



**LABORATORY DATA CONSULTANTS, INC.**

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

July 8, 2010

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

Dear Ms. Arnold,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on June 23, 2010. Attachment 1 is a summary of the samples that were reviewed for each analysis.

**LDC Project # 23436:**

<b><u>SDG #</u></b>	<b><u>Fraction</u></b>
280-2131-7, 280-2400-10, 280-2500-9	Semivolatiles, Metals, Perchlorate
280-2541-2, 280-3059-9, 280-3197-6	
280-3584-1, 280-3624-1, 280-3679-1	
280-3679-3	

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



EDD CHECKLIST

LDC #: 23436

SDG #: 280-2131-7, 280-2400-10, 280-2500-9, 280-2541-2

280-3059-9, 280-3197-6, 280-3584-1, 280-3624-1

280-3679-1, 280-3679-3

Tronox Northgate Henderson Worksheet

EDD Area	Yes	No	NA	Findings/Comments
<b>I. Completeness</b>				
Is there an EDD for the associated Tronox validation report?	X			
<b>II. EDD Qualifier Population</b>				
Were all qualifiers from the validation report populated into the EDD?	X			
<b>III. EDD Lab Anomalies</b>				
Were EDD anomalies identified?		X		
If yes, were they corrected or documented for the client?			X	See EDD_discrepancy_form_LDC23436_070710.doc
<b>IV. EDD Delivery</b>				
Was the final EDD sent to the client?	X			

**Tronox LLC Facility, PCS, Henderson, Nevada**  
**Data Validation Reports**  
**LDC #23436**

Semivolatiles

LD C

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

**Project/Site Name:** Tronox LLC Facility, PCS, Henderson, Nevada

**Collection Date:** April 6, 2010

**LDC Report Date:** July 6, 2010

**Matrix:** Soil

**Parameters:** Semivolatiles

**Validation Level:** Stage 4

**Laboratory:** TestAmerica, Inc.

**Sample Delivery Group (SDG):** 280-2131-7

**Sample Identification**

SSAJ8-01-10BPC

## **Introduction**

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

The following are definitions of the data qualifiers:

- J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.
- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.
- UU 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.

Sample FB-04072010-RZD (from SDG 280-2216-2) was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:



Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB-04072010-RZD	4/7/10	Bis(2-ethylhexyl)phthalate	2.2 ug/L	All samples in SDG 280-2131-7

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

## VI. Surrogate Spikes

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

## VII. Matrix Spike/Matrix Spike Duplicates

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

## VIII. Laboratory Control Samples (LCS)

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

## IX. Regional Quality Assurance and Quality Control

Not applicable.

## X. Internal Standards

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

## XI. Target Compound Identifications

All target compound identifications were within validation criteria.

## XII. Project Quantitation Limit

All compound quantitation and CRQLs were within validation criteria.

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-2131-7	All compounds reported below the PQL.	J (all detects)	A

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

Tentatively identified compounds were not reported by the laboratory.

### **XIV. System Performance**

The system performance was acceptable.

### **XV. Overall Assessment**

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

### **XVI. Field Duplicates**

No field duplicates were identified in this SDG.

**Tronox LLC Facility, PCS, Henderson, Nevada  
Semivolatiles - Data Qualification Summary - SDG 280-2131-7**

<b>SDG</b>	<b>Sample</b>	<b>Compound</b>	<b>Flag</b>	<b>A or P</b>	<b>Reason (Code)</b>
280-2131-7	SSAJ8-01-10BPC	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

**Tronox LLC Facility, PCS, Henderson, Nevada  
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-2131-7**

No Sample Data Qualified in this SDG

**Tronox LLC Facility, PCS, Henderson, Nevada  
Semivolatiles - Field Blank Data Qualification Summary - SDG 280-2131-7**

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

VALIDATION COMPLETENESS WORKSHEET

LDC #: 23436A2a  
 SDG #: 280-2131-7  
 Laboratory: Test America

Stage 4

Date: 7/02/10  
 Page: 1 of 1  
 Reviewer: JPK  
 2nd Reviewer:

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 4/06/10
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	2 KSD ✓
IV.	Continuing calibration/ICV	A	COV/NW ≤ 25 %
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	Client Spec
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	A	
XII.	Compound quantitation/CRQLs	A	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	A	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	SW	FB = FB-04072010-RZD (280-2216-2)

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

Validated Samples: Soil

1	SSAJ8-01-10BPC	11	21	31
2	MB 280-11504/A-A	12	22	32
3		13	23	33
4		14	24	34
5		15	25	35
6		16	26	36
7		17	27	37
8		18	28	38
9		19	29	39
10		20	30	40

LDC #: 23 936 A29  
 SDG #: See Cover

**VALIDATION FINDINGS CHECKLIST**

Page: 1 of 2  
 Reviewer: [Signature]  
 2nd Reviewer: [Signature]

**Method: Semivolatiles (EPA SW 846 Method 8270C)**

Validation Area	Yes	No	NA	Findings/Comments
<b>I. Technical holding times</b>				
All technical holding times were met.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Cooler temperature criteria was met.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>II. GC/MS Instrument performance check</b>				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all samples analyzed within the 12 hour clock criteria?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>III. Initial calibration</b>				
Did the laboratory perform a 5 point calibration prior to sample analysis?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was a curve fit used for evaluation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Did the initial calibration meet the curve fit acceptance criteria of > 0.990?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all percent relative standard deviations (%RSD) ≤ 30% and relative response factors (RRF) > 0.05?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>IV. Continuing calibration</b>				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all percent differences (%D) ≤ 25% and relative response factors (RRF) ≥ 0.05?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>V. Blanks</b>				
Was a method blank associated with every sample in this SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was a method blank analyzed for each matrix and concentration?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>VI. Surrogate spikes</b>				
Were all surrogate %R within QC limits?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>VII. Matrix spike/Matrix spike duplicates</b>				
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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Was a MS/MSD analyzed every 20 samples of each matrix?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>VIII. Laboratory control samples</b>				
Was an LCS analyzed for this SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

LDC #: 23 436 A2a  
 SDG #: See Cover

**VALIDATION FINDINGS CHECKLIST**

Page: 2 of 2  
 Reviewer: [Signature]  
 2nd Reviewer: [Signature]

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

# 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 #: 23436 A 29  
 SDG #: *San Jose*

**VALIDATION FINDINGS WORKSHEET**  
**Initial Calibration Calculation Verification**

Page: 1 of 1  
 Reviewer: *M4*  
 2nd Reviewer: *D*

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	Recalculated	Reported	Recalculated	Reported	Recalculated
				RRF (50 std)	RRF (50 std)	Average RRF (Initial)	Average RRF (Initial)	%RSD	%RSD
1	ICAL	4/20/2010	1,4-Dioxane (IS1)	0.5633	0.5633	0.5623	0.5623	3.9	3.88
	MSS K		Naphthalene (IS2)	1.0165	1.0165	0.9768	0.9768	12.1	12.09
			Fluorene (IS3)	1.3180	1.3180	1.2472	1.2472	11.8	11.84
			Hexachlorobenzene (IS4)	0.2487	0.2487	0.2372	0.2372	7.3	7.30
			Chrysene (IS5)	1.0840	1.0840	1.0536	1.0536	12.2	12.24
			Benzo(a)pyrene (IS6)	1.0986	1.0986	1.0351	1.0352	4.3	4.30

Inc IS/Cpd	Area cpd	Area IS
40/50	196298	278805
40/50	1372301	1080033
40/50	1066485	647354
40/50	352069	1132325
40/50	1779496	1313329
40/50	1859994	1354411

Conc	1,4-Dioxane	Naphthalene	Fluorene	Hexachlorob	Chrysene	Benzo(a)py
4.00	0.6098	1.1305	1.4155		1.2500	0.9983
10.00	0.5619	1.0760	1.3980	0.2566	1.1847	1.0322
20.00	0.5728	1.0779	1.3632	0.2532	1.1196	1.0866
<b>50.00</b>	<b>0.5633</b>	<b>1.0165</b>	<b>1.3180</b>	<b>0.2487</b>	<b>1.0840</b>	<b>1.0986</b>
80.00	0.5436	0.9602	1.2264	0.2394	1.0191	1.0452
120.00	0.5571	0.9039	1.1370	0.2323	0.9691	1.0322
160.00	0.5446	0.8412	1.0734	0.2198	0.9201	1.0281
200.00	0.5456	0.8082	1.0461	0.2107	0.8825	0.9600
X =	0.5623	0.9768	1.2472	0.2372	1.0536	1.0352
S =	0.0218	0.1181	0.1477	0.0173	0.1290	0.0445

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.

**VALIDATION FINDINGS WORKSHEET**  
**Continuing Calibration Results Verification**

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 =  $100 * (\text{ave. RRF} - \text{RRF}) / \text{ave. RRF}$   
 RRF =  $(Ax)(Cis) / (Ais)(Cx)$   
 Where:  
 ave. RRF = initial calibration average RRF  
 RRF = continuing calibration RRF  
 Ax = Area of compound      Ais = Area of associated internal standard  
 Cx = Concentration of compound      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	K2922	04/20/10	1,4-Dioxane (IS1)	0.5623	0.5223	0.5223	7.1	7.1
			Naphthalene (IS2)	0.9768	0.9507	0.9507	2.7	2.7
			Fluorene (IS3)	1.2472	1.2138	1.2138	2.7	2.7
			Hexachlorobenzene (IS4)	0.2372	0.2377	0.2377	0.2	0.2
			Chrysene (IS5)	1.0536	0.9852	0.9852	6.5	6.5
			Benzo(a)pyrene (IS6)	1.0351	1.0607	1.0607	2.5	2.5
2								

Compound (Reference IS)	CCV1		CCV2	
	Concentration (IS/Cpd)	Area Cpd	Area IS	Area IS
1,4-Dioxane (IS1)	40/80	328617	314591	
Naphthalene (IS2)	40/80	2342930	1232258	
Fluorene (IS3)	40/80	1842898	759171	
Hexachlorobenzene (IS4)	40/80	633836	1333067	
Chrysene (IS5)	40/80	3008940	1526995	
Benzo(a)pyrene (IS6)	40/80	3041867	1433844	

LDC #: 23436 A29  
 SDG #: See Cover

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

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

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

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

% Recovery:  $SF/SS * 100$

Where: SF = Surrogate Found  
 SS = Surrogate Spiked

Sample ID: # 1

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	100	87.2	87	87	0
2-Fluorobiphenyl	↓	84.1	84	84	↓
Terphenyl-d14	↓	91.9	92	92	↓
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					

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 =  $100 * \frac{LCSC - LCSDC}{LCSC + LCSDC}$       LCSC = Laboratory control sample concentration      LCSDC = Laboratory control sample duplicate concentration

LCS/LCSD samples: LCS 260 - 1504 / 2-A

Compound	Spike Added (45/15)		Spike Concentration (45/15)		LCS		LCSD		Percent Recovery		Percent Recovery		RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.	Reported	Recalc.		
Phenol														
N-Nitroso-di-n-propylamine														
4-Chloro-3-methylphenol														
Acenaphthene	2660	NA	2280	NA	86	86								
Pentachlorophenol														
Pyrene	2660		2590.4		98	97.4								

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.



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

**Project/Site Name:** Tronox LLC Facility, PCS, Henderson, Nevada

**Collection Date:** April 16, 2010

**LDC Report Date:** July 7, 2010

**Matrix:** Water

**Parameters:** Semivolatiles

**Validation Level:** Stage 2B

**Laboratory:** TestAmerica, Inc.

**Sample Delivery Group (SDG):** 280-2541-2

**Sample Identification**

EB-04152010-2RZD

## **Introduction**

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

This review follows the Standard Operating Procedures (SOP) 40, Data Review/Validation (BRC 2009), the Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada (June 2009), NDEP guidance (May 2006), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008).

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

- J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.
- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.
- UU 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.

Sample EB-04152010-2RZD was identified as an equipment blank. No semivolatile contaminants were found in this blank.

## VI. Surrogate Spikes

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

## VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there was insufficient sample volume for analysis of the matrix spike and matrix spike duplicate.

## 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

Raw data were not reviewed for this SDG.

## XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-2541-2	All compounds reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

## XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

## XIV. System Performance

Raw data were not reviewed for this SDG.

## **XV. Overall Assessment**

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

## **XVI. Field Duplicates**

No field duplicates were identified in this SDG.

**Tronox LLC Facility, PCS, Henderson, Nevada  
Semivolatiles - Data Qualification Summary - SDG 280-2541-2**

<b>SDG</b>	<b>Sample</b>	<b>Compound</b>	<b>Flag</b>	<b>A or P</b>	<b>Reason (Code)</b>
280-2541-2	EB-04152010-2RZD	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

**Tronox LLC Facility, PCS, Henderson, Nevada  
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-2541-2**

No Sample Data Qualified in this SDG

**Tronox LLC Facility, PCS, Henderson, Nevada  
Semivolatiles - Equipment Blank Data Qualification Summary - SDG 280-2541-2**

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

VALIDATION COMPLETENESS WORKSHEET

LDC #: 23436D2a  
 SDG #: 280-2541-2  
 Laboratory: Test America

Stage 2B

Date: 7/6/10  
 Page: 1 of 1  
 Reviewer: JVG  
 2nd Reviewer: JVG

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: 4/16/10
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	3 RSD 17
IV.	Continuing calibration/ICV	A	COV/ICV = 25%
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	Client spec Insufficient sample
VIII.	Laboratory control samples	A	ICS 10
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	ND	EB = 1

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

ND = No compounds detected  
 R = Rinsate  
 FB = Field blank

D = Duplicate  
 TB = Trip blank  
 EB = Equipment blank

Validated Samples: Water

1	EB-04152010-2RZD	11		21		31	
2	MB 280-11838/1-A	12		22		32	
3		13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

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

**Project/Site Name:** Tronox LLC Facility, PCS, Henderson, Nevada  
**Collection Date:** April 29, 2010  
**LDC Report Date:** July 6, 2010  
**Matrix:** Soil  
**Parameters:** Semivolatiles  
**Validation Level:** Stage 2B & 4  
**Laboratory:** TestAmerica, Inc.

**Sample Delivery Group (SDG):** 280-3059-9

**Sample Identification**

SSAO5-05-3BPC  
SSAO5-05-4BPC\*\*  
SSAO5-05-3BPCMS  
SSAO5-05-3BPCMSD

\*\*Indicates sample underwent Stage 4 review

## Introduction

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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.
- UU 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.

Sample FB-04072010-RZC (from SDG 280-2280-2) was identified as a field blank. No semivolatile contaminants were found in this blank.

## VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for sample SSAO5-05-4BPC\*\*. Since the samples were diluted out, no data were qualified.

## VII. Matrix Spike/Matrix Spike Duplicates

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

## VIII. Laboratory Control Samples (LCS)

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

Sample	Compound	Finding	Flag	A or P
SSAO5-05-3BPC	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

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-3059-9	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, Henderson, Nevada  
Semivolatiles - Data Qualification Summary - SDG 280-3059-9**

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-3059-9	SSAO5-05-3BPC	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)
280-3059-9	SSAO5-05-3BPC SSAO5-05-4BPC**	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

**Tronox LLC Facility, PCS, Henderson, Nevada  
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-3059-9**

No Sample Data Qualified in this SDG

**Tronox LLC Facility, PCS, Henderson, Nevada  
Semivolatiles - Field Blank Data Qualification Summary - SDG 280-3059-9**

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

VALIDATION COMPLETENESS WORKSHEET

LDC #: 23436E2a  
 SDG #: 280-3059-9  
 Laboratory: Test America

Stage 2B/4

Date: 7/29/10  
 Page: 1 of 1  
 Reviewer: JVC  
 2nd Reviewer: Q

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: 4/29/10
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	2 RSD r <sub>r</sub>
IV.	Continuing calibration/ICV	A	CV/ICV ≤ 25%
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	
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	N	
XVII.	Field blanks	ND	FB - FB04072010-R2C (SDG 280-2280-2)

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

Validated Samples:      S01\*\* Indicates sample underwent Stage 4 validation

1	SSAO5-05-3BPC	11	hb 280-15262/1-A	21		31	
2	SSAO5-05-4BPC**	12		22		32	
3	SSAO5-05-3BPCMS	13		23		33	
4	SSAO5-05-3BPCMSD	14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

LDC #: 27436 E9a  
 SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

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

Method: Semivolatiles (EPA SW 846 Method 8270C)

Validation Area	Yes	No	NA	Findings/Comments
<b>I. Technical holding times</b>				
All technical holding times were met.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Cooler temperature criteria was met.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>II. GC/MS Instrument performance check</b>				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all samples analyzed within the 12 hour clock criteria?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>III. Initial calibration</b>				
Did the laboratory perform a 5 point calibration prior to sample analysis?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was a curve fit used for evaluation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Did the initial calibration meet the curve fit acceptance criteria of $\geq 0.990$ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all percent relative standard deviations (%RSD) $\leq 30\%$ and relative response factors (RRF) $> 0.05$ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>IV. Continuing calibration</b>				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all percent differences (%D) $\leq 25\%$ and relative response factors (RRF) $\geq 0.05$ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>V. Blanks</b>				
Was a method blank associated with every sample in this SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was a method blank analyzed for each matrix and concentration?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>VI. Surrogate spikes</b>				
Were all surrogate %R within QC limits?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>VII. Matrix spike/Matrix spike duplicates</b>				
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.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was a MS/MSD analyzed every 20 samples of each matrix?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>VIII. Laboratory control samples</b>				
Was an LCS analyzed for this SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

LDC #: 23436 E3a  
 SDG #: See Cover

**VALIDATION FINDINGS CHECKLIST**

Page: 2 of 2  
 Reviewer: [Signature]  
 2nd Reviewer: [Signature]

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

# 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.









**VALIDATION FINDINGS WORKSHEET**  
**Initial Calibration Calculation Verification**

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:

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

$$\text{average RRF} = \text{sum of the RRFs} / \text{number of standards}$$

$$\%RSD = 100 * (S/X)$$

$$A_x = \text{Area of Compound}$$

$$C_x = \text{Concentration of compound}$$

$$S = \text{Standard deviation of the RRFs}$$

$$A_{is} = \text{Area of associated internal standard}$$

$$C_{is} = \text{Concentration of internal standard}$$

$$X = \text{Mean of the RRFs}$$

#	Standard ID	Calibration Date	Compound (Internal Standard)	Reported		Recalculated		Reported		Recalculated	
				RRF (50 std)	RRF (50 std)	Average RRF (Initial)	Average RRF (Initial)	%RSD	%RSD		
1	ICAL	5/12/2010	1,4-Dioxane (IS1)	0.5630	0.5630	0.5686	0.5686	2.7	2.7	2.68	2.68
	MSS K		Naphthalene (IS2)	1.0281	1.0281	1.0211	1.0211	6.6	6.6	6.60	6.60
			Fluorene (IS3)	1.3033	1.3033	1.2978	1.2978	7.0	7.0	6.96	6.96
			Hexachlorobenzene (IS4)	0.2320	0.2322	0.2313	0.2312	2.4	2.4	2.45	2.45
			Chrysene (IS5)	1.0597	1.0597	1.0588	1.0588	7.7	7.7	7.74	7.74
			Benzo(a)pyrene (IS6)	1.0950	1.0950	1.0629	1.0629	4.0	4.0	4.02	4.02

Inc IS/Cpd	Area cpd	Area IS
40/50	180207	256060
40/50	1276874	993578
40/50	950651	583548
40/50	283964	978167
40/50	1394199	1052500
40/50	1407224	1028084

Conc	1,4-Dioxane	Naphthalene	Fluorene	Hexachlorob	Chrysene	Benzo(a)py
4.00	0.5835	1.1259	1.4452		1.1823	0.9940
10.00	0.5929	1.0644	1.3682	0.2384	1.1293	1.0380
20.00	0.5646	1.0578	1.3466	0.2340	1.1090	1.0835
50.00	0.5630	1.0281	1.3033	0.2320	1.0597	1.0950
80.00	0.5874	1.0313	1.2950	0.2362	1.0775	1.1324
120.00	0.5574	1.0018	1.2565	0.2294	0.9858	1.0769
160.00	0.5566	0.9425	1.1967	0.2264	0.9750	1.0450
200.00	0.5559	0.9170	1.1712	0.2222	0.9515	1.0380
	0.5559					
X =	0.5686	1.0211	1.2978	0.2312	1.0588	1.0629
S =	0.0152	0.0673	0.0903	0.0057	0.0819	0.0427

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.

**VALIDATION FINDINGS WORKSHEET**  
**Continuing Calibration Results Verification**

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 =  $100 * (\text{ave. RRF} - \text{RRF}) / \text{ave. RRF}$   
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	K3872	05/18/10	1,4-Dioxane (IS1)	0.5700	0.5806	0.5806	1.9	1.9
			Naphthalene (IS2)	1.0211	1.0402	1.0402	1.9	1.9
			Fluorene (IS3)	1.2978	1.3277	1.3277	2.3	2.3
			Hexachlorobenzene (IS4)	0.2313	0.2302	0.2302	0.5	0.5
			Chrysene (IS5)	1.0588	1.0669	1.0669	0.8	0.8
			Benzo(a)pyrene (IS6)	1.0629	1.1392	1.1392	7.2	7.2
2	K3917	05/18/10						
			Hexachlorobenzene (IS4)	0.2313	0.2302	0.2302	0.5	0.5

CCV1			CCV2		
Compound (Reference IS)	Concentration (IS/Cpd)	Area Cpd	Area IS	Area Cpd	Area IS
1,4-Dioxane (IS1)	40/80	365341	314601		
Naphthalene (IS2)	40/80	2563410	1232195		
Fluorene (IS3)	40/80	1953157	735542		
Hexachlorobenzene (IS4)	40/80	569384	1236654	553547	1202559
Chrysene (IS5)	40/80	2723280	1276261		
Benzo(a)pyrene (IS6)	40/80	2629449	1154050		

LDC #: 23436E29  
 SDG #: Sre Cover

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

Page: 1 of 1  
 Reviewer: [Signature]  
 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: # 2 (1x)

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	100	49.2	49	49	0
2-Fluorobiphenyl	↓	60.0	60	60	↓
Terphenyl-d14	↓	66.1	66	66	↓
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					

**VALIDATION FINDINGS WORKSHEET**  
**Matrix Spike/Matrix Spike Duplicates Results Verification**

**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 SC = Sample concentration  
 SA = Spike added  
 RPD =  $|MSC - MSC| * 2 / (MSC + MSDC)$  MSC = Matrix spike concentration MSDC = Matrix spike duplicate concentration  
 MS/MSD samples: 3/4

Compound	Spike Added (ug/kg)		Sample Concentration (ug/kg)	Spiked Sample Concentration ( )		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD		MS	MSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol											
N-Nitroso-di-n-propylamine											
4-Chloro-3-methylphenol											
Acenaphthene	2960	3200	0	2196	2620	74	79	82	82	18	18
Pentachlorophenol											
Pyrene	2960	3200	200	2410	2760	74	75	80	80	14	14

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

LDC #: 23426 E 2a

VALIDATION FINDINGS WORKSHEET

Page: 1 of 1  
Reviewer: JVZ  
2nd Reviewer: P

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

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 =  $100 * (LCSC - LCSDC) / (LCSC + LCSDC)$  LCSC = Laboratory control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS/LCSD samples: LCS 280-15262/2-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	2660	NA	1980	NA	74	74				
Pentachlorophenol										
Pyrene	2660		2120		80	80				

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.





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

**Project/Site Name:** Tronox LLC Facility, PCS, Henderson, Nevada  
**Collection Date:** May 4, 2010  
**LDC Report Date:** July 6, 2010  
**Matrix:** Soil  
**Parameters:** Semivolatiles  
**Validation Level:** Stage 2B & 4  
**Laboratory:** TestAmerica, Inc.

**Sample Delivery Group (SDG):** 280-3197-6

**Sample Identification**

SSAM5-03-4BPC  
SSAM5-03-6BPC  
SSAM5-03-8BPC  
SSAM5-03-10BPC\*\*  
SSAM5-03-4BPCMS  
SSAM5-03-4BPCMSD

\*\*Indicates sample underwent Stage 4 review

## Introduction

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

This review follows the Standard Operating Procedures (SOP) 40, Data Review/Validation (BRC 2009), the Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada (June 2009), NDEP guidance (May 2006), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008).

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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.
- UU 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.

Sample FB-04132010-RIG2-RZE (from SDG 280-2400-2) was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB-04132010-RIG2-RZE	4/13/10	Bis(2-ethylhexyl)phthalate Di-n-octylphthalate	1.1 ug/L 1.6 ug/L	All samples in SDG 280-3197-6

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

## VI. Surrogate Spikes

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

## VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

## VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. 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 with the following exceptions:

Sample	Compound	Finding	Flag	A or P
SSAM5-03-6BPC SSAM5-03-8BPC SSAM5-03-10BPC**	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

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-3197-6	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, Henderson, Nevada  
Semivolatiles - Data Qualification Summary - SDG 280-3197-6**

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-3197-6	SSAM5-03-6BPC SSAM5-03-8BPC SSAM5-03-10BPC**	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)
280-3197-6	SSAM5-03-4BPC SSAM5-03-6BPC SSAM5-03-8BPC SSAM5-03-10BPC**	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

**Tronox LLC Facility, PCS, Henderson, Nevada  
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-3197-6**

No Sample Data Qualified in this SDG

**Tronox LLC Facility, PCS, Henderson, Nevada  
Semivolatiles - Field Blank Data Qualification Summary - SDG 280-3197-6**

No Sample Data Qualified in this SDG



**Tronox Northgate Henderson**  
**VALIDATION COMPLETENESS WORKSHEET**  
 Stage 2B/4

LDC #: 23436F2a  
 SDG #: 280-3197-6  
 Laboratory: Test America

Date: 7/6/10  
 Page: ( of )  
 Reviewer: [Signature]  
 2nd Reviewer: [Signature]

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 5/04/10
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	σ, KSD ✓
IV.	Continuing calibration/ICV	A	CV/AV ≤ 25%
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
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	N	
XVII.	Field blanks	SW	FB = FB-04152010-RIG2-RZE (280-2400-2)

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

Validated Samples: Soil \*\* Indicates sample underwent Stage 4 validation

1	SSAM5-03-4BPC	11	MD280-15018/1-A	21	31
2	SSAM5-03-6BPC	12		22	32
3	SSAM5-03-8BPC	13		23	33
4	SSAM5-03-10BPC**	14		24	34
5	SSAM5-03-4BPCMS	15		25	35
6	SSAM5-03-4BPCMSD	16		26	36
7		17		27	37
8		18		28	38
9		19		29	39
10		20		30	40

LDC #: 23 436 F2A  
 SDG #: See Cover

**VALIDATION FINDINGS CHECKLIST**

Page: 1 of 2  
 Reviewer: JG  
 2nd Reviewer: [Signature]

**Method: Semivolatiles (EPA SW 846 Method 8270C)**

Validation Area	Yes	No	NA	Findings/Comments
<b>I. Technical holding times</b>				
All technical holding times were met.				
Cooler temperature criteria was met.				
<b>II. GC/MS Instrument performance check</b>				
Were the DFTPP performance results reviewed and found to be within the specified criteria?				
Were all samples analyzed within the 12 hour clock criteria?				
<b>III. Initial calibration</b>				
Did the laboratory perform a 5 point calibration prior to sample analysis?				
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?				
Was a curve fit used for evaluation?				
Did the initial calibration meet the curve fit acceptance criteria of $> 0.990$ ?				
Were all percent relative standard deviations (%RSD) $\leq 30\%$ and relative response factors (RRF) $> 0.05$ ?				
<b>IV. Continuing calibration</b>				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?				
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?				
Were all percent differences (%D) $\leq 25\%$ and relative response factors (RRF) $\geq 0.05$ ?				
<b>V. Blanks</b>				
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.				
<b>VI. Surrogate spikes</b>				
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?				
<b>VII. Matrix spike/Matrix spike duplicates</b>				
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?				
<b>VIII. Laboratory control samples</b>				
Was an LCS analyzed for this SDG?				

LDC #: 03436 F 29  
 SDG #: See Cover

**VALIDATION FINDINGS CHECKLIST**

Page: 2 of 2  
 Reviewer: [Signature]  
 2nd Reviewer: [Signature]

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?				
<b>IX. Regional Quality Assurance and Quality Control</b>				
Were performance evaluation (PE) samples performed?				
Were the performance evaluation (PE) samples within the acceptance limits?				
<b>X. Internal standards</b>				
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?				
<b>XI. Target compound identification</b>				
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?				
<b>XII. Compound quantitation/CRQLs</b>				
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?				
<b>XIII. Tentatively identified compounds (TICs)</b>				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?				
Were relative intensities of the major ions within $\pm 20\%$ between the sample and the reference spectra?				
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?				
<b>XIV. System performance</b>				
System performance was found to be acceptable.				
<b>XV. Overall assessment of data</b>				
Overall assessment of data was found to be acceptable.				
<b>XVI. Field duplicates</b>				
Field duplicate pairs were identified in this SDG.				
Target compounds were detected in the field duplicates.				
<b>XVII. Field blanks</b>				
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 #: 23436 #204  
 SDG #: *da C...*

**VALIDATION FINDINGS WORKSHEET**  
**Initial Calibration Calculation Verification**

Page: 1 of 1  
 Reviewer: *[Signature]*  
 2nd Reviewer: *[Signature]*

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:

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

$$\text{average RRF} = \text{sum of the RRFs} / \text{number of standards}$$

$$\%RSD = 100 * (S/X)$$

$A_x$  = Area of Compound  
 $A_{is}$  = Area of associated internal standard  
 $C_x$  = Concentration of compound,  
 $C_{is}$  = Concentration of internal standard  
 $S$  = Standard deviation of the RRFs,  
 $X$  = Mean of the RRFs

#	Standard ID	Calibration Date	Compound (Internal Standard)	Reported		Recalculated		Reported		Recalculated	
				RRF (50 std)	Average RRF (Initial)	RRF (50 std)	Average RRF (Initial)	%RSD	Average RRF (Initial)	%RSD	Average RRF (Initial)
1	ICAL	5/17/2010	1,4-Dioxane (IS1)	0.5858	0.6981	0.5858	0.6981	13.4	0.6981	13.4	13.36
	MSS Y		Naphthalene (IS2)	1.0095	1.0394	1.0095	1.0394	2.7	1.0394	2.7	2.75
			Fluorene (IS3)	1.3686	1.4029	1.3686	1.4029	2.2	1.4029	2.2	2.20
			Hexachlorobenzene (IS4)	0.1973	0.2038	0.1973	0.2038	3.4	0.2038	3.4	3.40
			Chrysene (IS5)	1.0983	1.1019	1.0983	1.1019	5.2	1.1019	5.2	5.22
			Benzo(e)pyrene (IS6)	1.1920	1.1700	1.1920	1.1700	6.5	1.1700	6.5	6.50

Inc IS/Cpd	Area cpd	Area IS
40/50	185943	253936
40/50	1236178	979599
40/50	797054	465924
40/50	202044	819260
40/50	1161122	845794
40/50	1089572	731247

Conc	1,4-Dioxane	Naphthalene	Fluorene	Hexachlorob	Chrysene	Benzo(a)py
4.00		1.0967	1.4060		1.2054	1.0396
10.00	0.8159	1.0414	1.4052	0.1982	1.1123	1.0762
20.00	0.6727	1.0278	1.3506	0.1951	1.0706	1.1459
50.00	0.5858	1.0095	1.3686	0.1973	1.0983	1.1920
80.00	0.7642	1.0612	1.4468	0.2103	1.1544	1.2406
120.00	0.7371	1.0389	1.4126	0.2101	1.0751	1.2115
160.00	0.7438	1.0110	1.4032	0.2043	1.0837	1.2121
200.00	0.5675	1.0291	1.4302	0.2113	1.0151	1.2417
X =	0.6981	1.0395	1.4029	0.2038	1.1019	1.1700
S =	0.0932	0.0285	0.0309	0.0069	0.0575	0.0761

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.

**VALIDATION FINDINGS WORKSHEET**  
**Continuing Calibration Results Verification**

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:

Where:  
 $\% \text{ Difference} = 100 * (\text{ave. RRF} - \text{RRF}) / \text{ave. RRF}$   
 $\text{RRF} = (\text{Ax}) / (\text{Cis}) / (\text{Ais}) / (\text{Cx})$   
 ave. RRF = initial calibration average RRF  
 RRF = continuing calibration RRF  
 Ax = Area of compound      Ais = Area of associated internal standard  
 Cx = Concentration of compound      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	Y2435	05/17/10	1,4-Dioxane (IS1)	0.6981	0.7277	0.7277	4.2	4.2
			Naphthalene (IS2)	1.0394	1.0508	1.0508	1.1	1.1
			Fluorene (IS3)	1.4029	1.4728	1.4728	5.0	5.0
			Hexachlorobenzene (IS4)	0.2038	0.2109	0.2109	3.5	3.5
			Chrysene (IS5)	1.1019	1.1388	1.1388	3.4	3.4
			Benzo(a)pyrene (IS6)	1.1700	1.2924	1.2924	10.5	10.5

Compound (Reference IS)	Concentration (IS/Cpd)	Area Cpd	Area IS
1,4-Dioxane (IS1)	40/80	297217	204223
Naphthalene (IS2)	40/80	1685657	802046
Fluorene (IS3)	40/80	1374796	466718
Hexachlorobenzene (IS4)	40/80	348688	826697
Chrysene (IS5)	40/80	1983509	870843
Benzo(a)pyrene (IS6)	40/80	1860746	719859



LDC #: 23436 F29  
 SDG #: See Cover

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

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

**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

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	100	75.1	75	75	0
2-Fluorobiphenyl	↓	76.2	76	76	↓
Terphenyl-d14	↓	86.7	87	87	↓
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID:

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

Sample ID:

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

**VALIDATION FINDINGS WORKSHEET**  
**Matrix Spike/Matrix Spike Duplicates Results Verification**

**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:

$\% \text{ Recovery} = 100 * (\text{SSC} - \text{SC}) / \text{SA}$       Where:    SSC = Spiked sample concentration      SC = Sample concentration  
 $\text{RPD} = \frac{|\text{MSC} - \text{MSC}1 * 2 / (\text{MSC} + \text{MSDC})|}{\text{MSC} + \text{MSDC}} * 100$       MSC = Matrix spike concentration      MSDC = Matrix spike duplicate concentration  
 MS/MSD samples: 5/6

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	3160	2950	24	2440	2400	76	76	81	81	1	1.6
Pentachlorophenol											
Pyrene	3160	2950	79	2430	2540	81	81	83	83	4	3.5

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.





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

**Project/Site Name:** Tronox LLC Facility, PCS, Henderson, Nevada  
**Collection Date:** May 14, 2010  
**LDC Report Date:** July 6, 2010  
**Matrix:** Soil  
**Parameters:** Semivolatiles  
**Validation Level:** Stage 2B  
**Laboratory:** TestAmerica, Inc.  
**Sample Delivery Group (SDG):** 280-3584-1

**Sample Identification**

SSAK5-04-1BPC  
SSAK5-04-2BPC  
SSAK5-03-1BPC  
SSAK4-02-1BPC  
SSAK4-02-1BPCMS  
SSAK4-02-1BPCMSD

## Introduction

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

This review follows the Standard Operating Procedures (SOP) 40, Data Review/Validation (BRC 2009), the Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada (June 2009), NDEP guidance (May 2006), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008).

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

- J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.
- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.
- UU 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.

Sample FB-04072010-RZD (from SDG 280-2216-2) was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:



Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB-04072010-RZD	4/7/10	Bis(2-ethylhexyl)phthalate	2.2 ug/L	All samples in SDG 280-3584-1

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

## VI. Surrogate Spikes

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

## VII. Matrix Spike/Matrix Spike Duplicates

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

## VIII. Laboratory Control Samples (LCS)

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

## IX. Regional Quality Assurance and Quality Control

Not applicable.

## X. Internal Standards

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

## XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

## XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-3584-1	All compounds reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

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

Raw data were not reviewed for this SDG.

### **XIV. System Performance**

Raw data were not reviewed for this SDG.

### **XV. Overall Assessment**

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

### **XVI. Field Duplicates**

No field duplicates were identified in this SDG.

**Tronox LLC Facility, PCS, Henderson, Nevada  
Semivolatiles - Data Qualification Summary - SDG 280-3584-1**

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-3584-1	SSAK5-04-1BPC SSAK5-04-2BPC SSAK5-03-1BPC SSAK4-02-1BPC	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

**Tronox LLC Facility, PCS, Henderson, Nevada  
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-3584-1**

No Sample Data Qualified in this SDG

**Tronox LLC Facility, PCS, Henderson, Nevada  
Semivolatiles - Field Blank Data Qualification Summary - SDG 280-3584-1**

No Sample Data Qualified in this SDG

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

LDC #: 23436G2a  
SDG #: 280-3584-1  
Laboratory: Test America

Stage 2B

Date: 7/01/10  
Page: 1 of 1  
Reviewer: [Signature]  
2nd Reviewer: [Signature]

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

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

Validation Area			Comments
I.	Technical holding times	A	Sampling dates: 5/14/10
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	3 RSD r✓
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 25%
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	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	SW	FB = FB-04072010-RZD (from 280-2216-2)

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

ND = No compounds detected  
R = Rinsate  
FB = Field blank

D = Duplicate  
TB = Trip blank  
EB = Equipment blank

Validated Samples: Soil

1	SSAK5-04-1BPC	11	MB-280-16507/1-A	21		31	
2	SSAK5-04-2BPC	12		22		32	
3	SSAK5-03-1BPC	13		23		33	
4	SSAK4-02-1BPC	14		24		34	
5	SSAK4-02-1BPCMS	15		25		35	
6	SSAK4-02-1BPCMSD	16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

# VALIDATION FINDINGS WORKSHEET

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

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

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









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

**Project/Site Name:** Tronox LLC Facility, PCS, Henderson, Nevada  
**Collection Date:** May 18, 2010  
**LDC Report Date:** July 6, 2010  
**Matrix:** Water  
**Parameters:** Semivolatiles  
**Validation Level:** Stage 2B  
**Laboratory:** TestAmerica, Inc.

**Sample Delivery Group (SDG):** 280-3679-3

**Sample Identification**

EB-05182010-RZC

## Introduction

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

This review follows the Standard Operating Procedures (SOP) 40, Data Review/Validation (BRC 2009), the Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada (June 2009), NDEP guidance (May 2006), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (June 2008).

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

- J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.
- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.
- UU 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.

Sample EB-05182010-RZC was identified as an equipment blank. No semivolatile contaminants were found in this blank.

## VI. Surrogate Spikes

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

## VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there was insufficient sample volume for analysis of the matrix spike and matrix spike duplicate.

## VIII. Laboratory Control Samples (LCS)

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

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
LCS/D 280-16560/2-A/3-A (All samples in SDG 280-3679-3)	Pyridine	0 (24-120)	3 (24-120)	-	J- (all detects) R (all non-detects)	P

## IX. Regional Quality Assurance and Quality Control

Not applicable.

## X. Internal Standards

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

## XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

## XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-3679-3	All compounds reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

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

Raw data were not reviewed for this SDG.

### **XIV. System Performance**

Raw data were not reviewed for this SDG.

### **XV. Overall Assessment**

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

### **XVI. Field Duplicates**

No field duplicates were identified in this SDG.

**Tronox LLC Facility, PCS, Henderson, Nevada  
Semivolatiles - Data Qualification Summary - SDG 280-3679-3**

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-3679-3	EB-05182010-RZC	Pyridine	J- (all detects) R (all non-detects)	P	Laboratory control samples (%R) (I)
280-3679-3	EB-05182010-RZC	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

**Tronox LLC Facility, PCS, Henderson, Nevada  
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-3679-3**

No Sample Data Qualified in this SDG

**Tronox LLC Facility, PCS, Henderson, Nevada  
Semivolatiles - Equipment Blank Data Qualification Summary - SDG 280-3679-3**

No Sample Data Qualified in this SDG

**Tronox Northgate Henderson**  
**VALIDATION COMPLETENESS WORKSHEET**  
 Stage 2B

LDC #: 23436J2a  
 SDG #: 280-3679-3  
 Laboratory: Test America

Date: 7/01/10  
 Page: 1 of 1  
 Reviewer: [Signature]  
 2nd Reviewer: [Signature]

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: <u>5/18/10</u>
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	<u>2 RSD 17</u>
IV.	Continuing calibration/ICV	A	<u>CV/AV = 25%</u>
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	<u>Client spec Insufficient sample</u>
VIII.	Laboratory control samples	SW	<u>LCS 10</u>
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	ND	<u>EB = 1</u>

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

Validated Samples:

Water

1	EB-05182010-RZC	11		21		31	
2	<u>MB 280-16560/-A</u>	12		22		32	
3		13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	



# VALIDATION FINDINGS WORKSHEET

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

A. Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-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.



**Tronox LLC Facility, PCS, Henderson, Nevada  
Data Validation Reports  
LDC #23436**

**Metals**

**LD C**

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

**Project/Site Name:** Tronox LLC Facility, PCS, Henderson, Nevada  
**Collection Date:** April 13, 2010  
**LDC Report Date:** July 6, 2010  
**Matrix:** Soil  
**Parameters:** Arsenic  
**Validation Level:** Stage 4  
**Laboratory:** TestAmerica, Inc.  
**Sample Delivery Group (SDG):** 280-2400-10  
**Sample Identification**  
SA128-8BPC

## **Introduction**

This data review covers one soil sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 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) as there are no current guidelines for the method stated above.

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

Blanks are summarized in Section IV.

Field duplicates are summarized in Section XIV.

The following are definitions of the data qualifiers:

- J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.
- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.
- UU 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.

Sample FB-04132010-RIG2-RZE (from SDG 280-2400-2) was identified as a field 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**

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.

## **VII. Duplicate Sample Analysis**

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.

### 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 was not performed for this SDG.

### XII. Sample Result Verification and Project Quantitation Limit

All sample result verifications were acceptable.

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-2400-10	All analytes reported below the PQL.	J (all detects)	A

### XIII. Overall Assessment of Data

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

### XIV. Field Duplicates

No field duplicates were identified in this SDG.



**Tronox LLC Facility, PCS, Henderson, Nevada  
Arsenic - Data Qualification Summary - SDG 280-2400-10**

<b>SDG</b>	<b>Sample</b>	<b>Analyte</b>	<b>Flag</b>	<b>A or P</b>	<b>Reason (Code)</b>
280-2400-10	SA128-8BPC	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)

**Tronox LLC Facility, PCS, Henderson, Nevada  
Arsenic - Laboratory Blank Data Qualification Summary - SDG 280-2400-10**

No Sample Data Qualified in this SDG

**Tronox LLC Facility, PCS, Henderson, Nevada  
Arsenic - Field Blank Data Qualification Summary - SDG 280-2400-10**

No Sample Data Qualified in this SDG

LDC #: 23436B4  
 SDG #: 280-2400-10  
 Laboratory: Test America

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

Stage 4

Date: 6-28-10  
 Page: 1 of 1  
 Reviewer: CR  
 2nd Reviewer: [Signature]

**METHOD:** As (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: 4/13/10
II.	ICP/MS Tune	A	
III.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	N	Client specified
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	N	Not performed
XII.	Sample Result Verification	A	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	N	
XV.	Field Blanks	ND	FB = FB-04132010-RIG2-RZE (506x 280-2400-2)

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

Validated Samples: Soil

1	SA128-8BPC	11	PBS	21		31	
2		12		22		32	
3		13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

LDC #: 2343684  
 SDG #: see cover

**VALIDATION FINDINGS CHECKLIST**

Page: 1 of 2  
 Reviewer: RE  
 2nd Reviewer: W

**Method:Metals (EPA SW 846 Method 6010B/7000/6020)**

Validation Area	Yes	No	NA	Findings/Comments
<b>I. Technical holding times</b>				
All technical holding times were met.	/			
Cooler temperature criteria was met.	/			
<b>II. ICP/MS Tune</b>				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	/			
Were %RSD of isotopes in the tuning solution $\leq 5\%$ ?	/			
<b>III. Calibration</b>				
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 $> 0.995$ ?	/			
<b>IV. Blanks</b>				
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.		/		
<b>V. ICP Interference Check Sample</b>				
Were ICP interference check samples performed daily?	/			
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?	/			
<b>VI. Matrix spike/Matrix spike duplicates</b>				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.		/		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.		/		
Were the MS/MSD or duplicate relative percent differences (RPD) $\leq 20\%$ for waters and $\leq 35\%$ for soil samples? A control limit of $\pm RL$ ( $\pm 2X RL$ for soil) was used for samples that were $\leq 5X$ the RL, including when only one of the duplicate sample values were $\leq 5X$ the RL.		/		
<b>VII. Laboratory control samples</b>				
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 80-120% QC limits for water samples and laboratory established QC limits for soils?	/			

LDC #: 2343604  
 SDG #: See over

**VALIDATION FINDINGS CHECKLIST**

Page: 2 of 2  
 Reviewer: sr  
 2nd Reviewer: W

Validation Area	Yes	No	NA	Findings/Comments
<b>VIII. Furnace Atomic Absorption QC</b>				
If MSA was performed, was the correlation coefficients > 0.995?			/	
Do all applicable analyses 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?			/	
<b>IX. ICP Serial Dilution</b>				
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.			/	
<b>X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)</b>				
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?	/			
<b>XI. Regional Quality Assurance and Quality Control</b>				
Were performance evaluation (PE) samples performed?		/		
Were the performance evaluation (PE) samples within the acceptance limits?			/	
<b>XII. Sample Result Verification</b>				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	/			
<b>XIII. Overall assessment of data</b>				
Overall assessment of data was found to be acceptable.	/			
<b>XIV. Field duplicates</b>				
Field duplicate pairs were identified in this SDG.		/		
Target analytes were detected in the field duplicates.			/	
<b>XV. Field blanks</b>				
Field blanks were identified in this SDG.	/	/		
Target analytes were detected in the field blanks.		/		

LDC #: 2342604  
 SDG #: See cover

**VALIDATION FINDINGS WORKSHEET**  
**Initial and Continuing Calibration Calculation Verification**

Page: 1 of 1  
 Reviewer: GR  
 2nd Reviewer: W

**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:

$\%R = \frac{\text{Found} \times 100}{\text{True}}$  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		Reported		Acceptable (Y/N)
					%R		%R		
	ICP (Initial calibration)								
	GFAA (Initial calibration)								
	CVAA (Initial calibration)								
	ICP (Continuing calibration)								
	GFAA (Continuing calibration)								
	CVAA (Continuing calibration)								
ICV	ICPMS (Initial calibration)	As	40.5	46.0	101		101		Y
CCV (0.102)	ICPMS (Continuing calibration)	↓	56.7	56.0	101		101		Y

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

**VALIDATION FINDINGS WORKSHEET**  
**Level IV Recalculation Worksheet**

LDC #: 234360Y  
 SDG #: See cover

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

Percent recoveries (%R) for an ICP interference check sample, a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$$\%R = \frac{\text{Found} - \text{True}}{\text{True}} \times 100$$
 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) (mg/L)	True / D / SDR (units) (mg/L)	Recalculated		Acceptable (Y/N)
					%R / RPD / %D	%R / RPD / %D	
ICSAB	ICP interference check	As	104 mg/L	100 mg/L	104	104	Y
LCS	Laboratory control sample	↓	20.1	20	101	101	Y
	Matrix spike		(SSR-SR)				
	Duplicate						
	ICP serial dilution						

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.



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

**Project/Site Name:** Tronox LLC Facility, PCS, Henderson, Nevada  
**Collection Date:** April 15, 2010  
**LDC Report Date:** July 6, 2010  
**Matrix:** Soil  
**Parameters:** Arsenic  
**Validation Level:** Stage 2B & 4  
**Laboratory:** TestAmerica, Inc.  
**Sample Delivery Group (SDG):** 280-2500-9

**Sample Identification**

SA165-2BPC\*\*  
SA131-7BPC

\*\*Indicates sample underwent Stage 4 review



## Introduction

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

Blanks are summarized in Section IV.

Field duplicates are summarized in Section XIV.

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.
- UU 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.

Sample EB-04152010-RIG2-RZE (from SDG 280-2500-2) was identified as an equipment blank. No arsenic was found in this blank.

Sample FB-04132010-RIG2-RZE (from SDG 280-2400-2) was identified as a field 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**

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.

## **VII. Duplicate Sample Analysis**

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.

### **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 was not performed for this SDG.

### **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:

<b>Sample</b>	<b>Finding</b>	<b>Flag</b>	<b>A or P</b>
All samples in SDG 280-2500-9	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, Henderson, Nevada  
 Arsenic - Data Qualification Summary - SDG 280-2500-9**

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-2500-9	SA165-2BPC** SA131-7BPC	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)

**Tronox LLC Facility, PCS, Henderson, Nevada  
 Arsenic - Laboratory Blank Data Qualification Summary - SDG 280-2500-9**

No Sample Data Qualified in this SDG

**Tronox LLC Facility, PCS, Henderson, Nevada  
 Arsenic - Equipment Blank Data Qualification Summary - SDG 280-2500-9**

No Sample Data Qualified in this SDG

**Tronox LLC Facility, PCS, Henderson, Nevada  
 Arsenic - Field Blank Data Qualification Summary - SDG 280-2500-9**

No Sample Data Qualified in this SDG

LDC #: 23436  
24236C4  
 SDG #: 280-2500-9  
 Laboratory: Test America

Tronox Northgate Henderson  
**VALIDATION COMPLETENESS WORKSHEET**  
 Stage 2B/4

Date: 6-28-10  
 Page: 1 of 1  
 Reviewer: CR  
 2nd Reviewer: [Signature]

METHOD: As (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: 4/15/10
II.	ICP/MS Tune	A	
III.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	N	Client specified
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	N	Not performed
XII.	Sample Result Verification	A	Not reviewed for Stage 2B validation.
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	N	
XV.	Field Blanks	ND	FB = FB-04132010-RIGZ-RZE (SOBA 280-2400-2) EB = EB-04152010-RIGZ-RZE (SNOW 280-2500-2)

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

Validated Samples: \*\* Indicates sample underwent Stage 4 validation

1	SA165-2BPC**	11		21		31	
2	SA131-7BPC	12		22		32	
3		13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

LDC #: 23436  
 2423604  
 SDG #: see cover

**VALIDATION FINDINGS CHECKLIST**

Page: 1 of 2  
 Reviewer: GR  
 2nd Reviewer: [Signature]

**Method:Metals (EPA SW 846 Method 6010B/7000/6020)**

Validation Area	Yes	No	NA	Findings/Comments
<b>I. Technical holding times</b>				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
<b>II. ICP/MS Tune</b>				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	✓			
Were %RSD of isotopes in the tuning solution ≤5%?	✓			
<b>III. Calibration</b>				
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?	✓			
<b>IV. Blanks</b>				
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.		✓		
<b>V. ICP Interference Check Sample</b>				
Were ICP interference check samples performed daily?	✓			
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?	✓			
<b>VI. Matrix spike/Matrix spike duplicates</b>				
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.			✓	
<b>VII. Laboratory control samples</b>				
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 80-120% QC limits for water samples and laboratory established QC limits for soils?	✓			

LDC #: 23436  
 SDG #: 2422604  
see cover

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2  
 Reviewer: gr  
 2nd Reviewer: ✓

Validation Area	Yes	No	NA	Findings/Comments
<b>VIII. Furnace Atomic Absorption QC</b>				
If MSA was performed, was the correlation coefficients > 0.995?			✓	
Do all applicable analyses 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?			✓	
<b>IX. ICP Serial Dilution</b>				
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.			✓	
<b>X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)</b>				
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?	✓			
<b>XI. Regional Quality Assurance and Quality Control</b>				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
<b>XII. Sample Result Verification</b>				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
<b>XIII. Overall assessment of data</b>				
Overall assessment of data was found to be acceptable.	✓			
<b>XIV. Field duplicates</b>				
Field duplicate pairs were identified in this SDG.		✓		
Target analytes were detected in the field duplicates.			✓	
<b>XV. Field blanks</b>				
Field blanks were identified in this SDG.	✓			
Target analytes were detected in the field blanks.		✓		



LDC #: 23436C4  
 SDG #: see cover

**VALIDATION FINDINGS WORKSHEET**  
Initial and Continuing Calibration Calculation Verification

Page: 1 of 1  
 Reviewer: GR  
 2nd Reviewer: [Signature]

**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:

$\%R = \frac{\text{Found} \times 100}{\text{True}}$  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		Reported		Acceptable (Y/N)
					%R	%R	%R	%R	
	ICP (Initial calibration)								
	GFAA (Initial calibration)								
	CVAA (Initial calibration)								
	ICP (Continuing calibration)								
	GFAA (Continuing calibration)								
	CVAA (Continuing calibration)								
ICV	ICP/MS (Initial calibration)	As	40.5	40.0	101		101		Y
CCV(101)	ICP/MS (Continuing calibration)	↓	50.7	50.0	101		101		↓

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

**VALIDATION FINDINGS WORKSHEET**  
**Level IV Recalculation Worksheet**

LDC #: 23436C4  
 SDG #: See cover

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

Percent recoveries (%R) for an ICP interference check sample, a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$$\%R = \frac{\text{Found} \times 100}{\text{True}}$$
 Where, Found = Concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).  
 True = Concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$$RPD = \frac{|S-D|}{(S+D)/2} \times 100$$
 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		Acceptable (Y/N)
					%R / RPD / %D	%R / RPD / %D	
IES AB	ICP interference check	As	104 ug/L	100 ug/L	104	104	Y
LCS	Laboratory control sample	↓	20.1 mg/kg	20 mg/kg	101	101	Y
N	Matrix spike		(SSR-SR)				
N	Duplicate						
N	ICP serial dilution						

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.



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

**Project/Site Name:** Tronox LLC Facility, PCS, Henderson, Nevada

**Collection Date:** April 16, 2010

**LDC Report Date:** July 6, 2010

**Matrix:** Water

**Parameters:** Metals

**Validation Level:** Stage 2B

**Laboratory:** TestAmerica, Inc.

**Sample Delivery Group (SDG):** 280-2541-2

**Sample Identification**

EB-04152010-2-RZD

## Introduction

This data review covers one water sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 6020 for Metals. The metals analyzed were Arsenic, Cobalt, Lead, 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.

Blanks are summarized in Section IV.

Field duplicates are summarized in Section XIV.

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

The following are definitions of the data qualifiers:

- J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.
- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.
- UU 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
ICB/CCB	Cobalt	0.0237 ug/L	All samples in SDG 280-2541-2

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

Sample	Analyte	Reported Concentration	Modified Final Concentration
EB-04152010-2-RZD	Cobalt	0.13 ug/L	1.0U ug/L

Sample EB-04152010-2-RZD was identified as an equipment blank. No metal contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
EB-04152010-2-RZD	4/16/10	Lead Cobalt Manganese Magnesium	0.18 ug/L 0.13 ug/L 17 ug/L 66 ug/L	No associated samples 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

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.

## VII. Duplicate Sample Analysis

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.

## 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. 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 was not performed for this SDG.

## XII. Sample Result Verification and Project Quantitation Limit

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-2541-2	All analytes reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.



### **XIII. Overall Assessment of Data**

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

### **XIV. Field Duplicates**

No field duplicates were identified in this SDG.

**Tronox LLC Facility, PCS, Henderson, Nevada  
Metals - Data Qualification Summary - SDG 280-2541-2**

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-2541-2	EB-04152010-2-RZD	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)

**Tronox LLC Facility, PCS, Henderson, Nevada  
Metals - Laboratory Blank Data Qualification Summary - SDG 280-2541-2**

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
280-2541-2	EB-04152010-2-RZD	Cobalt	1.0U ug/L	A	bl

**Tronox LLC Facility, PCS, Henderson, Nevada  
Metals - Equipment Blank Data Qualification Summary - SDG 280-2541-2**

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

VALIDATION COMPLETENESS WORKSHEET

LDC #: 23436D4

SDG #: 280-2541-2

Laboratory: Test America

Stage 2B

Date: 6-26-10

Page: 1 of 1

Reviewer: OR

2nd Reviewer: W

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: 4/16/10
II.	ICP/MS Tune	A	
III.	Calibration	A	
IV.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	N	Client specified
VII.	Duplicate Sample Analysis	N	↓
VIII.	Laboratory Control Samples (LCS)	A	LCS/D
IX.	Internal Standard (ICP-MS)	A	
X.	Furnace Atomic Absorption QC	N	Not utilized
XI.	ICP Serial Dilution	N	Not performed
XII.	Sample Result Verification	N	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	N	
XV.	Field Blanks	SW	EB=1 (no associated samples)

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

ND = No compounds detected  
R = Rinsate  
FB = Field blank

D = Duplicate  
TB = Trip blank  
EB = Equipment blank

Validated Samples: water

1	EB-04152010- <del>2RZD</del> -R2D	11	PBW	21		31	
2		12		22		32	
3		13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



LDC #: 23-13604  
 SDG #: 580 cover

VALIDATION FINDINGS WORKSHEET  
 PB/ICB/CCB QUALIFIED SAMPLES

Reason: b1

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

METHOD: Trace Metals (EPA SW 846 Method 6010/7000)  
 Soil preparation factor applied: NA  
 Sample Concentration units, unless otherwise noted: ug/L Associate Samples: All

Analyte	Maximum PB* (mg/Kg)	Maximum PB* (ug/L)	Maximum ICB/CCB* (ug/L)	Blank Action Limit	Sample Identification
Al					
Sb					
As					
Ba					
Be					
Cd					
Ca					
Cr					
Cu			0.0237	0.13/1.0	
Fe					
Pb					
Mg					
Mn					
Hg					
Ni					
K					
Se					
Ag					
Na					
Tl					
V					
Zn					
B					
Mo					
Sr					

1

0.13/1.0

0.0237

Blank Action Limit

Maximum ICB/CCB\* (ug/L)

Maximum PB\* (ug/L)

Maximum PB\* (mg/Kg)

Sample Identification

Al Sb As Ba Be Cd Ca Cr Cu Fe Pb Mg Mn Hg Ni K Se Ag Na Tl V Zn B Mo Sr

1

0.13/1.0

0.0237

Blank Action Limit

Maximum ICB/CCB\* (ug/L)

Maximum PB\* (ug/L)

Maximum PB\* (mg/Kg)

Sample Identification

Al Sb As Ba Be Cd Ca Cr Cu Fe Pb Mg Mn Hg Ni K Se Ag Na Tl V Zn B Mo Sr

1

0.13/1.0

0.0237

Blank Action Limit

Maximum ICB/CCB\* (ug/L)

Maximum PB\* (ug/L)

Maximum PB\* (mg/Kg)

Sample Identification

Al Sb As Ba Be Cd Ca Cr Cu Fe Pb Mg Mn Hg Ni K Se Ag Na Tl V Zn B Mo Sr



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

**Project/Site Name:** Tronox LLC Facility, PCS, Henderson, Nevada

**Collection Date:** May 17, 2010

**LDC Report Date:** July 6, 2010

**Matrix:** Soil

**Parameters:** Arsenic

**Validation Level:** Stage 2B

**Laboratory:** TestAmerica, Inc.

**Sample Delivery Group (SDG):** 280-3624-1

**Sample Identification**

SSAM6-03-1BPC

SSAM6-03-5BPC

SSAM6-03-5BPCMS

SSAM6-03-5BPCMSD

## Introduction

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

Blanks are summarized in Section IV.

Field duplicates are summarized in Section XIV.

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



The following are definitions of the data qualifiers:

- J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.
- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.
- UU 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.

Sample FB-04072010-RZC (from SDG 280-2280-2) was identified as a field 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 analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-3624-1	All analytes reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

**XIII. Overall Assessment of Data**

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

**XIV. Field Duplicates**

No field duplicates were identified in this SDG.

**Tronox LLC Facility, PCS, Henderson, Nevada  
 Arsenic - Data Qualification Summary - SDG 280-3624-1**

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-3624-1	SSAM6-03-1BPC SSAM6-03-5BPC	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)

**Tronox LLC Facility, PCS, Henderson, Nevada  
 Arsenic - Laboratory Blank Data Qualification Summary - SDG 280-3624-1**

No Sample Data Qualified in this SDG

**Tronox LLC Facility, PCS, Henderson, Nevada  
 Arsenic - Field Blank Data Qualification Summary - SDG 280-3624-1**

No Sample Data Qualified in this SDG



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

**Project/Site Name:** Tronox LLC Facility, PCS, Henderson, Nevada  
**Collection Date:** May 18, 2010  
**LDC Report Date:** July 6, 2010  
**Matrix:** Soil  
**Parameters:** Arsenic  
**Validation Level:** Stage 2B & 4  
**Laboratory:** TestAmerica, Inc.  
**Sample Delivery Group (SDG):** 280-3679-1

**Sample Identification**

SSAM6-04-1BPC\*\*  
SSAM6-04-5BPC  
SSAJ2-03-1BPC  
SSAJ2-03-5BPC\*\*  
SSAM6-04-1BPCMS  
SSAM6-04-1BPCMSD

\*\*Indicates sample underwent Stage 4 review

## Introduction

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

Blanks are summarized in Section IV.

Field duplicates are summarized in Section XIV.

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.
- UU 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.

Sample EB-05182010-RZC (from SDG 280-3679-3) was identified as an equipment blank. No arsenic was found in this blank.

Samples FB-04072010-RZC (from SDG 280-2280-2) and FB-04072010-RZD (from SDG 280-2216-2) were identified as field blanks. No arsenic was found in these blanks.

## **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 280-3679-1	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, Henderson, Nevada  
 Arsenic - Data Qualification Summary - SDG 280-3679-1**

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-3679-1	SSAM6-04-1BPC** SSAM6-04-5BPC SSAJ2-03-1BPC SSAJ2-03-5BPC**	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)

**Tronox LLC Facility, PCS, Henderson, Nevada  
 Arsenic - Laboratory Blank Data Qualification Summary - SDG 280-3679-1**

No Sample Data Qualified in this SDG

**Tronox LLC Facility, PCS, Henderson, Nevada  
 Arsenic - Equipment Blank Data Qualification Summary - SDG 280-3679-1**

No Sample Data Qualified in this SDG

**Tronox LLC Facility, PCS, Henderson, Nevada  
 Arsenic - Field Blank Data Qualification Summary - SDG 280-3679-1**

No Sample Data Qualified in this SDG

LDC #: 2343614  
 SDG #: 280-3679-1  
 Laboratory: Test America

**Tronox Northgate Henderson**  
**VALIDATION COMPLETENESS WORKSHEET**  
 Stage 2B/4

Date: 6-29-10  
 Page: 1 of 1  
 Reviewer: QR  
 2nd Reviewer: W

**METHOD:** As (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: <u>5/18/10</u>
II.	ICP/MS Tune	A	
III.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	A	<u>MS/D</u>
VII.	Duplicate Sample Analysis	N	
VIII.	Laboratory Control Samples (LCS)	A	<u>LCS</u>
IX.	Internal Standard (ICP-MS)	A	
X.	Furnace Atomic Absorption QC	N	<u>No+utilized</u>
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	ND	<u>EB = EB-05182010-RZC, FB = FB-04072010-RZC,</u> <u>(280-3679-3)</u> <u>(280-2280-2)</u> <u>FB-04072010-RZD</u> <u>(280-2216-2)</u>

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

Validated Samples: \*\* Indicates sample underwent Stage 4 validation

Soil

1	SSAM6-04-1BPC**	11	<u>RBS</u>	21		31	
2	SSAM6-04-5BPC	12		22		32	
3	SSAJ2-03-1BPC	13		23		33	
4	SSAJ2-03-5BPC**	14		24		34	
5	SSAM6-04-1BPCMS	15		25		35	
6	SSAM6-04-1BPCMSD	16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

LDC #: 2343614  
 SDG #: see over

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2  
 Reviewer: GR  
 2nd Reviewer: [Signature]

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

Validation Area	Yes	No	NA	Findings/Comments
<b>I. Technical holding times</b>				
All technical holding times were met.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Cooler temperature criteria was met.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>II. ICP/MS Tune</b>				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were %RSD of isotopes in the tuning solution $\leq 5\%$ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>III. Calibration</b>				
Were all instruments calibrated daily, each set-up time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were the proper number of standards used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury) QC limits?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all initial calibration correlation coefficients $> 0.995$ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>IV. Blanks</b>				
Was a method blank associated with every sample in this SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>V. ICP Interference Check Sample</b>				
Were ICP interference check samples performed daily?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>VI. Matrix spike/Matrix spike duplicates</b>				
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.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
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.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were the MS/MSD or duplicate relative percent differences (RPD) $\leq 20\%$ for waters and $\leq 35\%$ for soil samples? A control limit of $\pm RL$ ( $\pm 2X RL$ for soil) was used for samples that were $\leq 5X$ the RL, including when only one of the duplicate sample values were $< 5X$ the RL.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>VII. Laboratory control samples</b>				
Was an LCS analyzed for this SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was an LCS analyzed per extraction batch?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
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?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

LDC #: 2343619  
 SDG #: see cover

**VALIDATION FINDINGS CHECKLIST**

Page: 2 of 2  
 Reviewer: gr  
 2nd Reviewer: [Signature]

Validation Area	Yes	No	NA	Findings/Comments
<b>VIII. Furnace Atomic Absorption QC</b>				
If MSA was performed, was the correlation coefficients > 0.995?			/	
Do all applicable analyses 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?			/	
<b>IX. ICP Serial Dilution</b>				
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.		/		
<b>X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)</b>				
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?	/			
<b>XI. Regional Quality Assurance and Quality Control</b>				
Were performance evaluation (PE) samples performed?		/		
Were the performance evaluation (PE) samples within the acceptance limits?			/	
<b>XII. Sample Result Verification</b>				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	/			
<b>XIII. Overall assessment of data</b>				
Overall assessment of data was found to be acceptable.	/			
<b>XIV. Field duplicates</b>				
Field duplicate pairs were identified in this SDG.		/		
Target analytes were detected in the field duplicates.			/	
<b>XV. Field blanks</b>				
Field blanks were identified in this SDG.	/			
Target analytes were detected in the field blanks.		/		

LDC #: 2343627  
 SDG #: secover

**VALIDATION FINDINGS WORKSHEET**  
**Initial and Continuing Calibration Calculation Verification**

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

**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:  

$$\%R = \frac{\text{Found} \times 100}{\text{True}}$$
 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		Reported		Acceptable (Y/N)
					%R		%R		
	ICP (Initial calibration)								
	GFAA (Initial calibration)								
	CVAA (Initial calibration)								
	ICP (Continuing calibration)								
	GFAA (Continuing calibration)								
	CVAA (Continuing calibration)								
ICV	ICPMS (Initial calibration)	AS	41.4	40.0	104		104		Y
CCV(2:13)	ICPMS (Continuing calibration)	↓	51.7	50.0	103		103		Y

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

LDC #: 2343613  
 SDG #: See cover

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

**VALIDATION FINDINGS WORKSHEET**  
**Level IV Recalculation Worksheet**

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

Percent recoveries (%R) for an ICP interference check sample, a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$$\%R = \frac{\text{Found} \times 100}{\text{True}} \quad \text{Where, Found} = \text{Concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found} = \text{SSR (spiked sample result)} - \text{SR (sample result).}$$

$$\text{True} = \text{Concentration of each analyte in the source.}$$

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$$\text{RPD} = \frac{|S-D|}{(S+D)/2} \times 100$$

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) mg/L	True / D / SDR (units) mg/L	Recalculated		Acceptable (Y/N)
					%R / RPD / %D	%R / RPD / %D	
ICS AB	ICP interference check	As	107 mg/L	100 mg/L	107	107	Y
LCS	Laboratory control sample		19.3	20	97	97	
S	Matrix spike		(SSR-SR) 21.6	21.2	102	102	
S/6	Duplicate		25.6	23.5	9	9	
1	ICP serial dilution	↓	4.0	4.42	<del>10</del> 9.6	9.4	↓

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.





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

**Project/Site Name:** Tronox LLC Facility, PCS, Henderson, Nevada

**Collection Date:** May 18, 2010

**LDC Report Date:** July 6, 2010

**Matrix:** Water

**Parameters:** Arsenic

**Validation Level:** Stage 2B

**Laboratory:** TestAmerica, Inc.

**Sample Delivery Group (SDG):** 280-3679-3

**Sample Identification**

EB-05182010-RZC

## **Introduction**

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

Blanks are summarized in Section IV.

Field duplicates are summarized in Section XIV.

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

The following are definitions of the data qualifiers:

- J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.
- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.
- UU 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.

Sample EB-05182010-RZC 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**

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.

## **VII. Duplicate Sample Analysis**

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.

### 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. 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 was not performed for this SDG.

### XII. Sample Result Verification and Project Quantitation Limit

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-3679-3	All analytes reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

### XIII. Overall Assessment of Data

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

### XIV. Field Duplicates

No field duplicates were identified in this SDG.

**Tronox LLC Facility, PCS, Henderson, Nevada  
Arsenic - Data Qualification Summary - SDG 280-3679-3**

<b>SDG</b>	<b>Sample</b>	<b>Analyte</b>	<b>Flag</b>	<b>A or P</b>	<b>Reason (Code)</b>
280-3679-3	EB-05182010-RZC	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)

**Tronox LLC Facility, PCS, Henderson, Nevada  
Arsenic - Laboratory Blank Data Qualification Summary - SDG 280-3679-3**

No Sample Data Qualified in this SDG

**Tronox LLC Facility, PCS, Henderson, Nevada  
Arsenic - Field Blank Data Qualification Summary - SDG 280-3679-3**

No Sample Data Qualified in this SDG

LDC #: 24236J4  
 SDG #: 280-3679-3  
 Laboratory: Test America

**Tronox Northgate Henderson**  
**VALIDATION COMPLETENESS WORKSHEET**  
 Stage 2B

Date: 6/29/10  
 Page: 1 of 1  
 Reviewer: [Signature]  
 2nd Reviewer: [Signature]

**METHOD:** As (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: <u>5/16/10</u>
II.	ICP/MS Tune	A	
III.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	N	Client specified
VII.	Duplicate Sample Analysis	N	↓
VIII.	Laboratory Control Samples (LCS)	A	LCS/D
IX.	Internal Standard (ICP-MS)	A	
X.	Furnace Atomic Absorption QC	N	Not utilized
XI.	ICP Serial Dilution	N	Not performed
XII.	Sample Result Verification	N	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	N	
XV.	Field Blanks	ND	EB=1 (no associated samples)

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

Validated Samples: water

1	EB-05182010-RZC	11	PPW	21		31	
2		12		22		32	
3		13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



**Tronox LLC Facility, PCS, Henderson, Nevada  
Data Validation Reports  
LDC #23436**

Perchlorate

**LDC**

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

**Project/Site Name:** Tronox LLC Facility, PCS, Henderson, Nevada  
**Collection Date:** April 16, 2010  
**LDC Report Date:** July 6, 2010  
**Matrix:** Soil  
**Parameters:** Perchlorate  
**Validation Level:** Stage 2B  
**Laboratory:** TestAmerica, Inc.

**Sample Delivery Group (SDG):** 280-2541-2

**Sample Identification**

SSAL5-05-2BPC  
SSAL5-05-4BPC  
SSAL5-05-6BPC  
SSAL5-05-8BPC  
SSAL5-05-10BPC

## Introduction

This data review covers 5 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.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG.

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 FB-04072010-RZD (from SDG 280-2216-2) was identified as a field 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 analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-2541-2	All analytes reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

**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, Henderson, Nevada  
 Perchlorate - Data Qualification Summary - SDG 280-2541-2**

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-2541-2	SSAL5-05-2BPC SSAL5-05-4BPC SSAL5-05-6BPC SSAL5-05-8BPC SSAL5-05-10BPC	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)

**Tronox LLC Facility, PCS, Henderson, Nevada  
 Perchlorate - Laboratory Blank Data Qualification Summary - SDG 280-2541-2**

No Sample Data Qualified in this SDG

**Tronox LLC Facility, PCS, Henderson, Nevada  
 Perchlorate - Equipment Blank Data Qualification Summary - SDG 280-2541-2**

No Sample Data Qualified in this SDG

**Tronox Northgate Henderson  
VALIDATION COMPLETENESS WORKSHEET**

LDC #: 23436D6  
SDG #: 280-2541-2  
Laboratory: Test America

Stage 2B

Date: 6-29-10  
Page: 1 of 1  
Reviewer: CR  
2nd Reviewer: W

**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: <u>4/16/10</u>
IIa.	Initial calibration	D	
IIb.	Calibration verification	D	
III.	Blanks	A	
IV.	Matrix Spike/Matrix Spike Duplicates	N	<u>Client specified</u>
V.	Duplicates	N	
VI.	Laboratory control samples	A	<u>LCS/D</u>
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X.	Field blanks	ND	<u>FB = FB-04072010-R2D</u> <u>(280-2216-2)</u>

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

Validated Samples: Soil

1	SSAL5-05-2BPC	11	<u>FB</u>	21		31	
2	SSAL5-05-4BPC	12		22		32	
3	SSAL5-05-6BPC	13		23		33	
4	SSAL5-05-8BPC	14		24		34	
5	SSAL5-05-10BPC	15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



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

**Project/Site Name:** Tronox LLC Facility, PCS, Henderson, Nevada  
**Collection Date:** May 17, 2010  
**LDC Report Date:** July 6, 2010  
**Matrix:** Soil  
**Parameters:** Perchlorate  
**Validation Level:** Stage 2B & 4  
**Laboratory:** TestAmerica, Inc.  
**Sample Delivery Group (SDG):** 280-3624-1

**Sample Identification**

SSAN5-02-1BPC  
SSAN5-02-5BPC\*\*  
SSAM6-02-1BPC  
SSAM6-02-5BPC  
SSAM6-03-1BPC  
SSAM6-03-5BPC  
SSAN5-02-1BPCMS  
SSAN5-02-1BPCMSD  
SSAN5-02-1BPCDUP

\*\*Indicates sample underwent Stage 4 review

## Introduction

This data review covers 9 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.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

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 FB-04072010-RZC (from SDG 280-2280-2) was identified as a field blank. No perchlorate was found in this blank.

## **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 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 280-3624-1	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

No field duplicates were identified in this SDG.

**Tronox LLC Facility, PCS, Henderson, Nevada  
 Perchlorate - Data Qualification Summary - SDG 280-3624-1**

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-3624-1	SSAN5-02-1BPC SSAN5-02-5BPC** SSAM6-02-1BPC SSAM6-02-5BPC SSAM6-03-1BPC SSAM6-03-5BPC	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)

**Tronox LLC Facility, PCS, Henderson, Nevada  
 Perchlorate - Laboratory Blank Data Qualification Summary - SDG 280-3624-1**

No Sample Data Qualified in this SDG

**Tronox LLC Facility, PCS, Henderson, Nevada  
 Perchlorate - Field Blank Data Qualification Summary - SDG 280-3624-1**

No Sample Data Qualified in this SDG

LDC #: 23436H6  
 SDG #: 280-3624-1  
 Laboratory: Test America

**Tronox Northgate Henderson**  
**VALIDATION COMPLETENESS WORKSHEET**  
 Stage 2B/4

Date: 6-29-10  
 Page: 1 of 1  
 Reviewer: CP  
 2nd Reviewer: W

**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: <u>5/17/10</u>
IIa.	Initial calibration	D	
IIb.	Calibration verification	A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	<u>MS/D</u>
V	Duplicates	A	<u>DUP</u>
VI.	Laboratory control samples	A	<u>LCS/D</u>
VII.	Sample result verification	A	Not reviewed for Stage 2B validation.
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X.	Field blanks	ND	<u>FB = FB-04072010-RZC</u> <u>(280-2280-2)</u>

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

Validated Samples: \*\* Indicates sample underwent Stage 4 validation

Soil

1	SSAN5-02-1BPC	11	<u>RBS</u>	21		31	
2	SSAN5-02-5BPC**	12		22		32	
3	SSAM6-02-1BPC	13		23		33	
4	SSAM6-02-5BPC	14		24		34	
5	SSAM6-03-1BPC	15		25		35	
6	SSAM6-03-5BPC	16		26		36	
7	SSAN5-02-1BPCMS	17		27		37	
8	SSAN5-02-1BPCMSD	18		28		38	
9	SSAN5-02-1BPCDUP	19		29		39	
10		20		30		40	

Notes: \_\_\_\_\_  
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LDC #: 2343646  
 SDG #: see cover

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2  
 Reviewer: CR  
 2nd Reviewer: W

Method: Inorganics (EPA Method See cover)

Validation Area	Yes	No	NA	Findings/Comments
<b>I. Technical holding times</b>				
All technical holding times were met.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Cooler temperature criteria was met.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>II. Calibration</b>				
Were all instruments calibrated daily, each set-up time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were the proper number of standards used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all initial calibration correlation coefficients > 0.995?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were titrant checks performed as required? (Level IV only)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Were balance checks performed as required? (Level IV only)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>III. Blanks</b>				
Was a method blank associated with every sample in this SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>IV. Matrix spike/Matrix spike duplicates and Duplicates</b>				
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.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
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.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
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.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>V. Laboratory control samples</b>				
Was an LCS analyzed for this SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was an LCS analyzed per extraction batch?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>VI. Regional Quality Assurance and Quality Control</b>				
Were performance evaluation (PE) samples performed?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Were the performance evaluation (PE) samples within the acceptance limits?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	



LDC #: 23436H6  
 SDG #: See cover

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2  
 Reviewer: [Signature]  
 2nd Reviewer: [Signature]

Validation Area	Yes	No	NA	Findings/Comments
<b>VII. Sample Result Verification</b>				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	/			
Were detection limits < RL?	/			
<b>VIII. Overall assessment of data</b>				
Overall assessment of data was found to be acceptable.	/			
<b>IX. Field duplicates</b>				
Field duplicate pairs were identified in this SDG.		/		
Target analytes were detected in the field duplicates.			/	
<b>X. Field blanks</b>				
Field blanks were identified in this SDG.	/			
Target analytes were detected in the field blanks.		/		

LDC #: 2343646  
 SDG #: SECOR

Validatin Findings Worksheet  
 Initial and Continuing Calibration Calculation Verification

Page: 1 of 1  
 Reviewer: [Signature]  
 2nd Reviewer: [Signature]

Method: Inorganics, Method 314.0

The correlation coefficient (r) for the calibration of ClO<sub>4</sub> was recalculated. Calibration date: 5/17/10

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R =  $\frac{\text{Found} \times 100}{\text{True}}$  Where, Found = concentration of each analyte measured in the analysis of the ICV or CCV solution  
 True = concentration of each analyte in the ICV or CCV source

Type of analysis	Analyte	Standard	Conc. (ug/l)	Area	Recalculated		Reported		Acceptable (Y/N)
					r	r <sup>2</sup>	r	r <sup>2</sup>	
Initial calibration	ClO <sub>4</sub>	s1	1	0.00137	0.999878	0.999700			Y
		s2	2.5	0.00562					
		s3	5	0.01434					
		s4	10	0.03176					
		s5	20	0.06198					
		s6	40	0.12605					
Calibration verification		ICV	20	Found (ug/L) 20.471	102	-			
Calibration verification		CCV	30	33.397	111	-			
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 #: 2343576  
 SDG #: Seecover

**VALIDATION FINDINGS WORKSHEET**  
**Level IV Recalculation Worksheet**

Page: 1 of 1  
 Reviewer: [Signature]  
 2nd Reviewer: [Signature]

METHOD: Inorganics, Method Seecover

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$$\%R = \frac{\text{Found}}{\text{True}} \times 100 \quad \text{Where, Found} = \text{concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found} = \text{SSR (spiked sample result) - SR (sample result)}$$

$$\text{True} = \text{concentration of each analyte in the source.}$$

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$$RPD = \frac{|S-D|}{(S+D)/2} \times 100 \quad \text{Where, S} = \text{Original sample concentration}$$

$$D = \text{Duplicate sample concentration}$$

Sample ID	Type of Analysis	Element	Found / S (analyte) - (mg/kg)	True / D (analyte) - (mg/kg)	Recalculated		Reported		Acceptable (Y/N)
					%R / RPD	%R / RPD			
65	Laboratory control sample	ClO4	0.103	0.0980	105	105	105	105	Y
7	Matrix spike sample	↓	(SSR-SR) 253	112	120	118	118	118	Y
9	Duplicate sample	↓	340	337	1	1	2	2	Y

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.



## Laboratory Data Consultants, Inc. Data Validation Report

**Project/Site Name:** Tronox LLC Facility, PCS, Henderson, Nevada  
**Collection Date:** May 18, 2010  
**LDC Report Date:** July 6, 2010  
**Matrix:** Soil  
**Parameters:** Perchlorate  
**Validation Level:** Stage 2B & 4  
**Laboratory:** TestAmerica, Inc.

**Sample Delivery Group (SDG):** 280-3679-1

### Sample Identification

SSAM6-04-1BPC\*\*  
SSAM6-04-5BPC  
SSAL6-01-1BPC  
SSAL6-01-5BPC  
SSAL6-02-1BPC  
SSAL6-02-5BPC  
SSAJ2-03-1BPC  
SSAJ2-03-5BPC\*\*  
SSAM6-04-1BPCMS  
SSAM6-04-1BPCMSD  
SSAM6-04-1BPCDUP

\*\*Indicates sample underwent Stage 4 review

## Introduction

This data review covers 11 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.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

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.
- UU 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-05182010-RZC (from SDG 280-3679-3) was identified as an equipment blank. No perchlorate was found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
EB-05182010-RZC	5/18/10	Perchlorate	3.3 ug/L	SSAM6-04-1BPC** SSAM6-04-5BPC

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

Samples FB-04072010-RZD (from SDG 280-2216-2) and FB-04072010-RZC (from SDG 280-2280-2) were identified as field blanks. No perchlorate was found in these blanks.

## 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 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 280-3679-1	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

No field duplicates were identified in this SDG.

**Tronox LLC Facility, PCS, Henderson, Nevada  
 Perchlorate - Data Qualification Summary - SDG 280-3679-1**

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-3679-1	SSAM6-04-1BPC** SSAM6-04-5BPC SSAL6-01-1BPC SSAL6-01-5BPC SSAL6-02-1BPC SSAL6-02-5BPC SSAJ2-03-1BPC SSAJ2-03-5BPC**	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)

**Tronox LLC Facility, PCS, Henderson, Nevada  
 Perchlorate - Laboratory Blank Data Qualification Summary - SDG 280-3679-1**

No Sample Data Qualified in this SDG

**Tronox LLC Facility, PCS, Henderson, Nevada  
 Perchlorate - Equipment Blank Data Qualification Summary - SDG 280-3679-1**

No Sample Data Qualified in this SDG

**Tronox LLC Facility, PCS, Henderson, Nevada  
 Perchlorate - Field Blank Data Qualification Summary - SDG 280-3679-1**

No Sample Data Qualified in this SDG

LDC #: 2343616  
 SDG #: 280-3679-1  
 Laboratory: Test America

**Tronox Northgate Henderson**  
**VALIDATION COMPLETENESS WORKSHEET**  
 Stage 2B/4

Date: 6-29-10  
 Page: 1 of 1  
 Reviewer: CR  
 2nd Reviewer: W

**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: 5/18/10
Ia.	Initial calibration	A	
Iib.	Calibration verification	A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	MS/D
V	Duplicates	A	DUP
VI.	Laboratory control samples	A	LCS/D
VII.	Sample result verification	A	Not reviewed for Stage 2B validation.
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X	Field blanks	SW	FB = FB-04072010-R2D, FB-04072010-R2C (280-2216-2) (280-2280-2) EB = EB-05182010-R2C (280-3679-3)

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

Validated Samples: \*\* Indicates sample underwent Stage 4 validation  
Soil

1	SSAM6-04-1BPC**	11	SSAM6-04-1BPCDUP	21	PBS	31	
2	SSAM6-04-5BPC	12		22		32	
3	SSAL6-01-1BPC	13		23		33	
4	SSAL6-01-5BPC	14		24		34	
5	SSAL6-02-1BPC	15		25		35	
6	SSAL6-02-5BPC	16		26		36	
7	SSAJ2-03-1BPC	17		27		37	
8	SSAJ2-03-5BPC**	18		28		38	
9	SSAM6-04-1BPCMS	19		29		39	
10	SSAM6-04-1BPCMSD	20		30		40	

Notes: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

LDC #: 2343614  
 SDG #: SEE COVER

VALIDATION FINDINGS CHECKLIST

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

Method: Inorganics (EPA Method See cover)

Validation Area	Yes	No	NA	Findings/Comments
<b>I. Technical holding times</b>				
All technical holding times were met.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Cooler temperature criteria was met.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>II. Calibration</b>				
Were all instruments calibrated daily, each set-up time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were the proper number of standards used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all initial calibration correlation coefficients > 0.995?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were titrant checks performed as required? (Level IV only)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Were balance checks performed as required? (Level IV only)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>III. Blanks</b>				
Was a method blank associated with every sample in this SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>IV. Matrix spike/Matrix spike duplicates and Duplicates</b>				
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.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
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.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
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.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>V. Laboratory control samples</b>				
Was an LCS analyzed for this SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was an LCS analyzed per extraction batch?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>VI. Regional Quality Assurance and Quality Control</b>				
Were performance evaluation (PE) samples performed?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Were the performance evaluation (PE) samples within the acceptance limits?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

LDC #: 2343614  
 SDG #: See case

**VALIDATION FINDINGS CHECKLIST**

Page: 2 of 2  
 Reviewer: [Signature]  
 2nd Reviewer: [Signature]

Validation Area	Yes	No	NA	Findings/Comments
<b>VII. Sample Result Verification</b>				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were detection limits < RL?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>VIII. Overall assessment of data</b>				
Overall assessment of data was found to be acceptable.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>IX. Field duplicates</b>				
Field duplicate pairs were identified in this SDG.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Target analytes were detected in the field duplicates.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>X. Field blanks</b>				
Field blanks were identified in this SDG.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Target analytes were detected in the field blanks.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	



LDC #: 2343614  
 SDG #: See case

**Validatin Findings Worksheet**  
**Initial and Continuing Calibration Calculation Verification**

Page: 1 of 1  
 Reviewer: CR  
 2nd Reviewer: W

Method: Inorganics, Method 314.0  
 The correlation coefficient (r) for the calibration of ClO<sub>2</sub> was recalculated. Calibration date: 5/17/10

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

$\%R = \frac{\text{Found} \times 100}{\text{True}}$  Where, Found = concentration of each analyte measured in the analysis of the ICV or CCV solution  
 True = concentration of each analyte in the ICV or CCV source

Type of analysis	Analyte	Standard	Conc. (ug/l)	Area	Recalculated		Reported	Acceptable (Y/N)
					r	r <sup>2</sup>		
Initial calibration	ClO <sub>2</sub>	s1	1	0.00138	0.999878	0.999699		Y
		s2	2.5	0.00562				
		s3	5	0.01434				
		s4	10	0.03176				
		s5	20	0.06198				
		s6	40	0.12605				
Calibration verification		ICV	20	Found (ug/l) 20.471	102	—	—	
Calibration verification		CCV	30	32.057	107	—	—	
Calibration verification		↓	10	10.612	106	—	—	Y

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

LDC #: 2343617  
 SDG #: Seecover

VALIDATION FINDINGS WORKSHEET  
 Level IV Recalculation Worksheet

Page: 1 of 1  
 Reviewer: [Signature]  
 2nd Reviewer: [Signature]

METHOD: Inorganics, Method Seecover

Percent recoveries (%R) for a laboratory control sample and a matrix spike sample were recalculated using the following formula:

$\%R = \frac{\text{Found}}{\text{True}} \times 100$  Where, Found = concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, True = Found = SSR (spiked sample result) - SR (sample result).  
 True = concentration of each analyte in the source.

A sample and duplicate relative percent difference (RPD) was recalculated using the following formula:

$RPD = \frac{|S-D|}{(S+D)/2} \times 100$  Where, S = Original sample concentration  
 D = Duplicate sample concentration

Sample ID	Type of Analysis	Element	Found / S (units) / (units)	True / D (units) / (units)	Recalculated		Reported %R / RPD	Acceptable (Y/N)
					%R	RPD		
LC5	Laboratory control sample	ClO4	103	99.3	104	104	104	Y
9	Matrix spike sample		(SSR-SR) 2390000	2100000	114	114	114	Y
11	Duplicate sample		3200000	3040000	5	5	5	Y

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.





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

**Project/Site Name:** Tronox LLC Facility, PCS, Henderson, Nevada  
**Collection Date:** May 18, 2010  
**LDC Report Date:** July 6, 2010  
**Matrix:** Water  
**Parameters:** Perchlorate  
**Validation Level:** Stage 2B  
**Laboratory:** TestAmerica, Inc.  
**Sample Delivery Group (SDG):** 280-3679-3

**Sample Identification**

EB-05182010-RZC  
EB-05182010-RZCMS  
EB-05182010-RZCMSD  
EB-05182010-RZCDUP

## Introduction

This data review covers 4 water 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.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Raw data were not reviewed for this SDG.

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.
- UU 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-05182010-RZC was identified as an equipment blank. No perchlorate was found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
EB-05182010-RZC	5/18/10	Perchlorate	3.3 ug/L	No associated samples 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 analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-3679-3	All analytes reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

## 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, Henderson, Nevada  
Perchlorate - Data Qualification Summary - SDG 280-3679-3**

<b>SDG</b>	<b>Sample</b>	<b>Analyte</b>	<b>Flag</b>	<b>A or P</b>	<b>Reason (Code)</b>
280-3679-3	EB-05182010-RZC	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)

**Tronox LLC Facility, PCS, Henderson, Nevada  
Perchlorate - Laboratory Blank Data Qualification Summary - SDG 280-3679-3**

No Sample Data Qualified in this SDG

**Tronox LLC Facility, PCS, Henderson, Nevada  
Perchlorate - Equipment Blank Data Qualification Summary - SDG 280-3679-3**

No Sample Data Qualified in this SDG

LDC #: 23436J6  
 SDG #: 280-3679-3  
 Laboratory: Test America

**Tronox Northgate Henderson**  
**VALIDATION COMPLETENESS WORKSHEET**  
 Stage 2B

Date: 6/29/10  
 Page: 1 of 1  
 Reviewer: [Signature]  
 2nd Reviewer: [Signature]

**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: <u>5/18/10</u>
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	<u>MS/D</u>
V	Duplicates	A	<u>Dup</u>
VI.	Laboratory control samples	A	<u>LCS/D</u>
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
X	Field blanks	SW	<u>EB=1 (no associated samples)</u>

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

Validated Samples: water

1	EB-05182010-RZC	11	<u>PBW</u>	21		31	
2	EB-05182010-RZCMS	12		22		32	
3	EB-05182010-RZCMSD	13		23		33	
4	EB-05182010-RZCDUP	14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



23136

LDC #: 24236J6

SDG #: See Cover

# VALIDATION FINDINGS WORKSHEET

## Field Blanks

Page: 1 of 1

Reviewer: OR

2nd Reviewer: W

METHOD: Inorganics, EPA Method See Cover

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

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

Blank units: ug/L Associated sample units: mg/Kg

Sampling date: 5/18/10 Soil factor applied 10X

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

Reason Code: be

Associated Samples: No associated samples

Analyte	Blank ID	Action Limit	Sample Identification			
	1					
C104	3.3	0.33				