

LABORATORY DATA CONSULTANTS, INC.

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

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

<u>SDG #</u>

Fraction

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

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LDC #: <u>23436</u> SDG #:<u>280-2131-7, 280-2400-10, 280-2500-9, 280-2541-2</u> <u>280-3059-9, 280-3197-6, 280-3584-1, 280-3624-1</u> <u>280-3679-1, 280-3679-3</u>

Tronox Northgate Henderson Worksheet

EDD Area	Yes	No	NA	Findings/Comments
I. Completeness				
Is there an EDD for the associated Tronox validation report?	x			
II. EDD Qualifier Population				
Were all qualifiers from the validation report populated into the EDD?	x			
III. EDD Lab Anomalies				
Were EDD anomalies identified?		Х		
If yes, were they corrected or documented for the client?			x	See EDD_discrepancy_ form_LDC23436_070710.doc
IV. EDD Delivery				
Was the final EDD sent to the client?	x			

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

Semivolatiles

LDC Report# 23436A2a

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for all compounds.

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

Average relative response factors (RRF) for all compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs) and 25.0% for all other compounds.

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

All of the continuing calibration relative response factors (RRF) were within method and validation criteria.

V. Blanks

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

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

SDG	Sample	Compound	Flag	A or P	Reason (Code)
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

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Stage 4

SDG #: <u>280-2131-7</u> Laboratory: <u>Test America</u>

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LDC #:

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2nd Reviewer:

Date: 7/02/10

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

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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
	Technical holding times	A	Sampling dates: 4/06 /10
.	GC/MS Instrument performance check	A	
111.	Initial calibration	A	2 KSD VY
IV.	Continuing calibration/ICV	A	carhar = 25 b
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	client spec
VIII.	Laboratory control samples	A	us
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	Á	
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->)

Note:

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

Soil

ND = No compounds detected R = Rinsate FB = Field blank D = Duplicate TB = Trip blank EB = Equipment blank

Validated Samples:

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1	SSAJ8-01-10BPC	11	21	31
2	MB 280- 11504 /-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

23 \$36 Azq LDC #: SDG #: See

VALIDATION FINDINGS CHECKLIST



Method: Semivolatiles (EPA SW 846 Method 8270C)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times			14 13 S	
All technical holding times were met.	-			
Cooler temperature criteria was met.				
II: GC/MS Instrument performance check	1		i i i I	
Were the DFTPP performance results reviewed and found to be within the specified criteria?				
Were all samples analyzed within the 12 hour clock criteria?				
III. Initial calibration			1	
Did the laboratory perform a 5 point calibration prior to sample analysis?		[
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	/			
Was a curve fit used for evaluation?				
Did the initial calibration meet the curve fit acceptance criteria of \geq 0.990?				
Were all percent relative standard deviations (%RSD) \leq 30% and relative response factors (RRF) \geq 0.05?				
IV. Continuing calibration	T	T.		
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?		r		
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 0.052				
V. Blanks				
Was a method blank associated with every sample in this SDG?	/			
Was a method blank analyzed for each matrix and concentration?	-			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		/		
VI. Surrogate spikes				
Were all surrogate %R within QC limits?	-			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?				
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?				
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.				
Was a MS/MSD analyzed every 20 samples of each matrix?		\leq		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			-	
VIII. Laboratory control samples		2		
Was an LCS analyzed for this SDG?				

SVOA-SW_2.wpd version 2.0

LDC #: 33 436 Aza SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?		<u>]</u> .		
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	<			
IX Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		<u> </u>	Ĺ	
Were the performance evaluation (PE) samples within the acceptance limits?				F
X. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?		'		
Were retention times within + 30 seconds from the associated calibration standard?				
XI. Target compound identification	-	14		
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	\Box	<u> </u>		
Did compound spectra meet specified EPA "Functional Guidelines" criteria?				
Were chromatogram peaks verified and accounted for?	\Box	\Box'		
XII. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	<			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?		F		
XIII. Tentatively identified compounds (TICs)				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?				
Were relative intensities of the major ions within <u>+</u> 20% between the sample and the reference spectra?				
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?				
XIV. System performance		<u> </u>		
System performance was found to be acceptable.				
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.				
XVI. Field duplicates				
Field duplicate pairs were identified in this SDG.		1	~	
Farget compounds were detected in the field duplicates.			7	
KVII. Field blanks				
Field blanks were identified in this SDG.	\leq			
Farget compounds were detected in the field blanks.	\overline{X}			

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	ll. 4-Nitrophenol*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenoi**	KK. 2,4-Dinitrotoluene	ZZ. Pyrane	000. 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	00. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	111.
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	nnn
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	ww.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	www.

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

COMPNDL

METHOD: GGNS BNA (EPA SW 446 Method 82/00) ZM NAL, were tried banks? ZM NAL, were tried banks for this SDS? Were tried banks? ZM NAL, were tried banks? Were tried banks? Sampla date: 4.0.10.10.10.10.10.10.10.10.10.10.10.10.1	LDC #: 73 436 A29 SDG #: 24 (1-1-1)		VALIDATIC	IN FINDINGS WORKSH Field Blanks	łEET		Page: of / Reviewer: <u>3V6</u>
Field blank type: (circle one) Field Blank blank type: (circle one) Field Blank blank to blank type: (circle one) Field Blank blank to blan	METHOD: GC/MS BNA (EP, Y/N N/A Were field bl X/N N/A Were target Blank units: 4, // Asso Samoling date: 4 / // //	A SW 846 Me anks identifie compounds d ociated samp	ethod 8270C) ed in this SDG? letected in the field blanks? vie units: <u>vs</u> <u>/ks</u>			(2nd Reviewer.
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5x Phthalates 2x All others

LDC #: ->3456 # 29 SDG #:

VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

2 / of C Page: 2nd Reviewer: Reviewer:

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

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

$RRF = (A_x)(C_s)/(A_s)(C_x)$
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,

 $\label{eq:A_s} A_{s} = \mbox{Area of associated internal standard} \\ C_{s} = \mbox{Concentration of internal standard} \\ X = \mbox{Mean of the RRFs} \\ \end{array}$

					Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration			RRF	RRF	Average RRF	Average RRF	%RSD	%RSD
#	Standard ID	Date	Compound (Internal Stands	ard)	(50 std)	(50 std)	(Initial)	(Initial)		
1	ICAL	4/20/2010	1,4-Dioxane (I	(IS1)	0.5633	0.5633	0.5623	0.5623	3.9	3.88
	MSS K		Naphthalene (I	(IS2)	1.0165	1.0165	0.9768	0.9768	12.1	12.09
			Fluorene (I	(IS3)	1.3180	1.3180	1.2472	1.2472	11.8	11.84
			Hexachlorobenzene (I	IS4)	0.2487	0.2487	0.2372	0.2372	7.3	7.30
			Chrysene (I	S5)	1.0840	1.0840	1.0536	1.0536	12.2	12.24
			Benzo(a)pyrene (I	S6)	1.0986	1.0986	1.0351	1.0352	4.3	4.30

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

-						
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
50.00	0.5633	1.0165	1.3180	0.2487	1.0840	1.0986
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
×	0.5623	0.9768	1.2472	0.2372	1.0536	1.0352
S N	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.

LDC # 29 4 36 A200 SDG # <u>See Cover</u>

VALIDATION FINDINGS WORSHEET Continuing Calibration Results Verification

2 of Page_ Reviewer: 2nd Reviewer.

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:

erence = 100 * (ave. RRF - RRF)/ave. RRF	= (Ax)(Cis)/(Ais)(Cx)
% Differenc	RRF = (Ax)

Where: ave. RRF = initial calibration average RRF RRF = continuing calibration RRF Ax = Area of compound Ais =

 Ax = Area of compound
 Ais = Area of associated internal standard

 Cx = Concentration of compound
 Cis = Concentration of internal standard

		Calibration			Average RRF	Reported	Recalculated	Reported	Recalculated
#	Standard ID	Date	Compound (Reference	IS)	(Initial RRF)	(CC RRF)	CC RRF)	۲. ۲.	%D
1	K2922	04/20/10	1,4-Dioxane	(IS1)	0.5623	0.5223	0.5223	7.1	1.1
			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	(185)	1.0536	0.9852	0.9852	6.5	6.5
			Benzo(a)pyrene	(186)	1.0351	1.0607	1.0607	2.5	2.5
2									

		ccV1		ccV2		
Compound (Reference IS)		Concentration	Area Cpd	Area IS	Area Cpd	Area IS
		(IS/Cpd)				
1,4-Dioxane	(IS1)	40/80	328617	314591		
Naphthalene	(IS2)	40/80	2342930	1232258		
Fluorene	(IS3)	40/80	1842898	759171		
Hexachlorobenzene	(IS4)	40/80	928269	1333067		
Chrysene	(IS5)	40/80	3008940	1526995		
Benzo(a)pyrene	(186)	40/80	3041867	1433844		

LDC #:	~	3436 Aza
SDG #:_	Sre	Cover

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:	<u>lof_1</u>
Reviewer:	JY
2nd reviewer:	QV/

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

Sample ID:

#

Where: SF = Surrogate Found SS = Surrogate Spiked

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	100	87.2	87	87	
2-Fluorobiphenyl		841	84	84	
Terphenyl-d14		91 9	ar	a v	
Phenol-d5		/			
2-Fluoropheno!					
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
				·····
	Surrogate Spiked	Surrogate Spiked Surrogate Found	Surrogate Spiked Surrogate Found Percent Recovery Reported	Surrogate Spiked Surrogate Found Percent Recovery Reported Percent Recovery Recalculated Image: Surrogate Found Image: Surrogate Recovery Recovery Reported Image: Surrogate Recovery Recover

	Laborator
\$ 36 A 2A	Cover
LDC #: ~3	SDG #: See

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

Page: <u>lof 1</u> Reviewer: <u>NC</u> 2nd Reviewer: <u>O</u>

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

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

% Recovery = 100 * (SC/SA Where: SSC = Spike concentration SA = Spike added

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

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

LCS/LCSD samples: LCS 260 - 11504 &-A

	Ś	vike	l ¹ S	vike		S		sn		G
Compound	Sh)	lded AG)	Conce (4 ₅	ntration	Percent	Recovery	Percent	Recovery	ā	
	l CS		8 <u>0</u> -			-		(m.m.		
						Kecalc	Keported	Recalc	Reported	Recalculated
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenal										
Acenaphthene	2660	₩	2260	A.A.	86	86				
Pentachlorophenol						2			N.	
Pyrene	2660		2596.4		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. LDC #: 73 436 AZA SDG #: Sre Cover

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	of
Reviewer:	M
2nd reviewer:	

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

YN N/A YN N/A

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

Conc	entratic	$n = (A_{,})(I_{,})(V_{,})(DF)(2.0) - (A_{,})(RRF)(V_{,})(V_{,})(%S)$	Example:
A _x	=	Area of the characteristic ion (EICP) for the compound to be measured	Sample I.D. <u>+</u> ,
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard	
l _s	=	Amount of internal standard added in nanograms (ng)	$Conc. = \frac{(2/3 \ 884)(4D)(1A)(1N)}{(2A)(2A)(2A)(2A)(2A)}$
V。	=	Volume or weight of sample extract in milliliters (ml) or grams (g).	(119 2145 0,237 7 3). 29 10. 926 1
V,	=	Volume of extract injected in microliters (ul)	= 10 47.2
V _t	=	Volume of the concentrated extract in microliters (ul)	,
Df	=	Dilution Factor.	~ 1000 mg/kg
%S	=	Percent solids, applicable to soil and solid matrices only.	ě ř ř
20	=	Factor of 2 to account for GPC cleanup	

			Reported Concentration	Calculated Concentration	Our life of a
#	Sample ID	Compound			Qualification
					·····
	3 				

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: Tronox LL

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for all compounds.

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

Average relative response factors (RRF) for all compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs) and 25.0% for all other compounds.

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

All of the continuing calibration relative response factors (RRF) were within method and validation criteria.

V. Blanks

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

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

SDG	Sample	Compound	Flag	A or P	Reason (Code)
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					
Stage 2B					

SDG #: 280-2541-2 Laboratory: Test America

LDC #: 23436D2a

Date: 7/61/10 Page: lof / Reviewer: NG 2nd Reviewer:

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

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

	Validation Area		Comments		
<u>і.</u>	Technical holding times	A	Sampling dates: 4 /6 /10		
,	GC/MS Instrument performance check	A			
.	Initial calibration	A	3 RSD 17		
IV.	Continuing calibration/ICV	A	cov/icv = 25		
V.	Blanks	А			
VI.	Surrogate spikes	A			
VII.	Matrix spike/Matrix spike duplicates	N	Ctient spec Insufficient sample		
VIII.	Laboratory control samples	A	KS /J		
IX.	Regional Quality Assurance and Quality Control	N			
Χ.	Internal standards	A			
XI.	Target compound identification	N			
XII.	Compound quantitation/CRQLs	N			
XIII	Tentatively identified compounds (TICs)	N			
XIV.	System performance	N			
XV.	Overall assessment of data	A			
XVI.	Field duplicates	N			
XVIL	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:

Wates

1	EB-04152010-2RZD	11	21	31
2	MB 280-11 838/1-A	12	22	32
3	1	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 Report# 23436E2a

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for all compounds.

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

Average relative response factors (RRF) for all compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs) and 25.0% for all other compounds.

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

All of the continuing calibration relative response factors (RRF) were within method and validation criteria.

V. Blanks

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

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 SSA05-05-4BPC**. 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)	Ρ

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)	Ρ	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
Stage 2B/4

SDG #: <u>280-3059-9</u> Laboratory: <u>Test America</u>

LDC #: 23436E2a

Date: 7/62/10 Page: _lof _l Reviewer: _____ 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
1.	Technical holding times	A	Sampling dates: 4/29 /ro
П.	GC/MS Instrument performance check	A	
111.	Initial calibration	A	2 RSD rr
IV.	Continuing calibration/ICV	A	ca/ia = 25b
V.	Blanks	Á	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	us
IX.	Regional Quality Assurance and Quality Control	N	
Χ.	Internal standards	A	
X1.	Target compound identification	À	Not reviewed for Stage 2B validation.
XII.	Compound quantitation/CRQLs	ŚŴ	Not reviewed for Stage 2B validation.
XIII.	Tentatively identified compounds (TICs)	X	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-RZC (SD6-20-2280-2)

Note:

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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	SSAO5-05-3BPC	11	MB 280-15262/1-A	21	31	
4 ×	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	

Method: Semivolatiles (EPA SW 846 Method 8270C)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times		<u> </u>		
All technical holding times were met.	5	1		
Cooler temperature criteria was met.	<u> </u>			
II. GC/MS Instrument performance check				Taus Anno 1977 - Constantino de Constantino de Constantino de Constantino de Constantino de Constantino de Const Terresta de Constantino de Constantino de Constantino de Constantino de Constantino de Constantino de Constantin
Were the DFTPP performance results reviewed and found to be within the specified criteria?				
Were all samples analyzed within the 12 hour clock criteria?				
III. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	\leq	1	<u> </u>	· · · · · · · · · · · · · · · · · · ·
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	<	<u> </u>		
Was a curve fit used for evaluation?				
Did the initial calibration meet the curve fit acceptance criteria of \geq 0.990?		ļ	 	
Were all percent relative standard deviations (%RSD) \leq 30% and relative response factors (RRF) \geq 0.05?				
IV. Continuing calibration		1		
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?		<u> </u>		
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	/			
Were all percent differences (%D) \leq 25% and relative response factors (RRF) \geq 0.05?				
V. Blanks				
Was a method blank associated with every sample in this SDG?				
Was a method blank analyzed for each matrix and concentration?				
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		/		
VI. Surrogate spikes				
Were all surrogate %R within QC limits?				
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?		/		
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?				
VII. Matrix spike/Matrix spike duplicates			- 1	
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.				
Was a MS/MSD analyzed every 20 samples of each matrix?				
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		/		
VIII. Laboratory control samples	7			
Was an LCS analyzed for this SDG?	_			

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Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?			ļ	
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		ł		
IX. Regional Quality Assurance and Quality Control			1	
Were performance evaluation (PE) samples performed?		<		
Were the performance evaluation (PE) samples within the acceptance limits?				
X. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	<			
Were retention times within + 30 seconds from the associated calibration standard?				
XI. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	(
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	\langle			
Were chromatogram peaks verified and accounted for?				
XII. Compound quantitation/CRQLs			- 1	
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	\langle	-		
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?				
XIII. Tentatively identified compounds (TICs)		3. j		
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?			7	
Were relative intensities of the major ions within \pm 20% between the sample and the reference spectra?			7	-
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?			-	
XIV. System performance				
System performance was found to be acceptable.	1			
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.	7			
XVI: Field duplicates				
Field duplicate pairs were identified in this SDG.		7	·	
Target compounds were detected in the field duplicates.				-
VII. Field blanks		I.,	~	
Field blanks were identified in this SDG.	$\overline{\Lambda}$	Ţ		
Farget compounds were detected in the field blanks.		Ź		

VALIDATION FINDINGS WORKSHEET

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

A Phenol**				
	r. pis(z⊷citioroetnoxy)metnane	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	ll. 4-Nitrophenol*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropy))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	000. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP. Benzoic Acid
l. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyi alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	00. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	111.
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	nnu
N. 2-Nitrophenoj**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	ww.
0. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	www.

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

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VALIDATION FINDINGS WORKSHEET Surrogate Recovery



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

Please see qualification below for all questions answered "N". Not applicable questions are identified as "N/A". <u>Y (N)N/A</u> Were percent recoveries (%R) for surrogates within QC limits? <u>Y N/A</u> If 2 or more base neutral or acid surrogates were outside QC limits was a reanalysis perform

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VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates



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

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". <u>V N NA</u> 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? Y/N N/A

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

# Date	DI DSW/SW	Compound	MS %R (Limits)		MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	3/4	SS)	13	(eci-LS)	(-	i In rule (MS i
)		()	()		A
					(()		
)	(()	()		
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	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
Ä	Phenol	26-90%	< 35%	12-110%	< 42%	ອອ	Acenaphthene	31-137%	< 19%	46-118%	≤ 31%
v	2-Chlorophenol	25-102%	< 50%	27-123%	< 40%	11.	4-Nitrophenol	11-114%	< 50%	10-80%	< 50%
ші	1,4-Dichlorobenzene	28-104%	< 27%	36-97%	≤ 28%	KK.	2,4-Dinitrotoluene	28-89%	< 47%	24-96%	≤ 38%
-;	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	< 38%	Т.	Pentachlorophenol	17-109%	< 47%	9-103%	< 50%
с.	1,2,4-Trichlorobenzene	38-107%	< 23%	39-98%	≤ 28%	77	Pyrene	35-142%	< 36%	26-127%	< 31%
>	4-Chloro-3-methylphenol	26-103%	< 33%	23-97%	< 42%						

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VALIDATION FINDINGS WORKSHEET Compound Quantitation and Reported CRQLs



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

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

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

Qualifications	JAT A (2)									- 12	
Associated Samples	peake										
Finding	666. HH # UNITSO/VED										
Sample ID											
Date											
*			 				 		-		

Comments: <u>See sample calculation verification worksheet for recalculations</u>

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

- of Page: Reviewer: 2nd Reviewer:

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

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

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

iderd doviction of the RBFs A_x = Area of Compound C_x = Concentration of compound, S= Standard deviation of the DDE

 A_{is} = Area of associated internal standard C_{is} = Concentration of internal standard X = Mean of the RRFs

RRF RVerage RRF Average RRF %RSD %RSD
Reported Recalculated Record Recalculated Reported Recalculated

				Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration		RRF	RRF	Average RRF	Average RRF	%RSD	%RSD
#	Standard ID	Date	Compound (Internal Standard)	(50 std)	(50 std)	(Initial)	(Initial)		
		5/10/0010	1 4-Diovane (IS1)	0.5630	0.5630	0.5686	0.5686	2.7	2.68
-	WSC K		Nanhthalene (IS2)	1.0281	1.0281	1.0211	1.0211	6.6	6.60
	2000		Flucture (IS3)	1.3033	1.3033	1.2978	1.2978	7.0	6.96
			Hevechlorohanzana (IS4)	0.2320	0.2322	0.2313	0.2312	2.4	2.45
			Christian (185)	1.0597	1.0597	1.0588	1.0588	7.7	7.74
			Renzo(a)nvrene (IS6)	1.0950	1.0950	1.0629	1.0629	4.0	4.02

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

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
20.00	0.5574	1.0018	1.2565	0.2294	0.9858	1.0769
80.00	0.5566	0.9425	1.1967	0.2264	0.9750	1.0450
00.00	0.5559	0.9170	1.1712	0.2222	0.9515	1.0380
	0.5559					
×	0.5686	1.0211	1.2978	0.2312	1.0588	1.0629
s 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.

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Continuing Calibration Results Verification VALIDATION FINDINGS WORSHEET



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:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF RRF = (Ax)(Cis)/(Ais)(Cx)

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

Ais = Area of associated internal standard Ax = Area of compound

Cis = Concentration of internal standard Cx = Concentration of compound

ation			Average RRF	Reported	Recalculated	Reported	Recalculated	
te	Compound	(Reference IS)	(Initial RRF)	(CC RRF)	(CC RRF)	%D	%D	
8/10	1.4-Dioxane	(IS1)	0.5700	0.5806	0.5806	1.9	1.9	
	Naphthalene	(1S2)	1.0211	1.0402	1.0402	1.9	1.9	
	Fluorene	(IS3)	1.2978	1.3277	1.3277	2.3	2.3	
							1	

		Calibration		Average RRF	Reported	Recalculated	Reported	Recalculated
#	Standard ID	Date	Compound (Reference IS)	(Initial RRF)	(CC RRF)	(CC RRF)	%D	%D
-	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
			Chrvsene (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
7	K3917	05/18/10						
			Hexachiorobenzene (IS4)	0.2313	0.2302	0.2302	0.5	0.5

		ccV1		ccV2		
Compound (Reference IS	()	Concentration	Area Cpd	Area IS	Area Cpd	Area IS
		(IS/Cpd)				
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
Chrvsene	(185)	40/80	2723280	1276261		
Benzo(a)pvrene	(186)	40/80	2629449	1154050		

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VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

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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: $\pm \gamma (x)$		SS = Sur	rrogate Spiked		
	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	167)	49.2	49	49	D
2-Fluorobiphenyl	1	60.0	66	66	
Terphenyl-d14	ł	66.1	66	65	
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					

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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

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

3/4

MS/MSD samples:

MSC = Matrix spike concentration

SSC = Spiked sample concentration SA = Spike added

Where:

MSDC = Matrix spike duplicate concentration

SC = Sample concentation

Recalculated 5 2 **MS/MSD** RPD Reported $\overline{\boldsymbol{\mathcal{A}}}$ 5 Matrix Spike Duplicate Ð Recalc 5 Percent Recovery Reported ۍ ک 80 Recalc Percent Recovery 75 76 Matrix Spike Reported 74 74 202 2760 MSD Spiked Sample Concentration 2196 2410 MS Sample Concentration <u>a</u> 2 2 2 2 2 2 2 2 2 2 2 0 2 320) 3200 MSD Spike Added Ľ 0360 2966 **SM** N-Nitroso-di-n-propylamine 4-Chloro-3-methylphenol Compound Pentachlorophenol Acenaphthene Phenol Pyrene

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. LCSCLC.2S

LDC #:>3436 E 79VALIDATION FINDINGS WORKSHEETSDG #:Sre CoverSample Calculation Verification

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

Y)N N/A <u>N N/A</u>

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

Example:

Concen	tration	$= (A_{b})(L_{b})(V_{b})(DF)(2.0) - (A_{b})(RRF)(V_{b})(V_{b})(S)$
A _x	=	Area of the characteristic ion (EICP) for the compound to be measured
A _{is}	=	Area of the characteristic ion (EICP) for the specific internal standard
ا _s	=	Amount of internal standard added in nanograms (ng)
V _°	2	Volume or weight of sample extract in milliliters (ml) or grams (g).
Vi	=	Volume of extract injected in microliters (ul)
Vt	=	Volume of the concentrated extract in microliters (ul)
Df	=	Dilution Factor.
%S	=	Percent solids, applicable to soil and solid matrices only.

Sample I.D. _____, _____; $Conc. = \frac{(342783, 40)(1m1, (4), (100)}{(1036671)(0.2313)(20, 23)(0.77)}$ = 9760 2 98 ug/Eg

Factor of 2 to account for GPC cleanup 2.0 -

Calculated Reported Concentration Concentration # Sample ID Compound Qualification () 1)

LDC Report# 23436F2a

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.

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for all compounds.

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

Average relative response factors (RRF) for all compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs) and 25.0% for all other compounds.

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

All of the continuing calibration relative response factors (RRF) were within method and validation criteria.

V. Blanks

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

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)	Ρ

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)	Р	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

SDG #: 280-3197-6 Laboratory: Test America

LDC #: 23436F2a

Date:7/62/10 Page:___of___) Reviewer:____0/0 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: 5/04/10					
	GC/MS Instrument performance check	A						
111.	Initial calibration	A	7. KSV r~					
IV.	Continuing calibration/ICV	A	ca/a =252					
V.	Blanks	A						
VI.	Surrogate spikes	A						
VII.	Matrix spike/Matrix spike duplicates	4						
VIII	Laboratory control samples	A	us					
IX.	Regional Quality Assurance and Quality Control	N						
Х.	Internal standards	A						
XI.	Target compound identification	Å	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-04132010-RIG2-RZE (250-2400-)					

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:

sles: ** Indicates sample underwent Stage 4 validation

1	SSAM5-03-4BPC	11	MO280-15018/1-A	21	31	
2	SSAM5-03-6BPC	12		22	32	
3	SSAM5-03-8BPC	13		23	33	
	SSAM5-03-10BPC**	14		24	34	
5	SSAM5-03-4BPCMS	15	······································	25	35	
6	SSAM5-03-4BPCMSD	16		26	36	
7		17		27	37	
		18		28	38	
0		19		29	39	
10		20		30	40	

23 436 Fra LDC #:_ SDG #:_ See Cover

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VALIDATION FINDINGS CHECKLIST

Page: <u>1</u> of <u>2</u> Reviewer: <u>V4</u> 2nd Reviewer: <u>4</u>

Method: Semivolatiles (EPA SW 846 Method 8270C)

Validation Area	Yes	No	NA	Findings/Comments
1. Technical holding times		C. R.		and the set of the set of the set of the
All technical holding times were met.				
Cooler temperature criteria was met.				
II. GC/MS Instrument performance check	17	÷.	92. ¹ 91	
Were the DFTPP performance results reviewed and found to be within the specified criteria?				
Were all samples analyzed within the 12 hour clock criteria?				
III. Initial calibration			e d	
Did the laboratory perform a 5 point calibration prior to sample analysis?				
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?				
Was a curve fit used for evaluation?				
Did the initial calibration meet the curve fit acceptance criteria of \geq 0.990?				
Were all percent relative standard deviations (%RSD) \leq 30% and relative response factors (RRF) \geq 0.05?				
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?				
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?				
Were all percent differences (%D) \leq 25% and relative response factors (RRF) \geq 0.05?				
V. Blanks				
Was a method blank associated with every sample in this SDG?				
Was a method blank analyzed for each matrix and concentration?				
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.				
VI. Surrogate spikes	'			
Were all surrogate %R within QC limits?				
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?				
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?				
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.				
Was a MS/MSD analyzed every 20 samples of each matrix?				
Were the MS/MSD percent recoveries (%R) and the relative percent differences RPD) within the QC limits?			T	
/III. Laboratory control samples				
Nas an LCS analyzed for this SDG?				

VALIDATION FINDINGS CHECKLIST

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?				
IX. Regional Quality Assurance and Quality Control	1			
Were performance evaluation (PE) samples performed?				
Were the performance evaluation (PE) samples within the acceptance limits? X. Internal standards		1.1.1		
Were internal standard area counts within -50% or +100% of the associated calibration standard?		Τ		
Were retention times within ± 30 seconds from the associated calibration standard?	 			
XI. Target compound identification	1.2		÷	
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?				
Were the correct internal standard (IS), quantitation ion and relative response factor RRF) used to quantitate the compound?				
Vere compound quantitation and CRQLs adjusted to reflect all sample dilutions and Iry weight factors applicable to level IV validation?				······································
(III. Tentatively identified compounds (TICs)				
Vere the major ions (> 10 percent relative intensity) in the reference spectrum valuated in sample spectrum?				
Vere relative intensities of the major ions within \pm 20% between the sample and the efference spectra?				
id the raw data indicate that the laboratory performed a library search for all quired peaks in the chromatograms (samples and blanks)?				
V. System performance		L		
stem performance was found to be acceptable.	Т			
/ Overall assessment of data				
verall assessment of data was found to be acceptable.			Γ	
/i. Fleld duplicates				
eld duplicate pairs were identified in this SDG.	T		<u> </u>	
rget compounds were detected in the field duplicates.				
II. Field blanks		<u> </u>		
ld blanks were identified in this SDG.	T			
get compounds were detected in the field blanks.	\rightarrow		-†-	

VALIDATION FINDINGS WORKSHEET

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

A Dhan-11++				
	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)nvrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	and Open
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG Accurates **		ooo. mdeno(1,2,5-cd)pyrene
			VV. Anthracene	KKK. Dibenz(a,h)anthracene
V. 1, V. UICHIODENZENE	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g.h.i)bervlene
E. 1,4-Dichiorobenzene**	T. 4-Chloroaniline	II. 4-Nitrophenol*	XX. Di-n-butylphthalate	
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	11 Dihonané		www. bis(z-chioroisopropyl)ether
		uu. Dibenzoruran	YY. Fluoranthene**	NNN. Aniline
G. 2-Metnylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	000. N-Nitrosodimethvlamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PDP Resson Asid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chloronhamid-shouid after		
			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	00. 4-Nitroaniline	DDD. Chrysene	
L. Nitrobenzene	AA. 2-Chloronaphthalene			
		······································	EEE. Bis(2-ethylhexyl)phthalate	TTT.
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	
N. 2-Nitrophenol**	CC. Dimethylohthalate			
		KK. 4-Bfomophenyl-phenylether	GGG. Benzo(b)fluoranthene	vw.
0. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	www.

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

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VALIDATION FINDINGS WORKSHEET **Field Blanks**



	GC/MS BNA (EPA SW 846 Method 8270C)	Were field blanks identified in this SDG?	
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	₽I¥	Z X	

Field blank type: (circle one) (Field Blank / Rinsate / Other: 4 N3 No Sampling date:

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ample identifice									
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		UN V							
	22 E	ci the		,					
	010-RTG2-								
Blank ID	FB-04132	1.]	1.6						
puno		EE E	FFE						
Сотр									CROL
	Compound Blank ID Sample Identification	Compound Blank ID Sample Identification Sample Identification Fb - 04 193010- RTG2-R2 モ Sample Identification	CompoundBlank IDSample Identification $Fb.04193010-RIG2-k2E$ Sample Identification EEE 1.1	CompoundBlank IDSample IdentificationFB. 04193010-RIG2-R2ESample IdentificationEEE1.1EEE1.1EEE1.6	CompoundBlank IDSample Identification $FB. 04 192010 - RTG2 - RZ E$ Sample Identification EEE 1.1 $Ci fhe$ FFE 1.6 $Ci fhe$ FFE 1.6	CompoundBlank IDSample Identification $Fb. 04/92010 - RIG2 - k2 E$ Sample Identification EEE 1.1 EFE 1.6 FFE 1.6	CompoundBlank IDSample Identification $Fb - 0413_{2010} - RI6_2 - R2 E$ $Sample Identification$ EEE 1.1 $Ci He$ ND FFE 1.6 $Ci He$ FFE VID VID VID VID VID FFE VID	CompoundBlank IDSample Identification $FB-04132010-RT62-42E$ $Sample Identification$ EEE 1,1 EEE 1,1 EEE 1,1 EEE 1,1 EEE 1,6 EEE 1.6 EE </td <td>Compound Blank ID Sample Identification FB 0/4/3/2010- RIG2-R2 E Sample Identification EEE 1, 1 EFE 1, 6 FFE 1.6</td>	Compound Blank ID Sample Identification FB 0/4/3/2010- RIG2-R2 E Sample Identification EEE 1, 1 EFE 1, 6 FFE 1.6

Associated sample units: Blank units:_

0 ס 11 12 Sampling date:_____

	(_
	tion						
amples:	ample identifica		-				
Associated S	S						
)ther:							
K / Kinsate / C							
e) rieid biani	Blank ID						
pe: (circle on	pond						
riela blank ty	Com					CRAL	

5x Phthalates 2x All others

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LDC #: 23 436 F29 SDG #:

VALIDATION FINDINGS WORKSHEET Compound Quantitation and Reported CRQLs

Page: <u>of</u> Reviewer: <u>076</u> 2nd Reviewer:

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

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

Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation? Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound? Y N N/A

	(9)	6									
Qualifications	J MI A										
Associated Samples	ed peaks										
Finding	666, HHH UNRSOW										ksheet for recalculations
Sample ID	234										ample calculation verification work
Date											ents: See s
*											Comm

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23436 Fin SDG #: LDC #:

VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

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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:

$RF = (A_x)(C_{is})/(A_{is})(C_x)$
<pre>www.second the KKFs/number of standards</pre>
6RSD = 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

					Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration		•	RRF	RRF	Average RRF	Average RRF	%RSD	%RSD
#	Standard ID	Date	Compound (Internal Star	ndard)	(50 std)	(50 std)	(Initial)	(Initial)		
٢	ICAL	5/17/2010	1,4-Dioxane	(IS1)	0.5858	0.5858	0.6981	0.6981	13.4	13.36
	MSS Y		Naphthalene	(IS2)	1.0095	1.0095	1.0394	1.0395	2.7	2.75
			Fluorene	(IS3)	1.3686	1.3686	1.4029	1.4029	2.2	2.20
			Hexachlorobenzene	(IS4)	0.1973	0.1973	0.2038	0.2038	3.4	3.40
			Chrysene	(IS5)	1.0983	1.0983	1.1019	1.1019	5.2	5.22
			Benzo(a)pyrene	(IS6)	1.1920	1.1920	1.1700	1.1700	6.5	6.50

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

Chrysene Benzo(a)py	1.2054 1.0396	1.1123 1.0762	1.0706 1.1459	1.0983 1.1920	1.1544 1.2406	1.0751 1.2115	1.0837 1.2121	1.0151 1.2417	1.1019 1.1700	0.0575
Hexachlorob		0.1982	0.1951	0.1973	0.2103	0.2101	0.2043	0.2113	0.2038	ບັນກອດ
Fluorene	1.4060	1.4052	1.3506	1.3686	1.4468	1.4126	1.4032	1.4302	1.4029	0,020,0
Naphthalene	1.0967	1.0414	1.0278	1.0095	1.0612	1.0389	1.0110	1.0291	1.0395	0.0285
1,4-Dioxane		0.8159	0.6727	0.5858	0.7642	0.7371	0.7438	0.5675	0.6981	0 0030
Conc	4.00	10.00	20.00	50.00	80.00	120.00	160.00	200.00	= ×	U U

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.

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VALIDATION FINDINGS WORSHEET 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:

RRF	
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F)/a	
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<u>10</u>	₹))(s
ii Q	ö
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iffer	"
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Where: ave. RRF = initial calibration average RRF RRF = continuing calibration RRF Ax = Area of compound Ais = /

 Ax = Continuous canon and the Ais = Area of associated internal standard

 Ax = Area of compound
 Ais = Area of associated internal standard

 Cx = Concentration of compound
 Cis = Concentration of internal standard

Reported Recalculated Reported Recalculated	(CC RRF) (CC RRF) %D %D	0.7277 0.7277 4.2 4.2	1.0508 1.0508 1.1 1.1	1.4728 1.4728 5.0 5.0	0.2109 0.2109 3.5 3.5 3.5	1.1388 1.1388 3.4 3.4	1.2924 1.2924 10.5 10.5			
Average RRF	(Initial RRF)	0.6981	1.0394	1.4029	0.2038	1.1019	1.1700			
	Compound (Reference IS)	(IS1) (IS1)	Naphthalene (IS2)	Fluorene (IS3)	Hexachlorobenzene (IS4)	Chrysene (IS5)	Benzo(a)pyrene (IS6)			
Calibration	Date	05/17/10								
	Standard ID	Y2435								
	#	-								

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

LDC #: 23436 F29 SDG #: <u>Sre Cover</u>

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page: lof 1 Reviewer: JK 2nd reviewer: K

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

4

Sample ID: #

Where: SF = Surrogate Found SS = Surrogate Spiked

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	(00	75.1	75	75	0,
2-Fluorobiphenyl		76.2	74	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					1
2-Fluorobiphenyl					
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

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2	See
LDC #:	SDG #:

Matrix Spike/Matrix Spike Duplicates Results Verification VALIDATION FINDINGS WORKSHEET

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

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

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

5/6

MS/MSD samples:

Where:

SSC = Spiked sample concentration SA = Spike added

MSC = Matrix spike concentration

SC = Sample concentation

MSDC = Matrix spike duplicate concentration

	ds	ike	Sample	Spiked :	Sample	Matrix	Spike	Matrix Spik	a Duplicate	WSW	g
Compound	194 (いら)	ded (kar	Concentration (WS / Kd	Concer (45	tration (k)	Percent F	ecovery	Percent F	ecovery	RPD	
	WS	/ MSD	0	MS	0 MSD	Renorted	Roralr	Panortad	Docalo		
Phenol											- Aecauculated
N-Nitroso-di-n-propylamine											
4-Chloro-3-methylphenol											
Acenaphthene	3160	2950	24	2440	2 400	76	76	81	(۶		-
Pentachlorophenol								2	+ >		
Pyrene	5160	2950	79	2430	Chrz	5)	8	٤ ٤	63	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.

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

Page: 1 of 1 Reviewer: 1

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

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

% Recovery = 100 * (SC/SA

Where: SSC = Spike concentration SA = Spike added

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

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

LCS/LCSD samples: LCS 260-15018 /2-A

	ß	ike	IJ	ike		V		9		
	Ad	ded		utration.						CSD
Compound	J. J.	<u>k</u>)		Ac,)	Percent	Recovery	Percent F	Recovery		Ģ
		ر ۱csn	LCS L	/ LCSD	Reported	Darala				
								KBCBIC.	Keported	Recalculated
Phenol										L
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene	5610	K-Y	2/80	A/A	84	64				
Pentachlorophenol				-						
Pyrene	2610	~	のりてん		87	87		$\left \right $		

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

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LDC #: 73436 F29

Concentration = $(A_x)(I_y)(V_y)(DF)(2.0)$

SDG #: Sre Cover

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification



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

N N/A N/N/A

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

Example:

		(A _{is})(RRF)(V _o)(V _i)(%S)
A _x	=	Area of the characteristic ion (EICP) for the compound to be measured
Α.	=	Area of the characteristic ion (EICP) for the encoiring

- A_{is} = Area of the characteristic ion (EICP) for the specific internal standard
- I_s = Amount of internal standard added in nanograms (ng)
- V_o = Volume or weight of sample extract in milliliters (ml) or grams (g).
- V₁ = Volume of extract injected in microliters (ul)
- V_t = Volume of the concentrated extract in microliters (ul)
- Df = Dilution Factor.

2.0

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

Factor of 2 to account for GPC cleanup

Sample I.D. _ # 4 22 $Conc. = \frac{(8/823)(40)(1m/)(107)(1)}{(0,2038)(1/82069)(32.88)(0,843)(1)}$ = 491, m ~ 490 mg /kg

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

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for all compounds.

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

Average relative response factors (RRF) for all compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs) and 25.0% for all other compounds.

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

All of the continuing calibration relative response factors (RRF) were within method and validation criteria.

V. Blanks

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

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
Stage 2B

Date: # 7/01/10
Page: 1 of 1
Reviewer: <u>v </u>
2nd Reviewer:

: f

SDG #: 280-3584-1 Laboratory: Test America

LDC #: 23436G2a

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
	Technical holding times	A	Sampling dates: 5/14 /10
1.	GC/MS Instrument performance check	A	
ş1 1 .	Initial calibration	A	3 KSD rr
IV.	Continuing calibration/ICV	A	$callev \leq 252$
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	
Χ.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	SW	FB = FB-04072010-RZD (frm 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: Seil

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	ll. 4-Nitrophenol*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenoi**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	000. 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	00. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	111.
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	ww.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	www.

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

COMPNDL

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LDC	SDG

VALIDATION FINDINGS WORKSHEET **Field Blanks**



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amples:	ample Identificatio					
Associated Si	ŭ					
ther:						
A Rinsate / O		0-RZD				
ev Field Blank	Blank ID	FB-0407201	2:2			
pling date: <u> </u>	Compound	-	H			
Sam						CR0

Blank units: Ass	ociated sam	ple units:							
Sampling date:	— e) Field Blank	: / Rinsate / Ot	her:	4	Associated Sa	amples:			
Compound	Blank ID				St	ample Identificat	lon		
				-					
CROL									

5x Phthalates 2x All others

FBLKASC2tronox.wpd

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VALIDATION FINDINGS WORKSHEET Surrogate Recovery



SDG # 24 400 SDG # 270C) METHOD: GC/MS BNA (EPA SW 846 Method 8270C)

Rease see qualification below for all questions answered "N". Not applicable questions are identified as "N/A". Were percent recoveries (%R) for surrogates within QC limits? NA NA If 2 or more base neutral or acid surrogates were outside OC limits. Were a regulation perform

If 2 or more base neutral or acid surrogates were outside OC limits was a reanalysis performed to confirm %B?

SUR.2S.wpd

1.1

LDC #: 23 436 6 22 2 2 Š SDG #:

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

lof___ M Page:___ Reviewer: 2nd Reviewer:

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

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Vere 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. Vas a MS/MSD analyzed every 20 samples of each matrix?

1 1111

Qualifications	No qual (MED .																
Associated Samples	4																
RPD (Limits)		()	(()	()		()	()		()	()		()	()	()	()	()
MSD %R (Limits)	()	()	()	()	()	ار ،	()	()	()	()	()	()	()	()	()	()	()
MS %R (Limits)	53 (54-120)	()	()	()	()		()	()	()	()	()	()	()	()	()	()	()
Compound	TII																
di dsw/sw	5 /b																
# Date																	

		A DESCRIPTION OF THE OWNER	A REAL PROPERTY OF A REAL PROPER								
	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
Ŕ	Phenol	26-90%	≤ 35%	12-110%	< 42%	ອອ	Acenaphthene	31-137%	< 19%	46-118%	< 31%
0	2-Chlorophenol	25-102%	< 50%	27-123%	< 40%	11.	4-Nitrophenol	11-114%	< 50%	10-80%	< 50%
ш	1,4-Dichlorobenzene	28-104%	< 27%	36-97%	< 28%	К К	2,4-Dinitrotoluene	28-89%	< 47%	24-96%	< 38%
	N-Nitroso-di-n-propylamine	41-126%	< 38%	41-116%	< 38%	Т Т .	Pentachlorophenol	17-109%	< 47%	9-103%	< 50%
<u>م</u>	1,2,4-Trichlorobenzene	38-107%	< 23%	39-98%	< 28%	17	Pyrene	35-142%	< 36%	26-127%	< 31%
>	4-Chloro-3-methylphenol	26-103%	< 33%	23-97%	< 42%						

MSD.wpd

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 30.0% for all compounds.

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

Average relative response factors (RRF) for all compounds were within method and validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

Percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were within the method criteria of less than or equal to 20.0% for calibration check compounds (CCCs) and 25.0% for all other compounds.

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

All of the continuing calibration relative response factors (RRF) were within method and validation criteria.

V. Blanks

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

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)	Ρ

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)	Ρ	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

LDC #: 23436J2a

Stage 2B

SDG #: 280-3679-3 Laboratory: Test America

Date: 1/01/16 Page: 1 of 1 Reviewer: 46 2nd Reviewer: 46

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

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

	Validation Area		Comments
l.	Technical holding times	A	Sampling dates: 51510
И.	GC/MS Instrument performance check	A	
111.	Initial calibration	A	2 RSD 17
IV.	Continuing calibration/ICV	A	Carla = 252
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	ctient spec Insufficient sample
VIII.	Laboratory control samples	SW	Ks /p
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII	Tentatively identified compounds (TICs)	N	
XIV	System performance	Ν	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	M	EB = 1

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

Water

ND = No compounds detected R = Rinsate FB = Field blank D = Duplicate TB = Trip blank EB = Equipment blank

Validated Samples:

1	EB-05182010-BZC	11	21	31	
, ,	MB 280-16560 /1-A	12	22	32	
2	Mp -30 10 10/14	13	23	33	
		14	24	34	
4 		15	25	35	
5		16	26	36	
		17	27	37	
		10	28	38	
⁸		10	20	39	
9		119	29	40	
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-chloroethy!) 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**	W. 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	ll. 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	000. 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	00. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	111.
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	UUU
N. 2-Nitrophenoi**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	ww.
0. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	www.

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

COMPNDL

LDC #: 23436J2a SDG #: <u>Sed Cone</u>

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)



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

Y N N/A

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". <u>Y N N/A</u> Was a LCS required? <u>Y N N/A</u> Were the LCS/LCSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

				<u>ی</u>	1760			
#	Date	LCS/LCSD ID	Compound	%R (Limits)	%R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		LCS/D 280-16560/2-A	3-A RRR	0 (24-120)	3 (24-120)	()	41	J-/R/P (1)
				()	()	()		
				()	()	()		
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				())			

LCSLCSD.2S

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

Metals

LDC

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

1

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

IV. Blanks

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

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

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
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

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Tronox Northgate Henderson LDC #: 23436B4 VALIDATION COMPLETENESS WORKSHEET

Stage 4

SDG #: 280-2400-10 Laboratory: Test America

Date: 6-28-10 Page: lof 1 Reviewer: 02 2nd Reviewer:

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
<u>.</u>	Technical holding times	A	Sampling dates: 4/13/10
	ICP/MS Tune	A	
	Calibration	A	
<u>.</u>	Blanks	A	
	ICP Interference Check Sample (ICS) Analysis	A	
Ι.	Matrix Spike Analysis	\mathcal{N}	Client specified
1.	Duplicate Sample Analysis	N	L
1.	Laboratory Control Samples (LCS)	A	LCS
	Internal Standard (ICP-MS)	A	
	Furnace Atomic Absorption QC	N	Noturivized
	ICP Serial Dilution	N	Nor preformed
I.	Sample Result Verification	A	U
Ι.	Overall Assessment of Data	A	· · · · · · · · · · · · · · · · · · ·
1.	Field Duplicates	\mathbb{N}	
,	Field Blanks	ND	FB= FB-01132010-RIG2-RZE

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: 50 i \

1	SA128-8BPC	11	PB5	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:





				
Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times	-			
All technical holding times were met.	\square			
Cooler temperature criteria was met.	$\left[\right]$			
II. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?		<u>^</u>		
Were %RSD of isotopes in the tuning solution ≤5%?				
III. Calibration				
Were all instruments calibrated daily, each set-up time?				
Were the proper number of standards used?	\square			
Were all initial and continuing calibration verification %Rs within the 90-110% (80- 120% for mercury) QC limits?		-		
Were all initial calibration correlation coefficients > 0.995?				
IV. Blanks				
Was a method blank associated with every sample in this SDG?	\leq			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		1	\square	
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?				
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?		\geq		
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.			-	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.				
Nere the MS/MSD or duplicate relative percent differences (RPD) \leq 20% for waters and \leq 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were \leq 5X the RL, including when only one of the duplicate sample values were \leq 5X the RL.				
VII. Laboratory control samples				
Was an LCS anaylzed for this SDG?	4			
Nas an LCS analyzed per extraction batch?	4			
Nere 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?	1			
			بالمسيبين	

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



VALIDATION FINDINGS CHECKLIST

Page: _____ of ____ Reviewer: ______ 2nd Reviewer: ______

Validation Area	Yes	No	NA	Findings/Comments
Valluauoli Area				
VIII. Furnace Atomic Absorption QC				
If MSA was performed, was the correlation coefficients > 0.995?				
Do all applicable analysies have duplicate injections? (Level IV only)				
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%? (Level IV only)	с. 1			
Were analytical spike recoveries within the 85-115% QC limits?				<u> </u>
IX. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?		-	 	_
Were all percent differences (%Ds) < 10%?			\lfloor	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.				
X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)			~~~~~	
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the internal standard in the associated initial calibration?	-			
If the %Rs were outside the criteria, was a reanalysis performed?				<u> </u>
XI Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			+	
Were the performance evaluation (PE) samples within the acceptance limits?				
YII Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable				
XIII Overall assessment of data				
		P	Τ	
Overall assessment of data was found to be acceptable.		1	1	<u></u>
XIV. Field duplicates	.	τ		
Field duplicate pairs were identified in this SDG.	ļ	1	\square	
Target analytes were detected in the field duplicates.				ł
XV. Field blanks	- <u>-</u>			
Field blanks were identified in this SDG.			1	
Target analytes were detected in the field blanks.				

LDC #: 2343684 SDG #: Seecover

VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification

Page: _______ Reviewer: _______ 2nd Reviewer: _______

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

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

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 %R = Found x 100 True

Stantiarci ID Type of Analysis Element Found (ugl1) True (ugl1) MR ICP (initial calibration) GFAA (initial calibration) GFAA (initial calibration) MR MR ICP (initial calibration) CVAA (initial calibration) MR MR MR ICP (continuing calibration) ICP (continuing calibration) MR MR MR ICP (continuing calibration) MS MO MO MO MO MO ICP (continuing calibration) MS MO <						Recalculated	Reported	
ICP (Initial calibration) ICP (Initial calibration) GFAA (Initial calibration) GFAA (Initial calibration) ICP (Continuing calibration) ICP (Continuing calibration) ICV ICP/MS (Initial calibration)	Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	%R	%R	Acceptable (Y/N)
GFAA (initial calibration) GFAA (initial calibration) CVAA (initial calibration) CVAA (initial calibration) ICP (continuing calibration) FAA (continuing calibration) GFAA (continuing calibration) MO (S) ICD ICP (continuing calibration) ICD ICP (continuing calibration) ICO ICP (continuing calibration) ICO ICP (continuing calibration) ICO ICP (Continuing calibration)		ICP (Initial calibration)						
CVAA (Initial calibration) CVAA (Initial calibration) ICP (Continuing calibration) ICP (Continuing calibration) GFAA (Continuing calibration) ICO TCV ICPAA (Continuing calibration) TCV ICPAA (Continuing calibration)		GFAA (Initial calibration)						
ICP (Continuing calibration) ICP (Continuing calibration) GFAA (Continuing calibration) ICP/AA (Continuing calibration) TCV ICP/AA (Continuing calibration) TCV ICP/AA (Continuing calibration)		CVAA (initial calibration)						
GFAA (Continuing calibration) GFAA (Continuing calibration) CVAA (Continuing calibration) MS TCV ICP/MS (Initial calibration) AC MO CVA MS		ICP (Continuing calibration)						
EVA (Continuing calibration) EVA (Continuing calibration) A U/0,0 10) 10 ICU ICP/MS (Initial calibration) A U/0,5 U/0,0 10) 10		GFAA (Continuing calibration)						
ICU ICP/MS (Initial calibration) AS UO.5 U/6,0 101 10		CVAA (Continuing calibration)						
	ACS H	ICP/MS (Initial calibration)	AS	40,5	U6,0	10)	101)
$\frac{1}{100}$	CCN(OITOR)	ICP/MS (Continuing calibation)	-)	1.93	56.0	101	101	2

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.

CALCLC.4SW

LDC #	
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VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

đ Reviewer: Page: 2nd Reviewer:

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

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

Where, Found = Concentration of each analyte <u>measured</u> 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. %R = Found_x 100 True

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

Where, S = Original sample concentration D = Duplicate sample concentration $RPD = \underline{|S-D|} \times 100$ (S+D)/2 An ICP serial dilution percent difference (%D) was recalculated using the following formula:

%D = <u>I-SDR</u> × 100

Where, I = Initial Sample Result (mg/L) SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

101 101 101 101 1001 1001	Found 1 S / 1 funits) (73/
101 101	x HOI
	P.
	(SSR-SR)

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.

TOTCLC.4SW



VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	L of
Reviewer:	CP
2nd reviewer:	<u> </u>

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

Please see qu <u>N N/A</u> <u>Y N N/A</u> <u>Detected analy</u> following equa	ee qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Have results been reported and calculated correctly? Are results within the calibrated range of the instruments and within the linear range of the ICP? Are all detection limits below the CRDL? analyte results for were recalculated and verified using the equation:								
Concentration = RD = FV = in. Vol. = Dil = %S =	(RD)(F (In. Vol Raw da Final vo Initial vo Dilution Decime	V)(Dil) Recalcu 1.)(%S) ta concentration wume (mi) plume (mi) or weight (G) factor t percent solids	100m L(5)(1 (1.04g)(0.8	<u>2.65.0010</u> =(1000 = (198)	5, 8mg/kg				
Sample I	D	Analyte	Reported Concentration (MR (MR)	Calculated Concentration	Acceptable (Y/N)				
<u> </u>		fis	6.8	6,8	4				
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		······································							
		· · · · · · · · · · · · · · · · · · ·							
		·							

RECALC.4S2

2

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

IV. Blanks

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

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:

Sample	Finding	Flag	A or P
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

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

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

Stage 2B/4

9
Date G- 76-10
Page: Lof)
Reviewer:
2nd Reviewer:

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.

Technical holding times	\cap	1/10/10
		Sampling dates: 9/15/10
ICP/MS Tune	A	
Calibration	A	
Blanks	A	
ICP Interference Check Sample (ICS) Analysis	A	,
Matrix Spike Analysis	\mathcal{N}	Clientspecified
Duplicate Sample Analysis	N	L
Laboratory Control Samples (LCS)	A	LCS
Internal Standard (ICP-MS)	A	
Furnace Atomic Absorption QC	N	Notutilized,
ICP Serial Dilution	\mathcal{N}	No+ performed
Sample Result Verification	A	Not reviewed for Stage 2B validation.
Overall Assessment of Data	P	
Field Duplicates	N	
Field Blanks	ND	FB= FB-01 132010-RIGZ-RZE (50612802
	Blanks CP Interference Check Sample (ICS) Analysis Matrix Spike Analysis Duplicate Sample Analysis _aboratory Control Samples (LCS) nternal Standard (ICP-MS) Furnace Atomic Absorption QC CP Serial Dilution Sample Result Verification Dverall Assessment of Data Field Duplicates	Blanks A CP Interference Check Sample (ICS) Analysis A Vatrix Spike Analysis N Duplicate Sample Analysis N _aboratory Control Samples (LCS) A internal Standard (ICP-MS) A Furnace Atomic Absorption QC N CP Serial Dilution A Sample Result Verification A Overall Assessment of Data A Field Duplicates NO

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

				the second se
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:



VALIDATION FINDINGS CHECKLIST



Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.				
Cooler temperature criteria was met.	~	_		
II. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	/	-		
Were %RSD of isotopes in the tuning solution \leq 5%?	/			
III. Calibration				
Were all instruments calibrated daily, each set-up time?				
Were the proper number of standards used?				
Were all initial and continuing calibration verification %Rs within the 90-110% (80- 120% for mercury) QC limits?	/	-		
Were all initial calibration correlation coefficients > 0.995?	/			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	1			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		/		
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?		1		
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?	-	_		
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.			1	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			1	
Were the MS/MSD or duplicate relative percent differences (RPD) \leq 20% for waters and \leq 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were \leq 5X the RL, including when only one of the duplicate sample values were \leq 5X the RL.				
VII. Laboratory control samples				
Was an LCS anaylzed for this SDG?	\sim			
Was an LCS analyzed per extraction batch?	\leq			
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?				

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

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VALIDATION FINDINGS CHECKLIST



Validation Area	Yes	No	NA	Findings/Comments		
VIII. Furnace Atomic Absorption QC						
If MSA was performed, was the correlation coefficients > 0.995?			\leq	-		
Do all applicable analysies have duplicate injections? (Level IV only)			/			
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%? (Level IV only)			\leq			
Were analytical spike recoveries within the 85-115% QC limits?			/			
IX. ICP Serial Dilution						
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?		/	-			
Were all percent differences (%Ds) < 10%?			\leq			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.						
X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)						
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?	\langle					
If the %Rs were outside the criteria, was a reanalysis performed?	_	r				
XI. Regional Quality Assurance and Quality Control						
Were performance evaluation (PE) samples performed?			_			
Were the performance evaluation (PE) samples within the acceptance limits?			/			
XII. Sample Result Verification						
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	-	_				
XIII. Overall assessment of data						
Overall assessment of data was found to be acceptable.	/	ſ				
XIV. Field duplicates						
Field duplicate pairs were identified in this SDG.		/				
Target analytes were detected in the field duplicates.						
XV. Field blanks						
Field blanks were identified in this SDG.	/					
Target analytes were detected in the field blanks.						



Initial and Continuing Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET



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: 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 %R = Found x 100 True

					Recalculated	Reported	
Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	%R	Q	Acceptable
	ICP (Initial calibration)					Ve	(N/1)
	GFAA (Initial calibration)						
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
	GFAA (Continuing calibration)						
	CVAA (Continuing calibration)						
FCV	ICP/MS (Initial calibration)	As	S oh	Uo.O		- () -	7
(CUONOL)	ICP/MS (Continuing calibation)	7	1:93	50.05	2.01		-

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.

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METHOD: Trace Metals ((EPA SW 846 Method	1 6010/7C	(00				
Percent recoveries (%R)	for an ICP interferenc	e check	sample, a laboratory con	Irol sample and a matrix (spike sample were r	ecalculated using the	e following formula:
%R = <u>Found</u> x 100 True	Where, Found = Conce True =	ntration of ∉ Found = Concen	aach analyte <u>measured</u> in the a = SSR (spiked sample result) - tration of each analyte in the st	nalysis of the sample. For the I SR (sample result). turce.	matrix spike calculation,		
A sample and duplicate r	elative percent differe	nce (RPI	D) was recalculated usinç	the following formula:			
RPD = <u> S-D </u> × 100 (S+D)/2	Where, $S = Ot$ D = Dt	iginal samp Iplicate san	ole concentration nple concentration				
An ICP serial dilution per-	cent difference (%D)	was reca	Itculated using the followi	ng formula:			
%D = <mark>II-SDR</mark> x 100 I	Where, I = Inil SDR = Serial Dil	iat Sample ution Resul	Result (mg/L) It (mg/L) (Instrument Reading x	5)			
		1	Found/S/I	True / D / SDR (units)	Recalculated	Raphriad via con ven	Acceptable
Sample ID	Iype or Analysis		(smm)			ANT NED / AD	(mm)
ITCS AD ICP I	interference check	Ð	104 rela	1002	104	л О -)+
LCS Labo	oratory control sample)	20.1 mg/kg	210 mg/kg	101	101	×
Matr	rix spike		(SSR-SR)		•)
	Nicate						
Ī	serial dilution						
Comments: <u>Refer to ap</u>	ppropriate worksheet	for list of	qualifications and associ	ated samples when repor	ted results do not ac	iree within 10.0% of	the recalculated results.

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VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

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

Please see qu <u>X N N/A</u> <u>Y N N/A</u> <u>X N N/A</u>	alificatio Have I Are re Are all	ns below for all questions a results been reported and c sults within the calibrated ra detection limits below the (nswered "N". alculated co ange of the ir CRDL?	Not applicable question rrectly? Instruments and within t	ons are identified as "I he linear range of the	N/A". ICP?
Detected analy following equa	yte resul ition:	ts for	A		were recalculated and	l verified using the
Concentration = RD = FV = In. Vol. = Dil = %S =	(RD)(FV (In. Vol. Raw dat Final vol Initial vo Dilution Decimal	<u>()(Dil)</u> a concentration lume (ml) lume (ml) or weight (G) factor percent solids		nlation: DmL)(5)(12- 10 904)(1,050	$\frac{10 \log l}{00} = 6$	s. Ymg/ks
Sampie I	D	Analyte		Reported Concentration (MC (C))	Calculated Concentration	Acceptable (Y/N)
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RECALC.4S2

LDC Report# 23436D4

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	Tronox LLC Facility, PCS, Henderson, Nevada
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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.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- B The analytical result may be a false positive totally attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.
- JB The analytical result may be biased high and partially attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.
- JK The analytical result is an estimated maximum possible concentration (EMPC).
- X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.
- J-TDS The analytical result is estimated based on failure of the Total Dissolved Solids (TDS) correctness check performed in accordance with the Standard Method 1030E.
- J-CAB The analytical result is estimated based on failure of the cation-anion balance correctness check performed in accordance with Standard Method 1030E.
- J-TDS & CAB The analytical result is unreliable based on the failure of the cation-anion balance and TDS correctness check performed in accordance with standard Method 1030E.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5% .

III. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No metals contaminants were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
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	А	bl

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

No Sample Data Qualified in this SDG

LDC #: 23436D4 SDG #: 280-2541-2 Laboratory: <u>Test America</u>

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 6-26-	10
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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
<u> </u>	Technical holding times	A	Sampling dates: 4/16/10
11.	ICP/MS Tune	A	
<u> </u>	Calibration	A	
IV.	Blanks	ŚW	
<u>V.</u>	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	LCSD
IX.	Internal Standard (ICP-MS)	A	
Χ.	Furnace Atomic Absorption QC	\sim	NotuLitzed
XI.	ICP Serial Dilution	N	Not performed
XII.	Sample Result Verification	N	9
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	N	
XV	Field Blanks	SW	EB=1 (no associated Samples)

Note:

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

Validated Samples:

1	- R2D EB-04152010-2 R2D	11	PBU	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 #: 234364 SDG #: 500 000

VALIDATION FINDINGS WORKSHEET Sample Specific Element Reference

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All circled elements are applicable to each sample.

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Sample ID	Matrix	Target Analyte List (TAL)
1		Al, Sb (As) Ba, Be, Cd, Ca, Cr, (Co), Cu, Fe (PB, Mg, Mn) Hg, Ni, K, Se, Ag, Na, TI, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
		Ai, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni; K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN [*] ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B. Si. CN'
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al. Sb. As. Ba. Be. Cd. Ca. Cr. Co. Cu. Fe. Pb. Mg. Mn. Hg. Ni, K. Se. Ag. Na, Tl, V, Zn, Mo, B, Si, CN.
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
÷		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN [*] ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN [*] ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN',
	r	Analysis Method
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN [*] ,
ICP Trace		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN',
ICP-MS		Al, Sb (A9, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Eb, Mg, Mn) Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,

Comments: Mercury by CVAA if performed

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S'V 846 M Inless other		Maximum ICB/CCB ^ª (uo/L)									00237																	
fetals (EPA tion units, u		Maximum PB [*] (uo/L)																										
D: Trace N Concentrat		Maximum PB" (ma/Ka)																										
METHO		Analyte	AI	sb	As	Ba	Be	8	ß	ö	8	G	Fe	Pb	Mg	Mn	۶	ī	¥	Se	Åg	Na	E		, SI		ş	

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SDG #: See Cover LDC #: 23436D4

VALIDATION FINDINGS WORKSHEET **Field Blanks**

6 Page: Reviewer: 2nd Reviewer:

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	ted Samples															
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Reason C	amples:	mple Identifica														
	Associated S	Sa														עד אמ תפופו וא
iks?	(Gi															
00) s SDG? the field blan mg/Kq	d 100 te / Other:															
6 6010B/700 entified in this detected in mple units:	factor applie lank / Rinsat															
EPA SW84 d blanks ide get analytes ociated sa	Soil Soil Eield B		Action Level			17	66									
ace Metals (Were field Were targ uo/L Ass	te: 4/16/10 ype: (circle c	Blank ID	4	0.18	0.13	17	99									
METHOD: Tr YN N/A YN N/A Blank units:	Sampling da Field blank t	Analyte		Pb	ပိ	Mn	Mg									

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT: Samples with analyte concentrations within five times the associated field blank concentration are listed above, these sample results were qualified as not detected, "U".

23436D4.wpd

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

IV. Blanks

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

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

Tronox Northgate Henderson
 VALIDATION COMPLETENESS WORKSHEET
 Stage 2B

D	ate:	6- ²⁰	i-to
Pa	ge:_	lof	1
Review	wer:	CP	-
2nd Review	wer:	ト	_

Laboratory: Test America

280-3624-1

24

LDC #:

SDG #:

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
Ι.	Technical holding times	A	Sampling dates: 5/17/16
١١.	ICP/MS Tune	A	
- 111.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	p	,
VI.	Matrix Spike Analysis	Ä	ms/D
VII.	Duplicate Sample Analysis	N	
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	A	
Χ.	Furnace Atomic Absorption QC	\mathcal{N}	Noturinzed
XI.	ICP Serial Dilution	A	
XII.	Sample Result Verification	N	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	N	
XV	Field Blanks	NQ	FB=FB-04072010-RZC

Note:

A = Acceptable N = Not provided/applicable SW = See worksheet ND = No compounds detected R = Rinsate FB = Field blank

(2**co-22 co -2**) D = Duplicate TB = Trip blank EB = Equipment blank

Validated Samples:

1	SSAM6-03-1BPC	11	rens	21	31	
2	SSAM6-03-5BPC	12		22	32	
3	SSAM6-03-5BPCMS	13		23	33	
4	SSAM6-03-5BPCMSD	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 Report# 2343614

Laboratory Data Consultants, Inc. Data Validation Report

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

Collection Date: May 18, 2010

LDC Report Date: July 6, 2010

Matrix:

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.

2

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

IV. Blanks

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

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)	А

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	
Laborator	W. Test America	

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

Stage 2B/4

Date:6-79-	-10
Page: 1_of_1_	
Reviewer:	
2nd Reviewer:	-

(280-2216-2)

EB = Equipment blank

Laboratory: lest America

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: 5/18/10
11.	ICP/MS Tune	A	
- 111.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	A	ms/D
VII.	Duplicate Sample Analysis	\mathcal{N}	
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	A	
X.	Furnace Atomic Absorption QC	\mathcal{N}	No+utilized
XI.	ICP Serial Dilution	A	
XII.	Sample Result Verification	A	Not reviewed for Stage 2B validation.
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	N	
xv	Field Blanks	NO	EB= EB-05182010-RZC, FB=FB-04072010-RZC,
Note:	A = Acceptable ND = N N = Not provided/applicable R = Rin	o compounds sate	(280-3670-3) (280-280-2) B detected D = Duplicate TB = Trip blank FB - 04072010- RED

N = Not provided/applicable SW = See worksheet

R = Rinsate FB = Field blank

Validated Samples: ** Indicates sample underwent Stage 4 validation 50:1

1	SSAM6-04-1BPC**	11	RBS	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:



VALIDATION FINDINGS CHECKLIST



Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.				
Cooler temperature criteria was met.				
II. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?	$\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $			
Were %RSD of isotopes in the tuning solution ≤5%?	/	1		
III. Calibration				
Were all instruments calibrated daily, each set-up time?		ſ		
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?	/	ל		
Were all initial calibration correlation coefficients > 0.995?	/	-		
IV. Blanks				
Was a method blank associated with every sample in this SDG?				
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		/	-	
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?	\langle			
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?	-	-		
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	/	_		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	1	(
Were the MS/MSD or duplicate relative percent differences (RPD) \leq 20% for waters and \leq 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were \leq 5X the RL, including when only one of the duplicate sample values were \leq 5X the RL.	/	-		
VII. Laboratory control samples				
Was an LCS anaylzed for this SDG?	1			
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?	/	-		

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

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VALIDATION FINDINGS CHECKLIST



Validation Area	Yes	No	NA	Findings/Comments
VIII. Furnace Atomic Absorption QC				
If MSA was performed, was the correlation coefficients > 0.995?			\leq	
Do all applicable analysies have duplicate injections? (Level IV only)			\leq	
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%? (Level IV only)			\leq	
Were analytical spike recoveries within the 85-115% QC limits?				
IX. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?	_			
Were all percent differences (%Ds) < 10%?	-			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		-		
X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)				
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the internal standard in the associated initial calibration?	/	h		
If the %Rs were outside the criteria, was a reanalysis performed?				
XI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		-		
Were the performance evaluation (PE) samples within the acceptance limits?			/	
XII. Sample Result Verification	······			• • • • • • • • • • • • • • • • • • •
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	/	-		
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	/	ł		
XIV. Field duplicates	4			•
Field duplicate pairs were identified in this SDG.		-	╉	
Target analytes were detected in the field duplicates.			/	-
XV. Field blanks				
Field blanks were identified in this SDG.	1	†		
Target analytes were detected in the field blanks.		$\left \right $	1	



Initial and Continuing Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Page: lof 2nd Reviewer: Reviewer:

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

An initial and continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula: %R = <u>Found</u> x 100 True

Where, Found = concentration (in ug/L) of each analyte <u>measured</u> in the analysis of the ICV or CCV solution True = concentration (in ug/L) of each analyte in the ICV or CCV source

						· · · ·	
					Recalculated	Reported	-
Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	8%		Acceptable
	ICP (Initial calibration)					7aR	(N/A)
	GFAA (Initial calibration)						
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
	GFAA (Continuing calibration)						
	CVAA (Continuiting collibriation)						
JCV	ICP/MS (Initial calibration)	AS	414	0.0h	50	וטרו	2
(CCUCUCI:13)	ICP/MS (Continuing calibation)		51.7	2	2		
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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

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VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

Reviewer: Page:

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:

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.
%R = Found x 100	True	

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

S = Original sample concentration D = Duplicate sample concentration	
Where,	
RPD = <u> S-D </u> × 100 (S+D)/2	

An ICP serial dilution percent difference (%D) was recalculated using the following formula:

%D = <u>I-SDR</u> × 100

Where, I = Initial Sample Result (mg/L) SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

Sample IDType of AnalysisElementFound / S // (K)True / D / SDR (write)%R / RPD / %D%A / RPD / %D $\pm CS \ AGS$ ICP interference checkAS $107 \ Jogl / Jogl /$				-		Recalculated	Renorted	
$\pm CS AG$ ICP Interfere checkAS $107 \ Log$ $107 \ Log$ 107 107 Y $L CS$ Laboratory control sample $101, 3$ 200 97 97 97 L Matrix splie $8sRsR_3$ $21, 2$ $21, 7$ 102 07 S buplicate $25, 6$ $21, 7$ 102 102 516 buplicate $25, 6$ $23, 5$ 97 97 1 107 estal dilution $1, 0, 0$ $1, 47$ 105 $9, 4$	Sample ID	Type of Analysis	Element	Found / S / 1 K	True / D / SDR (units) m8-/ K5	%R / RPD / %D	%R / RPD / %D	Acceptable (Y/N)
LCS Latoratory control sample $ $ $ C _{C}$ 20 97 97 S Matrix splice $ $ (SSR-SR) $ C _{C}$ $21, 2$ 102 102 102 $5 _{C}$ Duplicate $25, 6$ $23, 5$ 9 9 $ $ 1 $ c^{2}$ serial dilution \downarrow $4, 0$ $4, 47$ 105 105	ICS AB	ICP interference check	A5	107 roll	100 201	201	<u>Co</u>	7-
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	rc>	Laboratory control sample		101,3	20	97	97	
$5 6 Duplicate 25,6 73,5 9 9$ $1 10^{2} \text{ serial dilution} 10^{2} 10^{2} 10^{2} 9^{2} 10^{2} 1$	S	Matrix spike		(ssr-sr) 21,6	2112	201	201	
1 102 serial dilution 1 4,0 14,2 105,9,6 9,4 4	9/5	Duplicate		75,6	73,5	9	6	
		ICP serial dilution	\rightarrow	4,0	747 7	9'6 50 7	9.4	\rightarrow

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.

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VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	Lof
Reviewer:	CP-
2nd reviewer:	in

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

Please see qu <u>X N N/A</u> <u>Y N N/A</u> <u>Y N N/A</u>	Alificatio Have Are re Are all	ns below for all questions answerd results been reported and calculat sults within the calibrated range o I detection limits below the CRDL?	ed "N". ted co f the ir	Not applicable questic rrectly? Instruments and within the	ons are identified as "I he linear range of the	N/A". ICP?
Detected analy following equa	yte resul ation:	Its for	AS	>	were recalculated and	I verified using the
Concentration =	<u>(RD)(F</u> (in. Vol	<u>()(Dii)</u> .)(%S)	Recalcu	lation:		
RD = FV = In. Vol. = Dil = %S =	Raw dat Final vo Initial vo Dilution Decimal	ta concentration lume (mi) lume (mi) or weight (G) factor l percent solids		(100 mL)(5) (0.923)(1.0)		.4.0mg/kg
Sample I	D	Analyte		Reported Concentration (MQ-155)	Calculated Concentration	Acceptable (Y/N)
		AS		Ч.О	4.0	Y
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Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: Tronox LL

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Calibration

An initial calibration was performed.

The frequency and analysis criteria of the initial calibration verification (ICV) and continuing calibration verification (CCV) were met.

IV. Blanks

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

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

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
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

	Ч	
LDC #:	24 \$ 36J4	
SDG #:	280-3679-3	

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET Stage 2B

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

Date:6-29-10

Laboratory: Test America

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
1.	Technical holding times	A	Sampling dates: SIK6110
11.	ICP/MS Tune	A	
.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	N	Clientspecified
VII.	Duplicate Sample Analysis	\square	T
VIII.	Laboratory Control Samples (LCS)	A	LCS/D
IX.	Internal Standard (ICP-MS)	A	
Χ.	Furnace Atomic Absorption QC	N	Notubilized
XI.	ICP Serial Dilution	N	Notpresoned
XII.	Sample Result Verification	N	
XIII	Overail Assessment of Data	P	
XIV	Field Duplicates	\wedge	
xv	Field Blanks	ND	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-05182010-RZC	11	8 Br	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

LDC Report# 23436D6

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	Tronox LLC Facility, PCS, Henderson, Nevad
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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	Anaiyte	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
LDC #:23436D6	VALIDATION COMPLETENESS WORKSHEET
SDG #: <u>280-2541-2</u>	_ Stage 2B
Laboratory: Test America	

Date:	6-29-10
Page:_	Lof]
Reviewer:	CR-
2nd Reviewer:	V

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
١.	Technical holding times	A	Sampling dates: 4/16/10
lla.	Initial calibration	A	
ilb.	Calibration verification	A	
.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	Λ	Client specified
V	Duplicates	N	7
VI.	Laboratory control samples	A	LCS/D
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
L	Field blanks	ND	FB=FB-0407ZO10-RZD

Note:

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

licable R

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

(280-2216-2)
D = Duplicate
TB = Trip blank
EB = Equipment blank

Validated Samples:

1	SSAL5-05-2BPC	11	PBS	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:

LDC Report# 23436H6

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 SSAN5-02-1BPCMSD 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

	I ronox Northgate Henderson
LDC #: 23436H6	VALIDATION COMPLETENESS WORKSHEET
SDG #: <u>280-3624-1</u>	Stage 2B/4
Laboratory: Test America	

Date 6-29-10
Page: <u>1_of</u>
Reviewer:
2nd Reviewer:

METHOD: (Analyte) Perchlorate (EPA Method 314.0)

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

	Validation Area		Comments
١.	Technical holding times	A	Sampling dates: 5/17/10
lla.	Initial calibration	A	
llb.	Calibration verification	A	
	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	msto
V	Duplicates	A	OLP
VI.	Laboratory control samples	A	LISÍD
VII.	Sample result verification	A	Not reviewed for Stage 2B validation.
VIII.	Overall assessment of data	A,	
IX.	Field duplicates	N	
L_x	Field blanks	NO	FB = FB. 04072010-RZC

Note:

A = Acceptable N = Not provided/applicable SW = See worksheet ND = No compounds detected R = Rinsate FB = Field blank **CL80-2280-2)** D = Duplicate TB = Trip blank EB = Equipment blank

Validated Samples: ** Indicates sample underwent Stage 4 validation

1	SSAN5-02-1BPC	11	୧୦୦୦	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:





Method: Inorganics (EPA Method See Over)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.				
Cooler temperature criteria was met.				
II. Calibration				
Were all instruments calibrated daily, each set-up time?	\langle			
Were the proper number of standards used?				
Were all initial calibration correlation coefficients > 0.995?				
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?		(
Were titrant checks performed as required? (Level IV only)				
Were balance checks performed as required? (Level IV only)				
III. Blanks				
Was a method blank associated with every sample in this SDG?	\leq			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		/		
IV. Matrix spike/Matrix spike duplicates and Duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	/			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	/			
Were the MS/MSD or duplicate relative percent differences (RPD) \leq 20% for waters and \leq 35% for soil samples? A control limit of \leq CRDL(\leq 2X CRDL for soil) was used for samples that were \leq 5X the CRDL, including when only one of the duplicate sample values were \leq 5X the CRDL.	/			
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?	$\boldsymbol{\mathcal{C}}$			
Was an LCS analyzed per extraction batch?	_			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?	1			
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?				
Were the performance evaluation (PE) samples within the acceptance limits?			(





Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?				
Were detection limits < RL?	/			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	/			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.		7	-	
Target analytes were detected in the field duplicates.				-
X. Field blanks				
Field blanks were identified in this SDG.	\land			
Target analytes were detected in the field blanks.		/		

LDC #: 23436H6 SDG #: SEQ COLD

Validatin Findings Worksheet Initial and Continuing Calibration Calculation Verification

Page:_____of Reviewer:_______2nd Reviewer:______2nd Reviewer:_______

Method: Inorganics, Method 314.0

The correlation coefficient (r) for the calibration of $\frac{OO}{O}$ was recalculated. Calibration date: $\frac{5/17/10}{10}$

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

%R = Found X 100

True

Where,

Found = concentration of each analyte <u>measured</u> in the analysis of the ICV or CCV solution True = concentration of each analyte in the ICV or CCV source

-					Recalculated	Reported	Acceptable
Type of analysis	Analyte	Standard	Conc. (ug/l)	Area	r or r²	r or r²	(V/N)
Initial calibration		s1	~	0.00137			
		s2	2.5	0.00562	0.999878	0.999700	\ -
		s3	S	0.01434)-
	55	s4	10	0.03176			
		s5	20	0.06198			•
		s6	40	0.12605			
Calibration verification		TCN	02	[Lh.02 [Lh.02	101		
Calibration verification	\rightarrow	SC V	3	73,397	111		\rightarrow
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.

2343676	Second
DC #:	DG #:

VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

Page: 2nd Reviewer: Reviewer:

METHOD: Inorganics, Method Second

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

concentration of each analyte <u>measured</u> in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result). concentration of each analyte in the source. Found = True = Where, %R = Found x 100 True

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

1 1 0 0 RPD = <u>1S-D1</u> × 100 Where, (S+D)/2

Original sample concentration Duplicate sample concentration

	-						
		-	Found / S		Recalculated	Reported	
Sample IU	Typs of Analysis	Element	(Malley-Mal K)	(unite) (C)	0dH / 8%	%R / RPD	Acceptable
لح ا	Laboratory control sample		\				6
5		Clor	Q.103	6,0980		501	J.
				-) · .)	<u> </u>
ן	Maunx spike sample		(SSR-SR)				
	•		253	11.2	01		
		·)	- - -		PH:	
Ċ	Duplicate sample	/					-
5		>	Unz.	227		\mathbf{V}	
		•)) , .	- - - -		J	¢
Commenter Botor							

to appropriate worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated 5 results

TOTCLC.6

LDC #: 2343646 SDG #: <u>seeco</u>en

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

	11
Page:	
Reviewer:	9-
2nd reviewer:	<u></u>

SPECARL METHOD: Inorganics, Method ____

Slope (0,891)(1000) % Solid (1000) Reported Calculated Concentration Concentration Acceptable # Sample ID Analyte (mq/g)(m8/kg) (Y/N) 11/ 160 7 ()4 60

Note:

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** SSAM6-04-1BPCMSD SSAM6-04-1BPCMSD

**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.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- B The analytical result may be a false positive totally attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.
- JB The analytical result may be biased high and partially attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.
- JK The analytical result is an estimated maximum possible concentration (EMPC).
- X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.
- J-TDS The analytical result is estimated based on failure of the Total Dissolved Solids (TDS) correctness check performed in accordance with the Standard Method 1030E.
- J-CAB The analytical result is estimated based on failure of the cation-anion balance correctness check performed in accordance with Standard Method 1030E.
- J-TDS & CAB The analytical result is unreliable based on the failure of the cation-anion balance and TDS correctness check performed in accordance with standard Method 1030E.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met.

III. Blanks

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

Sample EB-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)	А

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	_
Laborato	orv: Test America	

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

Stage 2B/4

	Date:_	620	rle
ł	age:_	of	Ţ
Rev	iewer:_	R	
2nd Rev	iewer:	\sim	

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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
1.	Technical holding times	A	Sampling dates: 5/18/10
lia.	Initial calibration	A	
llb.	Calibration verification	A	
111,	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	ms/p
V	Duplicates	A	ap
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	
L X	Field blanks	Sw	FB= FB-04072010- BZD, FB-04072010-BZC
Note:	A = Acceptable N = Not provided/applicable SW = See worksheet	ND = No compounds R = Rinsate FB = Field blank	(250-226-2) s detected D = Duplicate TB = Trip blank EB = Equipment blank C250-2250-2) EG = EG-05182010-R30 C250-2250-2)

Validated Samples: ** Indicates sample underwent Stage 4 validation

			1	<u> </u>	00.1		
1	SSAM6-04-1BPC**	11	SSAM6-04-1BPCDUP	21	F135	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:



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Method:Inorganics	(EPA Method	See ar)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	\langle			
Cooler temperature criteria was met.	\backslash	-		
II. Calibration				
Were all instruments calibrated daily, each set-up time?				
Were the proper number of standards used?	/	-		
Were all initial calibration correlation coefficients < 0.995?	/	-		
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	<	-		
Were titrant checks performed as required? (Level IV only)			-	
Were balance checks performed as required? (Level IV only)			-	
III. Blanks				
Was a method blank associated with every sample in this SDG?				
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		/		
IV. Matrix spike/Matrix spike duplicates and Duplicates			****	
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	-	-		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	/	-		
Were the MS/MSD or duplicate relative percent differences (RPD) \leq 20% for waters and \leq 35% for soil samples? A control limit of \leq CRDL(\leq 2X CRDL for soil) was used for samples that were \leq 5X the CRDL, including when only one of the duplicate sample values were \leq 5X the CRDL.	/			
V. Laboratory control samples				
Was an LCS anaylzed for this SDG?	-			
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?				
VI. Regional Quality Assurance and Quality Control				·
Were performance evaluation (PE) samples performed?		-		
Were the performance evaluation (PE) samples within the acceptance limits?				

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VALIDATION FINDINGS CHECKLIST



Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	\backslash			
Were detection limits < RL?	/			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	/			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.		7	-	
Target analytes were detected in the field duplicates.			-	-
X. Field blanks				
Field blanks were identified in this SDG.	7			
Target analytes were detected in the field blanks.	/			

LDC #: <u>2343616</u> SDG #: <u>See Cover</u>

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

۳<u>م</u> Page: Reviewer: 2nd Reviewer:

		0.33	3.3	CI04
	No Qualifiers		EB-05182010-RZC (SDG#: 280-3679-3)	
Sample Ider		Action Limit	Blank ID	Analyte
ssociated Samples: 1, 2	her: (ÉB)	r applied <u>10x</u> / Rinsate / Ott	5/18/10 Soil facto (circle one) Field Blank	Sampling date: Field blank type:
Reason Code: be	? ild blanks? 	<u>Cover</u> d in this SDG cted in the fie units: <u>mg/Kg</u>	nics, EPA Method See Vere field blanks identifie Vere target analytes dete Associated sample u	METHOD: Inorga V V N/A V V V V/A V/A V Blank units: ug/L

Sample Identification

LDC # 2343654		tial and Cor	Validatin Fi <u>itinuing Cal</u>	ndings Worksl <u>libration Calcu</u>	neet lation Verifica	ition	Page: <u>of</u> Reviewer: <u>OC</u> 2nd Reviewer: <i>V</i>
Method: Inorganics, M	lethod	0.14.0					
The correlation coefficient ((r) for the calibr	ation of <u>CU</u>	T was recal	culated.Calibration	date:	0	
An initial or continuing cali	bration verificat	tion percent rec	overy (%R) was	s recalculated for e	ach type of analys	is using the follov	ving formula:
%R = <u>Found X 100</u> True		Where,	Found = conce True = conce	entration of each ar entration of each ar	ıalyte <u>measured</u> ir ıalyte in the ICV oı	the analysis of th CCV source	le ICV or CCV solution
					Recalculated	Reported	Acceptable
Type of analysis	Analyte	Standard	Conc. (ug/l)	Area	r or r²	r or r ²	(Y/N)
Initial calibration		s1	~	0.00138			
		s2	2.5	0.00562	0.999878	0.999699	L.
	$\frac{\langle}{\langle}$	s3	5	0.01434			2
	50	s4	10	0.03176			
.		s5	20	0.06198			
		s6	40	0.12605			
Calibration verification		TCV	20	Farre(-gl) 20.471	107	ſ	
Calibration verification		CCU	2	32.057	101		
Calibration verification	\rightarrow		01	10,612	106		\rightarrow
Comments: Refer to Calibr 10.0% of the recalculated r	ation Verificatic esults	on findings worl	ksheet for list o	of qualifications and	d associated samp	oles when reported	d results do not agree within

	16TY	VAL	-IDATION FINDIN evel IV Recalcul	NGS WORKSHE ation Workshee		2 PH	Page: of Teviewer: C	
METHOD: Inorgat	nics, Method Secco	ver	- - - -					
Percent recoverie:	s (%R) for a laboratory co	introl sample and	a matrix spike samp	le were recalculated	using the following	formula:		
%R = <u>Found</u> x 11 True	00 Where, Fou Tru	and = conc Four	sentration of each an nd = SSR (spiked sa sentration of each an	talyte <u>measured</u> in ti umple result) - SR (a ialyte in the source.	he analysis of the se ample result).	ample. For the matr	ix spike calculation,	
A sample and dup	plicate relative percent diff	ference (RPD) wa	is recalculated using	the following formul		•		
RPD = <u>IS-DI</u> × (S+D)/2	:100 Where, S = D =	Orig	inal sample concentr licate sample concer	ration ntration		· · · · ·		
	•		Entered (e /)		Recalculated	Reported		
Sample ID	Type of Analysis	Element	(1) (attens)	(unitar)	ada / az	%R / RPD	Acceptable (Y/N)	
57	Laboratory control sample	ClO4	<u>ر</u> ها	6,99	اں <u>دا</u>	101)	
(Matrix spike sample		(SSR-SR)		-			
5			0000622	0000012		hll		
	Duplicate sample	\rightarrow	32.0000	30-1000	D	5		
Comments: Referresults.	r to appropriate workshee	et for list of qualifi	cations and associate	ed samples when re	ported results do no	t agree within 10.0%	of the recalculated	

TOTCLC.6

LDC #: \mathcal{V} SDG #:_≤

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

rage:	
Reviewer:	q
2nd reviewer:	

METHOD: Inorganics, Method ____

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

Have results been reported and calculated correctly?

 $\left(\begin{array}{c|c}
\underline{Y} & \underline{N} & \underline{N/A} \\
\underline{Y} & \underline{N} & \underline{N/A} \\
\underline{Y} & \underline{N} & \underline{N/A}
\end{array}\right)$

Are results within the calibrated range of the instruments?

Stean

Are all detection limits below the CRQL?

()

Concentration =

Recalculation:

OFFSET)(DF)(PropFactor) % solid

 $\frac{(20000)(100)(0.047+0.0019)}{0.0032} = 3.2 \times 10^{-6}$ (0.923)(10.39)

reported with a positive detect were

#	Sample ID	Analyte	Reported Concentration (WK(KS)	Calculated Concentration (MR/LG)	Acceptable (Y/N)
		. MQLI	320000	3200000	
		· ·		_	
 					
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Note:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met.

III. Blanks

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

Sample EB-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

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

All analytes reported below the PQL were qualified as follows:

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

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
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

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET Stage 2B

Date: 629-10 Page: ___of __ Reviewer: 2nd Reviewer:

LDC #: 23436J6

SDG #: 280-3679-3 Laboratory: Test America

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: 516110
lla.	Initial calibration	A	
Ilb.	Calibration verification	A	
111.	Blanks	A	10
IV	Matrix Spike/Matrix Spike Duplicates	A	ms/D
V	Duplicates	A	DYP
VI.	Laboratory control samples	A	LCSD
VII.	Sample result verification	N	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
	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 PBW 21 31 EB-05182010-RZC 11 1 22 32 2 EB-05182010-RZCMS 12 23 33 EB-05182010-RZCMSD 13 3 34 EB-05182010-RZCDUP 24 4 14 35 25 5 15 26 36 16 6 27 37 7 17 38 8 18 28 19 29 39 9 20 30 40 10

Notes:

543	DC #: 24236 J6	DG #: See Cover
	С Ц	SDG

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

ď QPage: Reviewer: (2nd Reviewer:

WETHOD: Inorganics, EPA Method See Cover Y N/A Were field blanks identified in this SDG? Y N/A Were target analytes detected in the field blank units: ug/L Blank units: ug/L Associated sample units: mg/Kg Sampling date: 5/18/10 Soil factor applied Field blank type: (circle one) Field Blank / Rinsate / Other
--

Reason Code: be

Associated Samples: No associated samples

Analyte	Blank ID	Action Limit	Sample Identification	
	-			
2104	3.3	0.33		