6-06-3_01_BPC
SSAR6-06-4_01_BPC**
SSAR6-06-4_01_BPC_FD
SSAR6-06-5_01_BPC
SSAR6-06-6_01_BPC
SSAR6-06-7_01_BPC
SSAR6-06-8_01_BPC
SSAR6-06-9_01_BPC
SSAR6-06-10_01_BPC**
SA198-1_01_BPC
SA198-2_01_BPC
SA198-3_01_BPC**
EB-10142010_1
SSAR6-06-0_01_BPCMS
SSAR6-06-0_01_BPCMSD
EB-10142010_1MS
EB-10142010_1MSD

**Indicates sample underwent Stage 4 review

Introduction

This data review covers 17 soil samples and 3 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 6020 for Arsenic.

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).

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.

Samples indicated by a double asterisk on the front cover underwent a Stage 4 review. A Stage 2B review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Stage 2B criteria since this review is 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 arsenic was found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Arsenic	0.0528 mg/Kg	All soil samples in SDG 280-8606-1

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

Sample EB-10142010_1 was identified as an equipment blank. No arsenic was found in this blank.

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) 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.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable.

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 for samples on which a Stage 4 review was performed.

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-8606-1	All analytes reported below the PQL.	J (all detects)	A

Raw data were not evaluated for the samples reviewed by Stage 2B criteria.

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

Samples SSAR6-06-4_01_BPC** and SSAR6-06-4_01_BPC_FD were identified as field duplicates. No arsenic was detected in any of the samples with the following exceptions:

Analyte	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SSAR6-06-4_01_BPC**	SSAR6-06-4_01_BPC_FD				
Arsenic	3.5	3.6	3 (≤50)	-	-	-

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Arsenic - Data Qualification Summary - SDG 280-8606-1

SDG	Sample	Analyte	Flag	A or P	Reason
280-8606-1	SSAR6-06-0_01_BPC SSAR6-06-1_01_BPC SSAR6-06-2_01_BPC SSAR6-06-3_01_BPC SSAR6-06-4_01_BPC** SSAR6-06-4_01_BPC_FD SSAR6-06-5_01_BPC SSAR6-06-6_01_BPC SSAR6-06-7_01_BPC SSAR6-06-8_01_BPC SSAR6-06-9_01_BPC SSAR6-06-10_01_BPC** SA198-1_01_BPC SA198-2_01_BPC SA198-3_01_BPC** EB-10142010_1	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Arsenic - Laboratory Blank Data Qualification Summary - SDG 280-8606-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Arsenic - Equipment Blank Data Qualification Summary - SDG 280-8606-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B/4

LDC #: 24523D4 Date: 12-16-10
SDG #: 280-8606-1 Page: 1 of 1
Laboratory: Test America Laboratories, Inc. Reviewer: MG
2nd Reviewer: W

METHOD: Arsenic (EPA SW 846 Method 6020)

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: 10-14-10
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 / MSD
VII.	Duplicate Sample Analysis	N	
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	Not reviewed for Stage 2B validation.
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	SW	D = 5+6
XV	Field Blanks	ND	EB = 16

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: ** Indicates sample underwent Stage 4 validation

1	SSAR6-06-0_01_BPC S	11	SSAR6-06-9_01_BPC S	21 1	PBS	31	
2	SSAR6-06-1_01_BPC	12	SSAR6-06-10_01_BPC**	22 2	PBW	32	
3	SSAR6-06-2_01_BPC	13	SA198-1_01_BPC	23		33	
4	SSAR6-06-3_01_BPC	14	SA198-2_01_BPC	24		34	
5	SSAR6-06-4_01_BPC**	15	SA198-3_01_BPC**	25		35	
6	SSAR6-06-4_01_BPC_FD	16 2	EB-10142010_1 W	26		36	
7	SSAR6-06-5_01_BPC	17	SSAR6-06-0_01_BPCMS S	27		37	
8	SSAR6-06-6_01_BPC	18	SSAR6-06-0_01_BPCMSD	28		38	
9	SSAR6-06-7_01_BPC	19 2	EB-10142010_1MS W	29		39	
10	SSAR6-06-8_01_BPC	20 2	EB-10142010_1MSD	30		40	

Notes: _____

LDC #: 84523D4

VALIDATION FINDINGS CHECKLIST

Reviewer: MG
2nd Reviewer: V

Method: Metals (EPA SW 846 Method 6010B/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. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	✓			
Were %RSD of isotopes in the tuning solution ≤5%?	✓			
III. Calibration				
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) QC limits?	✓			
Were all initial calibration correlation coefficients ≥ 0.995?	✓			
IV. 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.	✓			
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?	✓			
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?	✓			
VI. 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.	✓			
VII. Laboratory control samples				
Was an LCS anaylzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	✓			

Validation Area	Yes	No	NA	Findings/Comments
VIII. 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?			✓	
IX. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?	✓			
Were all percent differences (%Ds) < 10%?	✓			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		✓		
X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)				
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?	✓			
If the %Rs were outside the criteria, was a reanalysis performed?			✓	
XI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
XII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
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 analytes were detected in the field duplicates.	✓			
XV. Field blanks				
Field blanks were identified in this SDG.	✓			
Target analytes were detected in the field blanks.		✓		

LDC #: 24523D4

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Reviewer: MG
2nd Reviewer:

METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)
Sample Concentration units, unless otherwise noted: mg/Kg

Soil preparation factor applied: 100x
Associated Samples: all soil (>RL)

Analyte	Maximum PB[a] (mg/Kg)	Maximum PB[a] (ug/L)	Maximum ICB/CCB[a] (ug/L)	Action Limit	No Qual's.									
As	0.0528													

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U".
Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC#: 24523D4

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: MG
2nd Reviewer: V

METHOD: Metals (EPA Method 6010B/6020/7000)

(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) 5	Concentration (mg/kg) 6	(≤50) RPD	(mg/Kg) Difference	(mg/Kg) Limits	Qualifications (Parent Only)
Arsenic	3.5	3.6	3			

V:\FIELD DUPLICATES\FD_inorganic\24523D4.wpd

LDC #: 24523D4

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Reviewer: MG
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 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)
	ICP (Initial calibration)						
1923 ICV	ICP/MS (Initial calibration)	As	41.07	40.0	103	103	Y
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
2206 CCV	ICP/MS (Continuing calibration)	As	50.12	50.0	100	100	
	CVAA (Continuing calibration)						
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

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 #: 24523D4

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

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

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

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)
2135 ICSAB2	ICP interference check	As	101.40 (ug/L)	100 (ug/L)	101	101	Y
2146 LCS	Laboratory control sample	As	18.70 (mg/kg)	20.0 (mg/kg)	94	94	
2200 17	Matrix spike	As	(SSR-SR) 16.96 (mg/kg)	18.8 (mg/kg)	90	90	
2200 / 2203 17/18	Duplicate	As	19.73 (mg/kg)	18.89 (mg/kg)	4	4	
2152 / 2155 1	ICP serial dilution	As	2.77 (mg/kg)	2.73 (mg/kg)	1.4	2.0	

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

LDC #: 24523D4

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: MG
2nd reviewer: ~

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

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 #5, As were recalculated and verified using the following equation:

Concentration = $\frac{(RD)(FV)(Dil)}{(In.\ Vol.)}$

RD = Raw data concentration
FV = Final volume (ml)
In. Vol. = Initial volume (ml) or weight (G)
Dil = Dilution factor

Recalculation:

$$\frac{(7.47\ \mu g/L)(0.100L)(5)}{(1.15\ g)(0.925)} = 3.511\ \mu g/g \text{ or } mg/kg$$

#	Sample ID	Analyte	Reported Concentration (mg/kg)	Calculated Concentration (mg/Kg)	Acceptable (Y/N)
1	5	As	3.5	3.5	Y

Note:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Collection Date:	September 22, 2010
LDC Report Date:	December 21, 2010
Matrix:	Soil
Parameters:	Perchlorate
Validation Level:	Stage 4
Laboratory:	TestAmerica, Inc.
Sample Delivery Group (SDG):	280-7662-2

Sample Identification

SB03-38.5_01_BPC
SB03-38.5_01_BPCMS
SB03-38.5_01_BPCMSD
SB03-38.5_01_BPCDUP

Introduction

This data review covers 4 soil samples listed on the cover sheet. The analyses were per EPA Method 314.0 for Perchlorate.

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).

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.

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
All samples in SDG 280-7662-2	Perchlorate	30 days	28 days	J- (all detects) UJ (all nondetects)	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 were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No perchlorate was found in the initial, continuing and preparation blanks.

No field blanks were identified in this SDG.

IV. 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.

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. 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 280-7662-2	All analytes reported below the PQL.	J (all detects)	A

VIII. Overall Assessment

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, PCS Additional Sampling, Henderson, Nevada
Perchlorate - Data Qualification Summary - SDG 280-7662-2

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-7662-2	SB03-38.5_01_BPC	Perchlorate	J- (all detects) UJ (all nondetects)	A	Technical holding time (h)
280-7662-2	SB03-38.5_01_BPC	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Perchlorate - Laboratory Blank Data Qualification Summary - SDG 280-7662-2

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Perchlorate - Field Blank Data Qualification Summary - SDG 280-7662-2

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 4

LDC #: 24523A6
SDG #: 280-7662-2
Laboratory: Test America

Date: 12-15-10
Page: 1 of 1
Reviewer: MG
2nd Reviewer: [illegible]

METHOD: (Analyte) Perchlorate (EPA Method 314.0)

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: 9-22-10
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	MS/MSD
V	Duplicates	A	DUP
VI.	Laboratory control samples	A	LCS/LCSD
VII.	Sample result verification	A	
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: soil

1	SB03-38.5_01_BPC	11		21		31	
2	SB03-38.5_01_BPCMS	12		22		32	
3	SB03-38.5_01_BPCMSD	13		23		33	
4	SB03-38.5_01_BPCDUP	14		24		34	
5	PBS	15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes:

LDC #: 24523A6

VALIDATION FINDINGS CHECKLIST

Reviewer: MG
2nd Reviewer: ✓

Method: Inorganics (EPA Method 314.0)

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?			✓	

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 #: 24523A6

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

Reviewer: MG
2nd reviewer: W

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:	314.0						
Parameters:	ClO4						
Technical holding time:	28 days						
Sample ID	Sampling date	Analysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier
1	9-22-10	10-22-10	(30 days)				J-/UJ/A
2	↓	↓	↓				↓
3	↓	↓	↓				↓
4	↓	↓	↓				↓
		(reanalysis)					

h ↓

LDC #: 24523A6

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Reviewer: MG
2nd Reviewer: L

METHOD: Inorganics, Method 314.0

The correlation coefficient (r) for the calibration of ClO_4 was recalculated. Calibration date: 10-21-10

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 ID	Conc Found (units)	Area True (units)	Recalculated r or %R	Reported r or %R	Acceptable (Y/N)
Initial calibration	ClO_4	Blank	-	-	r = 0.999811	r = 0.999539	Y
		Standard 1	1.0 (µg/L)	0.00316			
		Standard 2	2.5	0.00755			
		Standard 3	5.0	0.01462			
		Standard 4	10.0	0.02832			
		Standard 5	20.0	0.06066			
		Standard 6	40.0	0.12249			
		Standard 7	-	-			
Calibration verification	ClO_4	1046 CCV	10.375 (µg/L)	10.0 (µg/L)	104	104	
Calibration verification	-	-	-	-	-	-	-
Calibration verification	-	-	-	-	-	-	-

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 #: 24523A6

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

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

METHOD: Inorganics, Method 314.0

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)
1634 LCS	Laboratory control sample	ClO_4	0.1083 (mg/kg)	0.0990 (mg/kg)	109	109	Y
1212 2	Matrix spike sample	ClO_4	(SSR-SR) 7.30 (mg/kg)	7.12 (mg/kg)	103	102	↓
1128 / 1149 4	Duplicate sample	ClO_4	10.21 (mg/kg)	10.22 (mg/kg)	0.1	0.1	↓

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 #: 24523A6

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

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

METHOD: Inorganics, Method 314.0

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 #1, ClO4 reported with a positive detect were recalculated and verified using the following equation:

Concentration =
$y = mx + b$
where $m = 0.0030$
$b = -0.0001$
dil = 50 x

Recalculation:
$0.04334 = 0.0030\left(\frac{x}{50}\right) - 0.0001$
$724\ \mu g/L = x$
then $\frac{(724\ \mu g/L)(0.100\ L)}{(10.1\ g)(0.702)} = 10.211\ \mu g/g$ or mg/kg

#	Sample ID	Analyte	Reported Concentration (mg/kg)	Calculated Concentration (mg/kg)	Acceptable (Y/N)
1	1	ClO4	10	10	Y

Note:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Collection Date:	October 13, 2010
LDC Report Date:	December 23, 2010
Matrix:	Soil
Parameters:	Perchlorate
Validation Level:	Stage 2B & 4
Laboratory:	TestAmerica, Inc.
Sample Delivery Group (SDG):	280-8572-1

Sample Identification

SSAM5-04-2_01_BPC
SSAM5-04-3_01_BPC
SSAM5-04-4_01_BPC**
SSAM5-04-4_01_BPC_FD

**Indicates sample underwent Stage 4 review

Introduction

This data review covers 4 soil samples listed on the cover sheet. The analyses were per EPA Method 314.0 for Perchlorate.

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).

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.

Samples indicated by a double asterisk on the front cover underwent a Stage 4 review. A Stage 2B review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Stage 2B criteria since this review is 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 were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No perchlorate was found in the initial, continuing and preparation blanks.

No field blanks were identified in this SDG.

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. Sample Result Verification and Project Quantitation Limit

All sample result verifications were acceptable for samples on which a Stage 4 review was performed.

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-8572-1	All analytes reported below the PQL.	J (all detects)	A

Raw data were not evaluated for the samples reviewed by Stage 2B criteria.

VIII. Overall Assessment

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

IX. Field Duplicates

Samples SSAM5-04-4_01_BPC** and SSAM5-04-4_01_BPC_FD were identified as field duplicates. No perchlorate was detected in any of the samples with the following exceptions:

Analyte	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SSAM5-04-4_01_BPC**	SSAM5-04-4_01_BPC_FD				
Perchlorate	340	340	9 (≤50)	-	-	-

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Perchlorate - Data Qualification Summary - SDG 280-8572-1

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-8572-1	SSAM5-04-2_01_BPC SSAM5-04-3_01_BPC SSAM5-04-4_01_BPC** SSAM5-04-4_01_BPC_FD	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Perchlorate - Laboratory Blank Data Qualification Summary - SDG 280-8572-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Perchlorate - Field Blank Data Qualification Summary - SDG 280-8572-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B/4

LDC #: 24523C6
SDG #: 280-8572-1
Laboratory: Test America

Date: 12-16-10
Page: 1 of 1
Reviewer: MG
2nd Reviewer: [illegible]

METHOD: (Analyte) Perchlorate (EPA Method 314.0)

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: 10-13-10
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	N	client specified
V	Duplicates	N	" "
VI.	Laboratory control samples	A	LCS / LCSD
VII.	Sample result verification	A	Not reviewed for Stage 2B validation.
VIII.	Overall assessment of data	A	
IX.	Field duplicates	SW	D = 3+4
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: ** Indicates sample underwent Stage 4 validation

all soil

1	SSAM5-04-2_01_BPC	11		21		31	
2	SSAM5-04-3_01_BPC	12		22		32	
3	SSAM5-04-4_01_BPC**	13		23		33	
4	SSAM5-04-4_01_BPC_FD	14		24		34	
5	PBS	15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes:

LDC #: 24523C6

VALIDATION FINDINGS CHECKLIST

Reviewer: MG
2nd Reviewer: ✓

Method: Inorganics (EPA Method 314.0)

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?			✓	

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#: 24523C6
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: MG
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)		RPD (≤50)	Difference	Limits	Qualification (Parent only)
	3	4				
Perchlorate	340	310	9			

V:\FIELD DUPLICATES\FD_inorganic\24523C6.wpd

LDC #: 24523C6

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

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

METHOD: Inorganics, Method 314.0

The correlation coefficient (r) for the calibration of ClO_4 was recalculated. Calibration date: 10-21-10

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 ID	Conc Found (units)	Area True (units)	Recalculated r or %R	Reported r or %R	Acceptable (Y/N)
Initial calibration	ClO_4	Blank	–	–	r = 0.999811	r = 0.999539	Y
		Standard 1	1.0 (µg/L)	0.00316			
		Standard 2	2.5	0.00755			
		Standard 3	5.0	0.01462			
		Standard 4	10.0	0.02832			
		Standard 5	20.0	0.06066			
		Standard 6	40.0	0.12249			
		Standard 7	–	–			
Calibration verification	ClO_4	1338 ICV	21.216 (µg/L)	20.0 (µg/L)	106	106	
Calibration verification	–	–	–	–	–	–	–
Calibration verification	–	–	–	–	–	–	–

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 #: 24523C6

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: MG
2nd Reviewer: L

METHOD: Inorganics, Method 314.0

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)
1634 LCS	Laboratory control sample	ClO_4	0.1083 (mg/kg)	0.0990 (mg/kg)	109	109	Y
—	Matrix spike sample	—	(SSR-SR) —	—	—	—	—
—	Duplicate sample	—	—	—	—	—	—

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 #: 24523C6

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

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

METHOD: Inorganics, Method 314.0

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 #3, ClO_4 reported with a positive detect were recalculated and verified using the following equation:

Concentration =

$Y = mx + b$

where $m = 0.0030$

$b = -0.0001$

$dil = 2000 \times$

Recalculation:

$0.04799 = 0.0030\left(\frac{x}{2000}\right) - 0.0001$

$32060\ \mu g/L = x$

then $\frac{(32060\ \mu g/L)(0.100\ L)}{(10.1\ g)(0.927)} = 342.42\ \mu g/g$ or mg/kg

#	Sample ID	Analyte	Reported Concentration (mg/kg)	Calculated Concentration (mg/kg)	Acceptable (Y/N)
1	3	ClO_4	340	340	Y

Note:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name:	Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Collection Date:	October 14, 2010
LDC Report Date:	December 21, 2010
Matrix:	Soil/Water
Parameters:	Perchlorate
Validation Level:	Stage 2B & 4
Laboratory:	TestAmerica, Inc.
Sample Delivery Group (SDG):	280-8606-1

Sample Identification

SSAR6-06-0_01_BPC
SSAR6-06-1_01_BPC
SSAR6-06-2_01_BPC
SSAR6-06-3_01_BPC
SSAR6-06-4_01_BPC**
SSAR6-06-4_01_BPC_FD
SSAR6-06-5_01_BPC
SSAR6-06-6_01_BPC
SSAR6-06-7_01_BPC
SSAR6-06-8_01_BPC
SSAR6-06-9_01_BPC
SSAR6-06-10_01_BPC**
EB-10142010_1

**Indicates sample underwent Stage 4 review

Introduction

This data review covers 12 soil samples and one water sample listed on the cover sheet. The analyses were per EPA Method 314.0 for Perchlorate.

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).

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.

Samples indicated by a double asterisk on the front cover underwent a Stage 4 review. A Stage 2B review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Stage 2B criteria since this review is 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 were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No perchlorate was found in the initial, continuing and preparation blanks.

Sample EB-10142010_1 was identified as an equipment blank. No perchlorate was found in this blank.

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. Sample Result Verification and Project Quantitation Limit

All sample result verifications were acceptable for samples on which a Stage 4 review was performed.

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-8606-1	All analytes reported below the PQL.	J (all detects)	A

Raw data were not evaluated for the samples reviewed by Stage 2B criteria.

VIII. Overall Assessment

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

IX. Field Duplicates

Samples SSAR6-06-4_01_BPC** and SSAR6-06-4_01_BPC_FD were identified as field duplicates. No perchlorate was detected in any of the samples with the following exceptions:

Analyte	Concentration (mg/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SSAR6-06-4_01_BPC**	SSAR6-06-4_01_BPC_FD				
Perchlorate	2.2	2.3	4 (≤50)	-	-	-

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Perchlorate - Data Qualification Summary - SDG 280-8606-1

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-8606-1	SSAR6-06-0_01_BPC SSAR6-06-1_01_BPC SSAR6-06-2_01_BPC SSAR6-06-3_01_BPC SSAR6-06-4_01_BPC** SSAR6-06-4_01_BPC_FD SSAR6-06-5_01_BPC SSAR6-06-6_01_BPC SSAR6-06-7_01_BPC SSAR6-06-8_01_BPC SSAR6-06-9_01_BPC SSAR6-06-10_01_BPC** EB-10142010_1	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Perchlorate - Laboratory Blank Data Qualification Summary - SDG 280-8606-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada
Perchlorate - Equipment Blank Data Qualification Summary - SDG 280-8606-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B/4

LDC #: 24523D6
SDG #: 280-8606-1
Laboratory: Test America

Date: 12-17-10
Page: 1 of 1
Reviewer: MG
2nd Reviewer:

METHOD: (Analyte) Perchlorate (EPA Method 314.0)

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: 10-14-10
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	N	client specified
V	Duplicates	N	
VI.	Laboratory control samples	A	LCS/LCSD
VII.	Sample result verification	A	Not reviewed for Stage 2B validation.
VIII.	Overall assessment of data	A	
IX.	Field duplicates	SW	D = 5+6
X	Field blanks	ND	EB = 13

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: ** Indicates sample underwent Stage 4 validation

1	SSAR6-06-0_01_BPC S	11	SSAR6-06-9_01_BPC S	21		31	
2	SSAR6-06-1_01_BPC	12	SSAR6-06-10_01_BPC** ↓	22		32	
3	SSAR6-06-2_01_BPC	13 2	EB-10142010_1 W	23		33	
4	SSAR6-06-3_01_BPC	14 1	PBS	24		34	
5	SSAR6-06-4_01_BPC**	15 3	PBW	25		35	
6	SSAR6-06-4_01_BPC_FD	16		26		36	
7	SSAR6-06-5_01_BPC	17		27		37	
8	SSAR6-06-6_01_BPC	18		28		38	
9	SSAR6-06-7_01_BPC	19		29		39	
10	SSAR6-06-8_01_BPC ↓	20		30		40	

Notes:

LDC #: 24523 D6

VALIDATION FINDINGS CHECKLIST

Reviewer: MG
2nd Reviewer: [illegible]

Method: Inorganics (EPA Method 314.0)

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?			✓	

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#: 24523D6 **VALIDATION FINDINGS WORKSHEET** Page: 1 of 1
SDG#: See Cover **Field Duplicates** Reviewer: MG
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)
	5	6				
Perchlorate	2.2	2.3	4			

V:\FIELD DUPLICATES\FD_inorganic\24523D6.wpd

LDC #: 24523D6

VALIDATION FINDINGS WORKSHEET
Initial and Continuing Calibration Calculation Verification

Reviewer: MG
2nd Reviewer: [illegible]

METHOD: Inorganics, Method 314.0

The correlation coefficient (r) for the calibration of ClO_4 was recalculated. Calibration date: 10-21-10

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 ID	Conc Found (units)	Area True (units)	Recalculated r or %R	Reported r or %R	Acceptable (Y/N)
Initial calibration	ClO_4	Blank	-	-	r = 0.999811	r = 0.999539	Y
		Standard 1	1.0 (µg/L)	0.00316			
		Standard 2	2.5	0.00755			
		Standard 3	5.0	0.01462			
		Standard 4	10.0	0.02832			
		Standard 5	20.0	0.06066			
		Standard 6	40.0	0.12249			
		Standard 7	-	-			
Calibration verification	ClO_4	2132 CCV	30.881 (µg/L)	30.0 (µg/L)	103	103	
Calibration verification	-	-	-	-	-	-	-
Calibration verification	-	-	-	-	-	-	-

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 #: 24523D6

VALIDATION FINDINGS WORKSHEET
Level IV Recalculation Worksheet

Reviewer: MG
2nd Reviewer: [illegible]

METHOD: Inorganics, Method 314.0

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)
1634 LCS	Laboratory control sample	ClO4	0.1083 (mg/kg)	0.0990 (mg/kg)	109	109	Y
—	Matrix spike sample		(SSR-SR)	—	—	—	—
—	Duplicate sample	—	—	—	—	—	—

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 #: 24523D6

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: MG
2nd reviewer: V

METHOD: Inorganics, Method 314.0

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 # 5, ClO_4 reported with a positive detect were recalculated and verified using the following equation:

Concentration = $y = mx + b$
where $m = 0.0030$
$b = -0.0001$
$dil = 10x$

Recalculation:
$0.06257 = 0.0030\left(\frac{x}{10}\right) - 0.0001$
$208.9\ \mu g/L = x$
then $\frac{(208.9\ \mu g/L)(0.100\ L)}{(10.0\ g)(0.925)} = 2.258\ \mu g/g$ or mg/kg

#	Sample ID	Analyte	Reported Concentration (mg/kg)	Calculated Concentration (mg/kg)	Acceptable (Y/N)
1	5	ClO_4	2.2	2.3	Y

Note: