

LABORATORY DATA CONSULTANTS, INC.

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Northgate Environmental Management, Inc.

July 8, 2010

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

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 24, 2010. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 23448:

SDG#

Fraction

280-2131-11, 280-2352-7, 280-2400-11 Semivolatiles, Metals 280-2500-10, 280-2541-10, 280-2699-6 280-2836-10, 280-3197-8, 280-3264-7 280-3679-2

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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Attachment 1

DL 04/24/10

Page: 1 of 1 Reviewer: JE 2nd Reviewer: BC

LDC #: 23448

SDG #: <u>280-2131-11</u>, <u>280-2352-7</u>, <u>280-2400-11</u>, <u>280-2500-10</u>, <u>280-2541-10</u> <u>280-2699-6</u>, <u>280-2836-10</u>, <u>280-3197-8</u>, <u>280-3264-7</u>, <u>280-3679-2</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		t e		
Were EDD anomalies identified?		Х		
If yes, were they corrected or documented for the client?			х	See EDD_discrepancy_ form_LDC23448_070810.doc
IV. EDD Delivery				
Was the final EDD sent to the client?	X			

Tronox LLC Facility, PCS, Henderson, Nevada Data Validation Reports LDC #23448

Semivolatiles



Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS, Henderson, Nevada

Collection Date:

May 6, 2010

LDC Report Date:

July 6, 2010

Matrix:

Soil

Parameters:

Semivolatiles

Validation Level:

Stage 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-3264-7

Sample Identification

SSAO3-02-2BPC

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 with the following exceptions:

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
MB 280-16304/1-A	5/19/10	Di-n-octylphthalate	58.8 ug/kg	All samples in SDG 280-3264-7

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

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 SSAO3-02-2BPC. Since the sample was diluted out, no data were qualified.

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. 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 280-3264-7	All compounds reported below the PQL.	J (all detects)	Α

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 280-3264-7

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-3264-7	SSAO3-02-2BPC	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 280-3264-7

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Field Blank Data Qualification Summary - SDG 280-3264-7

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #:	23448l2a	VALIDATION COMPLET
SDG #:	280-3264-7	Stag
Laborato	ry: Test America	

Page: lof_ 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: 406 /ro
11.	GC/MS Instrument performance check	A	
111.	Initial calibration	A	7. KSD 12 100/101 = 25 }
IV.	Continuing calibration/ICV	A	100/101 € 25 }
V.	Blanks	SW	
VI.	Surrogate spikes	S₩	
VII.	Matrix spike/Matrix spike duplicates	<i>N</i>	Client Spec
VIII.	Laboratory control samples	<u> </u>	ics
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	<u>*</u>	
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	ND	FB = FB-04072010- RZC (280-2280-2)

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:

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	301		A CONTRACTOR OF THE CONTRACTOR		
1	SSAO3-02-2BPC	11	21	31	
2	MB 280-16304/1-A	12	22	32	
3		13	23	33	
4		14	24	34	
5		15	25	35	
6		16	26	36	
7		17	27	37	
8		18	28	38	
9		19	29	39	
10		20	30	40	

LDC #: 23 448 1 29 SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Method: Semivolatiles (EPA SW 846 Method 8270C)

Metrod: Cernivolatiles (EFA SW 646 Metrod 8270C)	,			
Validation Area	Yes	No	N/	Findings/Comments
I. Technical holding times				The state of the s
All technical holding times were met.				
Cooler temperature criteria was met.	/			
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?				
Were all samples analyzed within the 12 hour clock criteria?				
III. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?	(
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?				
Was a curve fit used for evaluation?	/			
Did the initial calibration meet the curve fit acceptance criteria of > 0.990?	/			
Were all percent relative standard deviations (%RSD) \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) ≤ 25% and relative response factors (RRF) ≥ 0.05?				
V. Blanks				
Was a method blank associated with every sample in this SDG?				
Was a method blank analyzed for each matrix and concentration?				
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.				
VI. Surrogate spikes				
Were all surrogate %R within QC limits?	N			
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?		AN		
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.				
Nas a MS/MSD analyzed every 20 samples of each matrix?		7		
Nere the MS/MSD percent recoveries (%R) and the relative percent differences RPD) within the QC limits?			1	
/III. Laboratory control samples				
Vas an LCS analyzed for this SDG?				

LDC #: 23448 J2a SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: 12
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	T	T	T	T
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?	/	ł		
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		/		
Were the performance evaluation (PE) samples within the acceptance limits?				
X. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?		,		
Were retention times within ± 30 seconds from the associated calibration standard?				
XI. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?				
Did compound spectra meet specified EPA "Functional Guidelines" criteria?			<u>'</u>	
Were chromatogram peaks verified and accounted for?				
XII. Compound quantifation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?				
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?				
XIII. Tentatively identified compounds (TICs)	,			
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?				
Were relative intensities of the major ions within \pm 20% between the sample and the reference spectra?			1	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?				
XIV. System performance				
System performance was found to be acceptable.			_	
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.				
XVI Field duplicates				affing to the second of the se
Field duplicate pairs were identified in this SDG.		1		
Target compounds were detected in the field duplicates.				
XVII. Field blanks	1	,		
Field blanks were identified in this SDG.				
Target compounds were detected in the field blanks.		\overline{Z}		

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-Dinitrophenoi*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene**	T. 4-Chloroaniline	II. 4-Nitrophenol*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP. Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	00. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TIT.
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	WV.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	WWW.

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

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VALIDATION FINDINGS WORKSHEET Blanks

Page: \ of Reviewer: 2nd Reviewer:

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

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

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

Was a method blank associated with every sample? Y N N/A X N N/A

X N N/A Was the blank contaminated? If yes, please see qualification below. Blank extraction date: 5/19/10 Blank analysis date: 5/22/10

Associated Samples: Conc. units:

Compound	Blank ID	Sample Identification
	MB 280-	NIB 280-16304/A
444	58.8	
ion date:	Blank analysis date:_	
Conc. units:		Associated Samples:

	Associated Sample
ysis date:	
Blank analysis date:	
Blank extraction date:	onc. units:
<u> </u>	Ŏ

Compound	Blank ID	Sample Identification	

5x Phthalates 2x all others

LDC# 23448 I 29

SDG#:

VALIDATION FINDINGS WORKSHEET

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Surrogate Recovery

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

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

Were percent recoveries (%R) for surrogates 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?

*	Date	Sample ID	Surrogate	%R (Limits)	nits)	Qualifications
		(xor)	TBP	44	(26-150	No grad
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					(
DC limits (NBZ) = (FBP) = (TPH) = (PHL) =	* QC limits are advisory S1 (NBZ) = Nitrobenzene-d5 S2 (FBP) = 2-Fluorobipheny S3 (TPH) = Terpheny-d14 S4 (PHL) = Phenol-d5	QC Limits (Soil) 23-120 30-115 18-137 24-113	its (W ater)	S5 (2FP)= 2-Fluorophenol S6 (TBP) = 2.4.6-Tribromophenol S7 (2CP) = 2-Chlorophenol-44 S8 (DCB) = 1,2-Dichlorobenzene-44	QC Limits (Soil) 25-121 19-122 20-130*	QC Limits (W ater) 21-100 10-123 33-110* 16-110*

LDC#: 73448 Ind SDG#: 5a Con

VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

Reviewer: 01/2
2nd Reviewer: 01/2

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

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

RRF = $(A_x)(C_{is})/(A_{is})(C_x)$ average RRF = sum of the RRFs/numbe

 A_x = Area of Compound C_x = Concentration of compound,

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

Recalculated

%RSD

2.68

6.96 2.45 7.74

4.02

average %RSD =	average KKF = sum or %RSD = 100 * (S/X)	Tithe KKFS/	average KKF = sum of the KKFs/number of standards %RSD = 100 * (S/X)	C _x = Concentr S= Standard d	C _x = Concentration or compound, S= Standard deviation of the RRFs,	na, 'RFs,	O _{is} = Concentration of interna X = Mean of the RRFs	auon oi interna e RRFs
				Reported	Recalculated	Reported	Recalculated	Reported
		Calibration		RRF	RRF	Average RRF	Average RRF	%RSD
#	Standard ID Date	Date	Compound (Internal Standard)	(50 std)	(50 std)	(Initial)	(Initial)	
-	ICAL	5/12/2010	1,4-Dioxane (IS1)	0.5630	0.5630	0.5686	0.5686	2.7
	MSS K		Naphthalene (IS2)	1.0281	1.0281	1.0211	1.0211	6.6
			Fluorene (IS3)	1.3033	1.3033	1.2978	1.2978	7.0
			Hexachlorobenzene (IS4)	0.2320	0.2322	0.2313	0.2312	2.4
			Chrysene (IS5)	1.0597	1.0597	1.0588	1.0588	7.7
			Benzo(a)pyrene (IS6)	1.0950	1.0950	1.0629	1.0629	4.0

Area IS	256060	993578	583548	978167	1052500	1028084
Area cpd	180207	1276874	950651	283964	1394199	1407224
nc IS/Cpd	40/20	40/20	40/20	40/20	40/20	40/20

Conc	1,4-Dioxane	Naphthalene	Fluorene	Hexachiorob	Chrysene	Benzo(a)py
4.00	0.5835	1.1259	1.4452		1.1823	0.9940
10.00	0.5929	1.0644	1.3682	0.2384	1.1293	1.0380
20.00	0.5646	1.0578	1.3466	0.2340	1.1090	1.0835
50.00	0.5630	1.0281	1.3033	0.2320	1.0597	1.0950
80.00	0.5874	1.0313	1.2950	0.2362	1.0775	1.1324
120.00	0.5574	1.0018	1.2565	0.2294	0.9858	1.0769
160.00	0.5566	0.9425	1.1967	0.2264	0.9750	1.0450
200.00	6999'0	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	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.

LDC # 23448 5 rd. SDG # See Cover

Continuing Calibration Results Verification **VALIDATION FINDINGS WORSHEET**

Page / of 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:

% Difference = 100 * (ave. RRF - RRF)/ave. RRF

RRF = (Ax)(Cis)/(Ais)(Cx)

ave. RRF = initial calibration average RRF

RRF = continuing calibration RRF

Ax = Area of compound

Ais = Area of associated internal standard Cis = Concentration of internal standard

Cx = Concentration of compound

#	Standard ID	Calibration Date	Compound	Compound (Reference IS)	Average RRF (Initial RRF)	Reported (CC RRF)	Recalculated (CC RRF)	Reported %D	Recalculated %D
	K3998	05/22/10	1,4-Dioxane	(IS1)	0.5700	0.6186	0.6186	8.5	8.5
			Naphthalene	(182)	1.0211	1.0804	1.0804	5.8	5.8
			Fluorene	(183)	1.2978	1.3788	1.3788	6.2	6.2
			Hexachlorobenzene	nzene (IS4)	0.2313	0.2358	0.2358	2.0	2.0
			Chrysene	(981)	1.0588	1.0961	1.0961	3.5	3.5
			Benzo(a)pyrene	ne (IS6)	1.0629	1.1711	1.1711	10.2	10.2
2	K4039	05/23/10							
			Hexachlorobenzene	inzene (IS4)	0.2313	0.2356	0.2356	1.9	1.9

Area Cpd Area IS	334940 270713	2203284 1019705	1632002 591802	456904 968766	2330734 1063185	2310746 986592
Concentration (IS/Cpd)	40/80	40/80	40/80	40/80	40/80	40/80
nd (Reference IS)	ine (IS1)	ene (IS2)	(83)	robenzene (IS4)	(185)	Benzo(a)pyrene (IS6)
	Area Cpd	(IS1)	(IS1) Concentration Area Cpd (IS/Cpd) 334940 (IS2) 40/80 2203284	(IS1) Concentration Area Cpd (IS/Cpd) 334940 (IS2) 40/80 2203284 (IS3) 40/80 1632002	(IS1) Concentration Area Cpd (IS1) 40/80 334940 (IS2) 40/80 2203284 (IS3) 40/80 1632002 (IS4) 40/80 456904	(IS1) Concentration Area Cpd (IS/Cpd) 334940 (IS2) 40/80 2203284 (IS3) 40/80 1632002 (IS4) 40/80 456904 (IS5) 40/80 2330734

LDC#: \(\forall \) 448 \(\forall \) 79 \(\forall \) VALIDATION FINDINGS WORKSHEET \(\forall \) SDG#: \(\forall \) cover \(\forall \) Surrogate Results Verification

Page:	_lof_1_
Reviewer:	W
2nd reviewer:	

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

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

% Recovery: SF/SS * 100

Where: SF = Surrogate Found

(X) Sample ID:

٠.	o an ogato	
SS =	Surrogate	Spiked

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	19	23:0	57	52	0
2-Fluorobipheny!		56.7	ST	57	
Terphenyl-d14		63.5	64	64	8
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					

23448 1 29 SDG #: See Coner LDC#:

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

Reviewer: 374 36 2nd Reviewer: _

Page: lof 1

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

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

% Recovery = 100 * (SC/SA

SSC = Spike concentration SA = Spike added Where:

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

7-2/40471 -082 87 LCS/LCSD samples:

	S.	ike	<i>\$</i>	oike		SU		I CSD	I CS/	CS/I CSD
Compound	, Ad	Added (Va /E)	Conce	Concentration	Percent	Percent Recovery	Domoc			
		*				Necovely .	Leicelli	r el celli necovery	2	RPD
	SDI	I CSD	ICS	/ ICSD	Reported	Recalc	Reported	ν ε-ν Q	7	1.7
O. Phenomena										Necalculated
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene	2752	\$	1890	XX	DE L	44			\	
Pentachlorophenol										
Pyrene	250		1980		7	77				
		*		7						
						-				

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 #: 23 4 48 1 29 VALIDATION FINDINGS WORKSHEET SDG #: Sre Cover Sample Calculation Verification

Page:_	lof1_
Reviewer:	SVC
nd reviewer.	

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

$\langle \mathbf{Y} \rangle$	N	N/A
¥	Ν	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?

Conce	entratio	n = <u>(A.)(I.)(V.)(DF)(2.0)</u> (A _b)(RRF)(V _o)(V _i)(%S)	Example:
A _x	=	Area of the characteristic ion (EICP) for the compound to be measured	Sample I.D. $\frac{1}{2}$, $\frac{SS}{S}$: $\frac{SS}{S}$
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard	
l _s	=	Amount of internal standard added in nanograms (ng)	Conc. = $\frac{(240996)(40)(10)(10)(10)}{(909232)(0.2313)(3.46)(0.682)(0.682)(0.682)}$
V _o	=	Volume or weight of sample extract in milliliters (ml) or grams (g).	107231.49 10,687
V_{i}	=	Volume of extract injected in microliters (ul)	= 21404.5
V_{t}	=	Volume of the concentrated extract in microliters (ul)	
Df	=	Dilution Factor.	~ 21000.0 m/kg
%S	=	Percent solids, applicable to soil and solid matrices only.	7 9

2.0 Factor of 2 to account for GPC cleanup Reported Calculated Concentration Concentration # Sample ID Compound Qualification

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:

Semivolatiles

Validation Level:

Stage 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-3679-2

Sample Identification

SSAJ6-01-10BPC SSAJ6-01-10BPCMS

SSAJ6-01-10BPCMSD

Introduction

This data review covers 3 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 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 280-3679-2

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) 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 280-3679-2	All compounds reported below the PQL.	J (all detects)	А

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 280-3679-2

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-3679-2	SSAJ6-01-10BPC	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 280-3679-2

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Field Blank Data Qualification Summary - SDG 280-3679-2

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

SDG #: 280-3679-2 Stage 4
Laboratory: Test America

Da	te:7/0 2/10	
Pag	e:lof <i>]</i>	
Review	er: 	
2nd Review	er:	

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: 5/8/10
11.	GC/MS Instrument performance check	A	
111.	Initial calibration	A	2 RSD 17 COV/101 & 25 b
IV.	Continuing calibration/ICV	A	con /a = 25 b
V.	Blanks	4	
VI.	Surrogate spikes	۷2	
VII.	Matrix spike/Matrix spike duplicates	SN	
VIII.	Laboratory control samples	A	US
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	/	
XI.	Target compound identification	A	
XII.	Compound quantitation/CRQLs	₼	
XIII.	Tentatively identified compounds (TICs)	A	
XIV.	System performance	Ą	
XV	Overall assessment of data	A	
XVI.	Field duplicates	7	
XVII.	Field blanks	ZW	FB = FB-0407-2010 - KZD (280-2216-2)

Note: A = Acceptable

LDC #:___ 23448J2a

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

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	801				
)1	SSAJ6-01-10BPC	11	21	3	31
2	SSAJ6-01-10BPCMS	12	. 22	3	32
3	SSAJ6-01-10BPCMSD	13	23	3	33
4	MB 280-16997/-A	14	24	3	34
5	,	15	25	3	35
6		16	26	3	36
7		17	27	3	37
8		18	28	3	38
9		19	29	3	39
10		20	30	4	10

VALIDATION FINDINGS CHECKLIST

Method: Semivolatiles (EPA SW 846 Method 8270C)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	/			
Cooler temperature criteria was met.		<u>t </u>		
II. GC/MS Instrument performance check	1			
Were the DFTPP performance results reviewed and found to be within the specified criteria?	_			
Were all samples analyzed within the 12 hour clock criteria?				
III. Initial calibration		-		
Did the laboratory perform a 5 point calibration prior to sample analysis?				
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?				
Was a curve fit used for evaluation?				
Did the initial calibration meet the curve fit acceptance criteria of > 0.990?		-		
Were all percent relative standard deviations (%RSD) \leq 30% and relative response factors (RRF) \geq 0.05?		/		
IV. Continuing calibration				
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?		$\overline{}$		
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			1	
VII Matrix spike/Matrix spike dupticates				
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?	\forall			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		7		
VIII Laboratory control samples				
Was an LCS analyzed for this SDG?	7			
	~			

LDC #: x3 4 48 Jrg SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2 Reviewer: 506 2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?				
IX. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		/		
Were the performance evaluation (PE) samples within the acceptance limits?			_	
X. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?				
Were retention times within + 30 seconds from the associated calibration standard?	/			
XI. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?				
Did compound spectra meet specified EPA "Functional Guidelines" criteria?				
Were chromatogram peaks verified and accounted for?		^		
XII. Compound quantitation/CRQLs				Area (Albert 1997) (Albert 1997)
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?				
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?		/		
XIII. Tentatively identified compounds (TICs)				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?				
Were relative intensities of the major ions within \pm 20% between the sample and the reference spectra?			1	
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				the second secon
System performance was found to be acceptable.				
XV Overall assessment of data				
Overall assessment of data was found to be acceptable.	7			
KVI. Field duplicates				The state of the s
Field duplicate pairs were identified in this SDG.		7		
Farget compounds were detected in the field duplicates.			7	
(VII. Field blanks)				
Field blanks were identified in this SDG.				
arget compounds were detected in the field blanks.	1			

VALIDATION FINDINGS WORKSHEET

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

A. Phenoi**	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. Acenaphthene⁴⁴	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene**	T. 4-Chloroaniline	II. 4-Nitrophenol*	XX. Di-n-buty/phthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP. Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chiorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	OO. 4-Nitroaniline	DDD. Chrysene	SSS, Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	ПТ.
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: = System performance check compound (SPCC) for RRF; ** = Calibration check compound (CCC) for %RSD.

LDC#: 23 448 Jrd SDG #: Sec Con-

VALIDATION FINDINGS WORKSHEET

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Reviewer:_ 2nd Reviewer:

Field Blanks

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

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

Associated sample units: 15 /c Sampling date: 4 /c / 10 Y N N/A

Were field blanks identified in this SDG?

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

(PA)

Sample Identification Associated Samples: FB-04672010-RZD Blank ID 4 444 Compound CROL

Associated sample units: Blank units:_

Associated Samples:

Compound	Blank ID		Sa	Sample Identification	ion		
CROL							

5x Phthalates 2x All others

234485226 LDC#:

ا الم

SDG#:

VALIDATION FINDINGS WORKSHEET

Surrogate Recovery

Reviewer: Page:

2nd Reviewer:

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

ease 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?

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?

																	7	П	<u> </u>	Ī		-	\neg	
Qualifications	No juce (only 1 ms)																							QC Limits (Water) 21-100 10-123 33-110* 16-110*
%R (Limits)	32 (51-120)	()	()	()	()		()	()	()	()	()		()	()	()	()	()	()	()	()	()	()	(S5 (2FP)= 2-Fluorophenol 25-121 S6 (TBP) = 2,4,6-Tribromophenol 19-122 S7 (2CP) = 2-Chlorophenol-d4 20-130* S8 (DCB) = 1,2-Dichlorobenzene-d4 20-130*
Surrogate	TEP																							
Sample ID	MB 280- 16997/-A																							QC Limits (Soil) QC Limits (Water) 23-120 35-114 30-115 43-116 18-137 33-141 24-113 10-94
Date																								* QC limits are advisory S1 (NBZ) = Nitrobenzene-d5 S2 (FBP) = 2-Fluorobipheny S3 (TPH) = Terphenyl-d14 S4 (PHL) = Phenol-d5
#																								OC limit (1 (NBZ) (2 (FBP) (3 (TPH) 4 (PHL)
	لــــ	 1	<u> </u>	L		<u>!</u>	<u> </u>			<u> </u>		<u></u>	<u> </u>	<u></u>	<u> </u>		لسيا						لــــا	* w w w w

LDC#: 23 448 Ja SDG #: 4' C'V

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Page: 1 of Reviewer: 2nd Reviewer:

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

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

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.

N N/A

Y AND AND

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?

,	-	Qi Qanian	Pailoamo	SW SW	MSD (1) G.	(a)imi I/ QOO	Association Seminor	Out of the contractions
<u>.</u>	Date	di demism	7++	70K (LITHES)	70K (LIIIIIS)	VED (FILLIES)	Associated Satisfies	Addinications
		2/4	777	(3/ (34-(76)	(7000
		,		()	()	()		(ms in)
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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)
Α̈́	Phenol	76-90%	< 35%	12-110%	< 42%	99	Acenaphthene	31-137%	< 19%	46-118%	< 31%
ن ن	2-Chlorophenol	25-102%	< 50%	27-123%	< 40%	=	4-Nitrophenol	11-114%	< 50%	10-80%	< 50%
ш	1,4-Dichlorobenzene	28-104%	< 27%	36-97%	< 28%	天	2,4-Dinitrotoluene	28-89%	< 47%	24-96%	< 38%
اح	N-Nitroso-di-n-propylamine	41-126%	< 38%	41-116%	< 38%	Ë	Pentachlorophenol	17-109%	< 47%	9-103%	< 50%
αż	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%						

LDC# 29448 J.A. SDG#.

VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

Reviewer:

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

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

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

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

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

				Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration		RRF	RRF	Average RRF	Average RRF	%RSD	%RSD
#	Standard ID Date	Date	Compound (Internal Standard)	(50 std)	(50 std)	(Initial)	(Initial)		
-	ICAL	5/26/2010	5/26/2010 1,4-Dioxane (IS1)	0.5027	0.5027	0.5263	0.5263	3.1	3.06
	MSSK		Naphthalene (IS2)	1.0468	1.0468	1.0463	1.0463	3.3	3.31
			Fluorene (IS3)	1.3121	1.3121	1.3164	1.3164	3.6	3.62
			Hexachlorobenzene (IS4)	0.2331	0.2331	0.2374	0.2374	5.3	5.33
			Chrysene (IS5)	1.0301	1.0301	1.0388	1.0389	3.6	3.62
			Benzo(a)pyrene (IS6)	1.0993	1.0993	1.0967	1.0967	7.1	7.15

_							
	Area IS	266078	1022206	609236	1011668	1057674	887232
	Area cpd	167190	1337516	999226	294751	1361944	1219171
	nc IS/Cpd	40/50	40/20	40/20	40/20	40/20	40/50

Conc	1,4-Dioxane	Naphthalene	Fluorene	Hexachlorob	Chrysene	Benzo(a)py
4.00	0.5549	1.0427	1.2674		1.0923	0.9816
10.00	0.5146	1.0144	1.2648	0.2205	1.0307	1.0205
20.00	0.5157	0.9915	1.2629	0.2208	1.0261	1.0189
50.00	0.5027	1.0468	1.3121	0.2331	1.0301	1.0993
80.00	0.5345	1.1001	1.3820	0.2491	1.0906	1.1725
120.00	0.5242	1.0841	1.3704	0.2478	1.0442	1.1631
160.00	0.5263	1.0499	1.3364	0.2478	1.0176	1.1562
200.00	0.5373	1.0411	1.3352	0.2426	0.9792	1.1613
×	0.5263	1.0463	1.3164	0.2374	1.0389	1.0967
S	0.0161	0.0346	0.0477	0.0126	0.0376	0.0784

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.

SDG # See Cover

Continuing Calibration Results Verification VALIDATION FINDINGS WORSHEET

Page of 2nd Reviewer: 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:

ave. RRF = initial calibration average RRF

Ais = Area of associated internal standard Cis = Concentration of internal standard

RRF = continuing calibration RRF Cx = Concentration of compound Ax = Area of compound % Difference = 100 * (ave. RRF - RRF)/ave. RRF RRF = (Ax)(Cis)/(Ais)(Cx)

		Calibration			Average RRF	Reported	Recalculated	Reported	Recalculated
#	Standard ID	Date	Compound (Reference IS)		(Initial RRF)	(CC RRF)	(CC RRF)	۷۵%	0%
1	K4259	06/01/10	ı	(IS1)	0.5263	0.5448	0.5448	3.5	3.5
			Naphthalene (IS	(185)	1.0463	1.0762	1.0762	2.9	2.9
			Fluorene (IS	(183)	1.3164	1.3814	1.3814	4.9	4.9
			robenzene	(184)	0.2374	0.2465	0.2465	3.9	3.8
				(185)	1.0388	1.0705	1.0705	3.0	3.1
			Benzo(a)pyrene (IS	(981)	1.0967	1.1616	1.1616	5.9	5.9
2	K4303	06/02/10	1,4-Dioxane (IS	(IS1)	0.5263	0.5127	0.5127	2.6	2.6
			Naphthalene (IS	(182)	1.0463	1.1269	1.1269	7.7	7.7
			Fluorene (IS	(183)	1.3164	1.4475	1.4475	10.0	10.0
			robenzene	(184)	0.2374	0.2516	0.2516	6.0	6.0
			Chrysene (IS	(185)	1.0388	1.1248	1.1248	8.3	8.3
			Benzo(a)nvrene	(9)	1.0967	1.2328	1.2328	12.4	12.4

		CCV1		CCV2		
Compound (Reference IS)	(Concentration	Area Cpd	Area IS	Area Cpd	Area IS
		(IS/Cpd)				
1,4-Dioxane	(1S1)	40/80	270169	247945	245508	239426
Naphthalene	(182)	40/80	2040112	947848	2057095	912731
Fluorene	(183)	40/80	1537267	556423	1605716	554661
Hexachlorobenzene	(184)	40/80	444880	902273	462548	919235
Chrysene	(185)	40/80	2079022	971045	2265596	1007071
Benzo(a)pyrene	(186)	40/80	1995187	858787	1977238	801930

LDC#: 33448 J29 SDG#: See Cover

VALIDATION FINDINGS WORKSHEET **Surrogate Results Verification**

<u> </u>
JV4 /
V

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:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	100	61.5	62	6 V	a
2-Fluorobiphenyl		59,9	60	60	
Terphenyl-d14		73.9	74	74	
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					

23 448 5 29 SDG #: LDC #:

Matrix Spike/Matrix Spike Duplicates Results Verification VALIDATION FINDINGS WORKSHEET

Reviewer: 0/6 Page: \of_ 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

Where:

SC = Sample concentation

RPD = I MS - MSD I * 2/(MS + MSD)

SSC = Spiked sample concentration SA = Spike added

MS = Matrix spike percent recovery

MSD = Matrix spike duplicate percent recovery

MS/MSD samples:

	S	ike	Sample	Spiked S	ample	Matrix Snike	Snike	Matrix Snike Dunlicate	Dunlicate	USW/SW	Q.
Compound	Added (W/F	Ided	Concentration	Concentration (MS/EL)	ration	Percent Recovery	всочегу	Percent Recovery	ecovery	RPD	
	MS	6 MSD	0	MS	o Msn	Reported	Recalc	Reported	Recalc	Renorted	Recalculated
Phenol											
N-Nitroso-di-n-propylamine											
4-Chloro-3-methylphenoi											
Acenaphthene	2750	2770	9	629	1520	5	6	स	525	٨	7
Pentachlorophenol											
Pyrene	2750	2770	1	1720	1580	६९	2	57	57	•	√, √,

Comments: Refer to Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results. LDC#32448 J22 SDG #: See Corer

<u>Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification</u> VALIDATION FINDINGS WORKSHEET

Reviewer: 2nd Reviewer:

Page:

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

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

% Recovery = 100 * (SC/SA

Where:

SSC = Spike concentration SA = Spike added

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

LCS/LCSD samples: _

2007 16947

	is	pike	Š	Spike) [GS	31	CSD	7831	CS/II/SO
Compound	۸ (۳۶	Added (سې /لحي)	Conce	Concentration	Percent F	Percent Recovery	Percent Recovery	Recovery		RPD
	SDI	CICSD	SOI	I CSD	Reported	Borsic	Posta C	-10	31	
Phenol							oanopay	Kecalc	керопед	Kecalculated
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol		j								
Acenaphthene	2630	kΑ	1750	K.X	67	6.7				
Pentachiorophenol					\ \	\ \ \				
Pyrene	Or sic		1800		89	79				
						3				

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 #: 23 44 8 Jzg SDG #: Sre Cover

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	lof1_
Reviewer:	W
nd reviewer.	N

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

Υ	N	N/A
Y	Ν	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?

Concer	ntration	$n = \frac{(A_{s})(I_{s})(V_{t})(DF)(2.0)}{(A_{b})(RRF)(V_{o})(V_{t})(%S)}$	Example:
A _x	=	Area of the characteristic ion (EICP) for the compound to be measured	Sample I.D,
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard	
l _s	=	Amount of internal standard added in nanograms (ng)	Conc. = ()()()()()()
V _o	=	Volume or weight of sample extract in milliliters (ml) or grams (g).	
V_{I}	=	Volume of extract injected in microliters (ul)	=
V_{t}	=	Volume of the concentrated extract in microliters (ul)	
Df	=	Dilution Factor.	
%S	=	Percent solids, applicable to soil and solid matrices only.	

2.0	= Factor of 2 to acco	unt for GPC cleanup			
#	Sample ID	Compound	Reported Concentration ()	Calculated Concentration	Qualification

Tronox LLC Facility, PCS, Henderson, Nevada Data Validation Reports LDC #23448

Metals



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:

Arsenic

Validation Level:

Stage 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-2131-11

Sample Identification

SA51-2BPC

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).

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-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

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 280-2131-11	All analytes reported below the PQL.	J (all detects)	Α

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, PCS, Henderson, Nevada Arsenic - Data Qualification Summary - SDG 280-2131-11

SDG	Sample	Analyte	Flag	A or P	Reason (Code)	
280-2131-11	SA51-2BPC	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 280-2131-11

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Arsenic - Field Blank Data Qualification Summary - SDG 280-2131-11

No Sample Data Qualified in this SDG

Tronox Northgate Henderson Т

_DC #: 23448A4	VALIDATION COMPLETENESS WORKSHEE
SDG #: 280-2131-11	Stage 4
aboratory: Test America	

Date: 6-79-70
Page: 1 of 1
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.

	Validation Area		Comments
1.	Technical holding times	A	Sampling dates: 416110
II.	ICP/MS Tune	Á	
Ш.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	N	Chents pecified
VII.	Duplicate Sample Analysis	\mathcal{N}	,
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	A	
X.	Furnace Atomic Absorption QC	\sim	Notutired
XI.	ICP Serial Dilution	\sim	Notutined Notpresomed
XII.	Sample Result Verification	A	4
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	\sim	
XV	Field Blanks	NO	FB=FB-04072010-RZC (280-2280-2

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: 50, \

1	SA51-2BPC	11	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#: 23448A4 SDG#: SECOVER

VALIDATION FINDINGS CHECKLIST

Page: of Z Reviewer: 2 2nd Reviewer: 2

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

Method:Metals (EPA SW 846 Method 6010B/7000/6020)						
Validation Area	Yes	No	NA	Findings/Comments		
I. Technical holding times						
All technical holding times were met.	/	<u> </u>				
Cooler temperature criteria was met.		<u> </u>				
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?						
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury) QC limits?						
Were all initial calibration correlation coefficients > 0.995?	/					
IV. Blanks						
Was a method blank associated with every sample in this SDG?		^				
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		/				
V. ICP Interference Check Sample						
Were ICP interference check samples performed daily?						
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?						
VI. Matrix spike/Matrix spike duplicates						
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.			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.						
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?	7	-				
Was an LCS analyzed per extraction batch?						
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?						

LDC#: 23448 A4 SDG#: 500 COVERT

VALIDATION FINDINGS CHECKLIST

Page: __of __ Reviewer: __< 2nd Reviewer: __

Validation Area	Yes	No	NA	Findings/Comments
Validation Area	.00		L	Findings/Comments
VIII. Furnace Atomic Absorption QC	A		r	
If MSA was performed, was the correlation coefficients > 0.995?	30	2	/	
Do all applicable analysies have duplicate injections? (Level IV only)	2			
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%? (Level IV only)	N	<i></i>		<i>C</i>
Were analytical spike recoveries within the 85-115% QC limits?	2/			
IX. ICP Serial Dilution				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?		\ \		
Were all percent differences (%Ds) < 10%?				
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.				
X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)				
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?				
If the %Rs were outside the criteria, was a reanalysis performed?			<u> </u>	
XI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?			<u> </u>	
Were the performance evaluation (PE) samples within the acceptance limits?			_	
XII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?				
XIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.				
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.		_		
Target analytes were detected in the field duplicates.			_	
XV. Field blanks				
Field blanks were identified in this SDG.				
Target analytes were detected in the field blanks.		/		

SDG#: 2344044

VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification

Page: of Beviewer: GZ

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> × 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)	%R	%R	Acceptable (Y/N)
	ICP (Initial calibration)						
	GFAA (Initial calibration)						
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						-
	GFAA (Continuing calibration)						
	CVAA (Continuing calibration)	·					
ICV	ICP/MS (Initial calibration)	AS	9,04	0.07	101	101)-
CC Veoros)	C Vcotor) ICP/MS (Continuing calibation)	7	56.7	26.0)(0)	101	^

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

LDC# 2378-47

VALIDATION FINDINGS WORKSHEET **Level IV Recalculation Worksheet**

Reviewer: 2nd Reviewer:__

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

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

%R = Found × 100 True

Where, Found = Concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).

True = Concentration of each analyte in the source.

RPD = <u>IS-DL</u> x 100 (S+D)/2

S = Original sample concentration D = Duplicate sample concentration Where,

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

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

%D = ILSDR x 100

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

-	אומי - אמים		לבע – ספופו הומנותו (אופגער (אופגערוופון בעספריים אחסיים) אין פון מיינים אחסיים אחסיים אחסיים אחסיים אחסיים אחסיים	6			
					Recelculated	Reported	
Sample ID	Type of Analysis	Element	Found / S / 1 (units)	True / D / SDR (units)	%R / RPD / %D	%R / RPD / %D	Acceptable (Y/N)
TCSAS	ICP interference check	£3	104rpl	100 rok	1094	h01)-
527	Laboratory control sample	\rightarrow	70.1	0.02	101	(01	-)
2	Matrix spike		(SSR-SR)				
>	Duplicate				·		
>	ICP serial dilution	·					

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

LDC #: SECOLO

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page: _____of____ Reviewer: ______2nd reviewer: _____

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

		<u>-</u>	••••
YN	IVA	nave results been reported a	d range of the instruments and within the linear range of the ICP?
Detect following	ed analy	rte results fortion:	were recalculated and verified using the
Concent	ration =	(RD)(FV)(Dil) (In. Vol.)(%S)	Recalculation:
RD FV In. Vol. Dil %S		Raw data concentration Final volume (ml) Initial volume (ml) or weight (G) Dilution factor Decimal percent solids	(100mL)(5) (15.76 m/L) = 7.9 m/kg

			0	
Sample ID	Analyte	Reported Concentration (MG/KG)	Calculated Concentration (mg/KS)	Acceptable (Y/N)
	AS	79	7.9	7
· ·				
				-5

İ				
			:	
<u> </u>				

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS, Henderson, Nevada

Collection Date:

April 12, 2010

LDC Report Date:

July 6, 2010

Matrix:

Soil

Parameters:

Arsenic

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-2352-7

Sample Identification

SSAJ3-02-1BPC

SSAJ3-02-5BPC**

SSAJ3-02-1BPC FD

RSAJ2-5BPC FD

RSAJ2-2BPC

RSAJ2-5BPC

SSAJ3-02-5BPCMS

SSAJ3-02-5BPCMSD

RSAJ2-2BPCMS

RSAJ2-2BPCMSD

^{**}Indicates sample underwent Stage 4 review

Introduction

This data review covers 10 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 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-04122010-RIG3-RZD (from SDG 280-2352-2) was identified as an equipment blank. No arsenic was found in this blank.

Sample FB-04072010-RZD (from SDG 280-2216-2) 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 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 280-2352-7	All analytes reported below the PQL.	J (all detects)	Α

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

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

Samples SSAJ3-02-1BPC and SSAJ3-02-1BPC_FD and samples RSAJ2-5BPC_FD and RSAJ2-5BPC were identified as field duplicates. No arsenic was detected in any of the samples with the following exceptions:

	Concentra	tion (mg/Kg)	RPD			
Analyte	SSAJ3-02-1BPC	SSAJ3-02-1BPC_FD	(Limits)	Difference (Limits)	Flags	A or P
Arsenic	3.7	3.7	0 (≤50)	-	-	-

	Concentrati	on (mg/Kg)	nnn	Difference		
Analyte	RSAJ2-5BPC_FD	RSAJ2-5BPC	RPD (Limits)	Difference (Limits)	Flags	A or P
Arsenic	4.1	4.8	16 (≤50)	-	•	-

Tronox LLC Facility, PCS, Henderson, Nevada Arsenic - Data Qualification Summary - SDG 280-2352-7

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-2352-7	SSAJ3-02-1BPC SSAJ3-02-5BPC** SSAJ3-02-1BPC_FD RSAJ2-5BPC_FD RSAJ2-2BPC RSAJ2-5BPC	All analytes reported below the PQL.	J (all detects)	А	Sample result verification (PQL) (sp)

Tronox LLC Facility, PCS, Henderson, Nevada Arsenic - Laboratory Blank Data Qualification Summary - SDG 280-2352-7

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Arsenic - Equipment Blank Data Qualification Summary - SDG 280-2352-7

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Arsenic - Field Blank Data Qualification Summary - SDG 280-2352-7

No Sample Data Qualified in this SDG

Tronox Northgate Henderson EET

LDC #: 23448B4	_ VALIDATION COMPLETENESS WORKSHI
SDG #: 280-2352-7	Stage 2B/4
Laboratory: Test America	-

Reviewer: CA 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
1.	Technical holding times	A	Sampling dates: 4/12/10
II.	ICP/MS Tune	9	
111.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	À	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		Not utilized
XI.	ICP Serial Dilution	A	
XII.	Sample Result Verification	A	Not reviewed for Stage 2B validation.
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	SW	(1,3), (4,6)
xv	Field Blanks	ND	FB= FB-04072010-RZD, EB= EB-04122010-RIG3-BZ (280-2216-2) (280-2352-2)

Note: A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

D = Duplicate TB = Trip blank

FB = Field blank

EB = Equipment blank

Validated Samples: ** Indicates sample underwent Stage 4 validation

	<u>Sc</u>	5,1				
1	SSAJ3-02-1BPC	11	<i>ଓ</i> ଜ5	21	31	
2	SSAJ3-02-5BPC**	12		22	32	
3	SSAJ3-02-1BPC_FD	13		23	33	
4	RSAJ2-5BPC_FD	14		24	34	
5	RSAJ2-2BPC	15		25	35	
6	RSAJ2-5BPC	16		26	36	
7	SSAJ3-02-5BPCMS	17		27	37	
8	SSAJ3-02-5BPCMSD	18		28	38	
9	RSAJ2-2BPCMS	19		29	39	
10	RSAJ2-2BPCMSD	20		30	40	

Notes:		

LDC#: Secorer

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2

Reviewer: SE

2nd Reviewer: V

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

Method: Metals (EPA SW 846 Method 6010B/7000/6020)	,	, .		
Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times	·			
All technical holding times were met.				
Cooler temperature criteria was met.				
II. ICP/MS Tune			,	
Were all isotopes in the tuning solution mass resolution within 0.1 amu?				
Were %RSD of isotopes in the tuning solution ≤5%?	-			
III. Calibration				
Were all instruments calibrated daily, each set-up time?				
Were the proper number of standards used?	_			
Were all initial and continuing calibration verification %Rs within the 90-110% (80- 120% for mercury) QC limits?		-		
Were all initial calibration correlation coefficients > 0.995?		<u> </u>		
IV. Blanks				
Was a method blank associated with every sample in this SDG?				
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.			_	
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?				
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?				
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.				
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	<i>پ</i>	ſ		
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?				
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	/			

LDC#: 23448BH SDG#: SEQ COVERT

VALIDATION FINDINGS CHECKLIST

Page: __of __ Reviewer: __
2nd Reviewer: __

Validation Area	Yes	No	NA	Findings/Comments		
VIII. Furnace Atomic Absorption QC						
If MSA was performed, was the correlation coefficients > 0.995?						
Do all applicable analysies have duplicate injections? (Level IV only)						
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%? (Level IV only)			\			
Were analytical spike recoveries within the 85-115% QC limits?						
IX. ICP Serial Dilution						
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?	~					
Were all percent differences (%Ds) < 10%?						
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		/				
X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)	/44	,				
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?		~				
If the %Rs were outside the criteria, was a reanalysis performed?						
XI. Regional Quality Assurance and Quality Control						
Were performance evaluation (PE) samples performed?						
Were the performance evaluation (PE) samples within the acceptance limits?						
XII. Sample Result Verification						
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?		-				
XIII. Overall assessment of data						
Overall assessment of data was found to be acceptable.		/				
XIV. Field duplicates						
Field duplicate pairs were identified in this SDG.		ר				
Target analytes were detected in the field duplicates.						
XV. Field blanks						
Field blanks were identified in this SDG.						
Target analytes were detected in the field blanks.						

LDC#:	23448B4	
SDG#:	See Cover	

VALIDATION FINDINGS WORKSHEET Field Duplicates

_ ()	
Pagelof	_
Reviewer:	_ ,
2nd Reviewer:	_

METHOD: Metals (EPA Method 6020/7000)

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

	Concentration	on (mg/Kg)	(≤50)	(mg/Kg)	(mg/Kg)	Qualifications
Compound	1	3	RPD	Difference	Limits	(Parent Only)
Arsenic	3.7	3.7	0			

V:\FIELD DUPLICATES\FD_inorganic\23448B4.wpd

	Concentrati	on (mg/Kg)	(≤50)	(mg/Kg)	(mg/Kg)	Qualifications
Compound	4	6	RPD	Difference	Limits	(Parent Only)
Arsenic	4.1	4.8	16			

LDC # 2344864 SDG #: SECCOVER

VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification

Page: of Reviewer: GZ

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> × 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

Acceptable (Y/N) Reported % % 56 \aleph Recalculated %R g do 6 True (ug/L) 0,0/2 20.0 Found (ug/L) 45.6 39. Element AS ICP/MS (Continuing calibation) GFAA (Continuing calibration) CVAA (Continuing calibration) ICP (Continuing calibration) ICP/MS (Initial calibration) Type of Analysis GFAA (Initial calibration) CVAA (Initial calibration) ICP (Initial calibration) 20/24:26) Standard ID

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

SDG #: SER COLON 4818452 LDC#:

VALIDATION FINDINGS WORKSHEET **Level IV Recalculation Worksheet**

2nd Reviewer: 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 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 × 100 True

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

RPD = <u>IS-DL</u> × 100 (S+D)/2

Where,

S = Original sample concentration D = Duplicate sample concentration

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

%D = II-SDR x 100

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

-		nego i com		(A)			
					Recalculated	Reported	
Sample ID	Type of Analysis	Element	Found/S/1	True / D / SDR (units)	%R / RPD / %D	%R / RPD / %D	Acceptable (Y/N)
ECS APS	ICP interference check	AS	99.12gli	1001g/L	99	66)- -
\$7	Laboratory control sample		19.0	0.02	95	95	
7	Matrix spike		(SSR-SR)	1.61	26	26	
9/10	Duplicate		L3.7	7,57	Q	9	
ಹ	ICP serial dilution	\rightarrow	2,7	3.81	L'1	17	8

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

LDC #: 23448BY SDG #: <u>Secore</u>

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page;_	L	of	
Reviewer:_		2	
2nd reviewer:			
		$\overline{\nabla}$	

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

Please M N Y N Y N	see qua N/A N/A N/A		uestions answered "N". Not applicable quest orted and calculated correctly? alibrated range of the instruments and within pelow the CRDL?	
Detector following	ed analy g equat	te results for	<u>A5</u>	_ were recalculated and verified using the
Concenti	ration =	(RD)(FV)(Dil) (In. Vol.)(%S)	Recalculation:	_
RD FV In. Vol. Dil %S	==	Raw data concentration Final volume (ml) Initial volume (ml) or weight (Dilution factor Decimal percent solids	$\frac{(100m1)(5)}{(0,937)(1)}$	7.37491) = 3.7 mg/tg

		1				
Sample ID	Analyte	Reported Concentration (MS (KC)	Calculated Concentration (MY (CO))	Acceptable (Y/N)		
2	As	3.7	1275	U		
			J. /	 		

		*				
			·			
			· · · · · · · · · · · · · · · · · · ·			
			1			

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 2B

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-2400-11

Sample Identification

SSAJ3-03-1BPC SSAJ3-03-5BPC SSAJ3-03-1BPC FD

Introduction

This data review covers 3 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 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 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-04132010-RIG3-RZD (from SDG 280-2400-2) was identified as an equipment blank. No arsenic was found in this blank.

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

Sample	Finding	Flag	A or P
All samples in SDG 280-2400-11	All analytes reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

Samples SSAJ3-03-1BPC and SSAJ3-03-1BPC_FD were identified as field duplicates. No arsenic was detected in any of the samples with the following exceptions:

	Concentration (mg/Kg)					
Analyte	SSAJ3-03-1BPC	SSAJ3-03-1BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Arsenic	5.8	5.6	4 (≤50)	-	-	-

Tronox LLC Facility, PCS, Henderson, Nevada Arsenic - Data Qualification Summary - SDG 280-2400-11

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-2400-11	SSAJ3-03-1BPC SSAJ3-03-5BPC SSAJ3-03-1BPC_FD	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 280-2400-11

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada

Arsenic - Equipment Blank Data Qualification Summary - SDG 280-2400-11

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Arsenic - Field Blank Data Qualification Summary - SDG 280-2400-11

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #: 23448C4 SDG #: 280-2400-11 Stage 2B Laboratory: Test America

Date: 6-29-10 Page: \ of \ 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.

Validation Area	<u> </u>	Comments
Technical holding times	A	Sampling dates: 4/3/10
ICP/MS Tune	A	•
Calibration	A	
Blanks	A	
ICP Interference Check Sample (ICS) Analysis	A	
Matrix Spike Analysis	N	Clientspecisied
Duplicate Sample Analysis	N	ν,
Laboratory Control Samples (LCS)	A	LC>
Internal Standard (ICP-MS)	B	
Furnace Atomic Absorption QC	N	Notutilized
ICP Serial Dilution	N	Not presoned
Sample Result Verification	N	4
Overall Assessment of Data	K	
Field Duplicates	Sw	(1,3)
Field Blanks	NO	FB=FB-04072010-RZD, EB=EB-04132010-RIG3-10 (250-2216-2) s detected D=Duplicate
	ICP/MS Tune Calibration Blanks ICP Interference Check Sample (ICS) Analysis Matrix Spike Analysis Duplicate Sample Analysis Laboratory Control Samples (LCS) Internal Standard (ICP-MS) Furnace Atomic Absorption QC ICP Serial Dilution Sample Result Verification Overall Assessment of Data Field Duplicates	ICP/MS Tune Calibration Blanks ICP Interference Check Sample (ICS) Analysis Matrix Spike Analysis Duplicate Sample Analysis Laboratory Control Samples (LCS) Internal Standard (ICP-MS) Furnace Atomic Absorption QC ICP Serial Dilution Sample Result Verification Overall Assessment of Data Field Duplicates

N = Not provided/applicable

SW = See worksheet

R = Rinsate

FB = Field blank

TB = Trip blank EB = Equipment blank

Validated Samples:

	Soil					
1_	SSAJ3-03-1BPC	11	RBS	21	31	
2	SSAJ3-03-5BPC	12		22	32	
3	SSAJ3-03-1BPC_FD	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#:	23448C4
SDG#:	See Cover

VALIDATION FINDINGS WORKSHEET Field Duplicates

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

METHOD: Metals (EPA Method 6020/7000)

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

	Concentration (mg/Kg)		(≤50)	(mg/Kg)	(mg/Kg)	Qualifications
Compound	1	3	RPD	Difference	Limits	(Parent Only)
Arsenic	5.8	5.6	4			

V:\FIELD DUPLICATES\FD_inorganic\23448C4.wpd

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS, Henderson, Nevada

Collection Date:

April 16, 2010

LDC Report Date:

July 6, 2010

Matrix:

Soil

Parameters:

Arsenic

Validation Level:

Stage 2B

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-2500-10

Sample Identification

SSAL8-01-1BPC

SSAL8-01-5BPC

SSAK8-02-1BPC

SSAK8-02-5BPC

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 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-RZD (from SDG 280-2541-2) was identified as an equipment blank. No arsenic was found in this blank.

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

Sample	Finding	Flag	A or P
All samples in SDG 280-2500-10	All analytes reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, PCS, Henderson, Nevada Arsenic - Data Qualification Summary - SDG 280-2500-10

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-2500-10	SSAL8-01-1BPC SSAL8-01-5BPC SSAK8-02-1BPC SSAK8-02-5BPC	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 280-2500-10

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Arsenic - Equipment Blank Data Qualification Summary - SDG 280-2500-10

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Arsenic - Field Blank Data Qualification Summary - SDG 280-2500-10

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #:_	23448D4	VALIDATION COMPLETE
SDG #:_	280-2500-10	Stage
Laborato	ory: Test America	

	Date:	629-10
		<u>cof 1</u>
	Reviewer:	مي
2nd	Reviewer:	10

METHOD: As (EPA SW 846 Method 6020)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 4/16/10
11.	ICP/MS Tune	A	
! .	Calibration	A	
IV.	Blanks	P	
V.	ICP Interference Check Sample (ICS) Analysis	P	
VI.	Matrix Spike Analysis	N	Clientspecified
VII.	Duplicate Sample Analysis	N	
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	<i>B</i>	
X.	Furnace Atomic Absorption QC	N	Not resormed
XI.	ICP Serial Dilution	N	Not presormed
XII.	Sample Result Verification	N	
XIII.	Overall Assessment of Data	(3	
XIV.	Field Duplicates	\sim	
XV	Field Blanks	ND	FB=FB-04072010-RZD, EB=EB-04152010-2-RZD
Note:	A = Acceptable ND = No	o compound	FB=FB-04072010-RZD, EB=EB-04152010-2-RZD (280-2216-2) s detected D = Duplicate (280-2541-2)

N = Not provided/applicable

SW = See worksheet

R = Rinsate

FB = Field blank

TB = Trip blank

EB = Equipment blank

Validated Samples:

r					
1	SSAL8-01-1BPC	11	885	21	31
2	SSAL8-01-5BPC	12		22	32
3	SSAK8-02-1BPC	13		23	33
4	SSAK8-02-5BPC	14		24	34
5		15		25	35
6		16		26	36
7		17		27	37
8		18		28	38
9		19		29	39
9		20		30	40

Notes:		

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS, Henderson, Nevada

Collection Date:

April 16, 2010

LDC Report Date:

July 6, 2010

Matrix:

Soil

Parameters:

Arsenic

Validation Level:

Stage 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-2541-10

Sample Identification

SSAK7-02-10BPC

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 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.

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-04152010-2-RZD (from SDG 280-2541-2) was identified as an equipment blank. No arsenic was found in this blank.

Sample FB-04072010-RZD (from SDG 280-2216-2) 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 280-2541-10	All analytes reported below the PQL.	J (all detects)	Α

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, PCS, Henderson, Nevada Arsenic - Data Qualification Summary - SDG 280-2541-10

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-2541-10	SSAK7-02-10BPC	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 280-2541-10

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Arsenic - Equipment Blank Data Qualification Summary - SDG 280-2541-10

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Arsenic - Field Blank Data Qualification Summary - SDG 280-2541-10

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATIO

N COMPLETENESS WORKSHEET	Date: 6-29-1
Stage 4	Page: 1 of 1 Reviewer: 0
-	Reviewer:
	2nd Reviewer:

METHOD: As (EPA SW 846 Method 6020)

LDC #: 23448E4 SDG #: 280-2541-10 Laboratory: Test America

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
۱.	Technical holding times	A	Sampling dates: 4/16/10
11.	ICP/MS Tune	A	
Ш.	Calibration *	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	$\dot{\mathcal{N}}$	Client specified
VII.	Duplicate Sample Analysis	\mathcal{N}	L"
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	A	
X.	Furnace Atomic Absorption QC	\sim	NOTUEIlized
XI.	ICP Serial Dilution	N	Not preformed
XII.	Sample Result Verification	A	*
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	\wedge	
XV	Field Blanks	NO	FB=FB-04072010-BZD, EB=EB-04152010-2-RZD
lote:	A = Acceptable ND = N	o compound	FB=FB-04072010-BZD, EB=EB-04152010-2-RZD (280-2216-2) s detected D=Duplicate (280-2541-2)

N = Not provided/applicable SW = See worksheet

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

,						
1	SSAK7-02-10BPC	11	<i>RPS</i> 5	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:	* All	Calibrations	checked	from	SDGX	280-2699-6	
		40	ecalculation				

LDC# 23448£4 SDG# Secover

VALIDATION FINDINGS CHECKLIST

Page: Of Z Reviewer: QZ 2nd Reviewer: _____

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

Method: Metals (EPA SW 846 Method 6010B/7000/6020)							
Validation Area	Yes	No	NA	Findings/Comments			
I. Technical holding times	,						
All technical holding times were met.							
Cooler temperature criteria was met.							
II. ICP/MS Tune			,				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?							
Were %RSD of isotopes in the tuning solution ≤5%?							
III. Calibration							
Were all instruments calibrated daily, each set-up time?	\						
Were the proper number of standards used?							
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury) QC limits?				÷			
Were all initial calibration correlation coefficients > 0.995?							
IV. Blanks							
Was a method blank associated with every sample in this SDG?							
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		/					
V. ICP Interference Check Sample							
Were ICP interference check samples performed daily?		į					
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?							
VI. Matrix spike/Matrix spike duplicates							
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.		/					
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			_				
Were the MS/MSD or duplicate relative percent differences (RPD) \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 anayized for this SDG?			<u></u>				
Was an LCS analyzed per extraction batch?							
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?							

LDC #: 500 COVERT

VALIDATION FINDINGS CHECKLIST

Page: __of __ Reviewer: __
2nd Reviewer: __

Validation Area	Yes	No	NA	Findings/Comments			
VIII. Furnace Atomic Absorption QC			<u></u>				
If MSA was performed, was the correlation coefficients > 0.995?				-			
Do all applicable analysies have duplicate injections? (Level IV only)							
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%? (Level IV only)							
Were analytical spike recoveries within the 85-115% QC limits?							
IX. ICP Serial Dilution							
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?		/					
Were all percent differences (%Ds) < 10%?							
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.							
X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)							
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?							
If the %Rs were outside the criteria, was a reanalysis performed?			L				
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			, <u>.</u>				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?							
XIII. Overall assessment of data	-						
Overall assessment of data was found to be acceptable.							
XIV. Field duplicates							
Field duplicate pairs were identified in this SDG.							
Target analytes were detected in the field dupticates.			/				
XV. Field blanks							
Field blanks were identified in this SDG.			1				
Target analytes were detected in the field blanks.		7					

SDG #: SERCOVER 13847EZ # 2011

Initial and Continuing Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Page: 2nd Reviewer: Reviewer:_

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

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

%R = Found x 100 True

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

					Recalculated	Reported	
Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	%R	%R	Acceptable (Y/N)
	ICP (Initial calibration)						
	GFAA (Initial calibration)						
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
	GFAA (Continuing calibration)						
	CVAA (Continuing calibration)						
JCV	ICP/MS (initial calibration)	AS	39.1	0'9h	86	98	J -
CCVCZZ	CCV (22.78) ICP/MS (Continuing calibation))	h'.8 n	80.0	4	97	\rightarrow

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

SDG #: SECOLOR 132m22 LDC#

VALIDATION FINDINGS WORKSHEET **Level IV Recalculation Worksheet**

2nd Reviewer:_ Page: 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 measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).

True = Concentration of each analyte in the source.

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

RPD = <u>IS-DL</u> × 100 (S+D)/2

%R = Found × 100 True

Where,

S = Original sample concentration D = Duplicate sample concentration

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

%D = ||-SDR| x 100

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

-						:	
					Recelculated	Renorted	
Sample ID	Type of Analysis	Element	Found / S / I (units)	True / D / SDR (units)	%R / RPD / %D	%R / RPD / %D	Acceptable (Y/N)
ICS APS	ICP interference check	As	99.12glc	10 m/L	66	46	2-
(53)	Laboratory control sample	→	19,0 mglkg	20.0 mg/kg	56	95	7
>	Matrix spike		(SSR-SR)				
\nearrow	Duplicate						
\nearrow	ICP serial dilution	·					

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

533

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

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

Please W N Y N Y N	see qua N/A N/A N/A	have results been tebotted	ted range of the instruments and	questions are identified as "N/A". within the linear range of the ICP?
	ed analy ng equa	rte results fortion:	AS	were recalculated and verified using the
Concent	ration =	(RD)(FV)(Dil) (In. Vol.)(%S)	Recalculation:	
RD FV In. Vol. Dil %S	== == ==	Raw data concentration Final volume (ml) Initial volume (ml) or weight (G) Dilution factor Decimal percent solids	(100mL) (0,9	$\frac{(5)(17.12 \text{ ng/L})}{(1000)} = 9.2 \text{ rg/kg}$

Sample ID	Analyte	Reported Concentration (MG/LG)	Calculated Concentration (Ma IICS)	Acceptable (Y/N)
	AS	9.2	97	<i>V</i>
	· · · · · · · · · · · · · · · · · · ·			

	<u>.</u>			
			·	

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS, Henderson, Nevada

Collection Date:

April 21, 2010

LDC Report Date:

July 6, 2010

Matrix:

Soil

Parameters:

Arsenic

Validation Level:

Stage 2B

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-2699-6

Sample Identification

SSAK8-03-1BPC SSAK8-03-5BPC

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.

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.
- 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-RZD (from SDG 280-2216-2) 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 analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-2699-6	All analytes reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, PCS, Henderson, Nevada Arsenic - Data Qualification Summary - SDG 280-2699-6

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-2699-6	SSAK8-03-1BPC SSAK8-03-5BPC	All analytes reported below the PQL.	J (all detects)	А	Sample result verification (PQL) (sp)

Tronox LLC Facility, PCS, Henderson, Nevada Arsenic - Laboratory Blank Data Qualification Summary - SDG 280-2699-6

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Arsenic - Field Blank Data Qualification Summary - SDG 280-2699-6

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

Stage 2B

	Date: <u>629-1</u> 6
	Page: <u> </u> of <u> </u>
	Reviewer:
2nd	Reviewer:

SDG #:____280-2699-6 Laboratory: Test America

LDC #: 23448F4

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
١.	Technical holding times	P	Sampling dates: 4 [7]/10
11.	ICP/MS Tune	A	
.	Calibration	A	
IV.	Blanks	B	
V.	ICP Interference Check Sample (ICS) Analysis	P	
VI.	Matrix Spike Analysis	N	Client specified
VII.	Duplicate Sample Analysis	<u> </u>	7
VIII.	Laboratory Control Samples (LCS)	Α	LCS
IX.	Internal Standard (ICP-MS)	A	
X.	Furnace Atomic Absorption QC	\mathcal{N}	Notutired
XI.	ICP Serial Dilution	\sim	Notutived Not prefamed
XII.	Sample Result Verification	N	7
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	\sim	
XV	Field Blanks	NO	FB=FB-04072010-RZD (SD6 N 280-2216-2)

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

D = Duplicate TB = Trip blank FB = Field blank EB = Equipment blank

Validated Samples:

,	2011					
1	SSAK8-03-1BPC	11	8735	21	31	
2	SSAK8-03-5BPC	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:		

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS, Henderson, Nevada

Collection Date:

April 23, 2010

LDC Report Date:

July 6, 2010

Matrix:

Soil

Parameters:

Arsenic

Validation Level:

Stage 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-2836-10

Sample Identification

SSAJ2-01-10BPC

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 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.

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-RZD (from SDG 280-2216-2) 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 280-2836-10	All analytes reported below the PQL.	J (all detects)	А

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, PCS, Henderson, Nevada Arsenic - Data Qualification Summary - SDG 280-2836-10

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-2836-10	SSAJ2-01-10BPC	All analytes reported below the PQL.	J (all detects)	А	Sample result verification (PQL) (sp)

Tronox LLC Facility, PCS, Henderson, Nevada Arsenic - Laboratory Blank Data Qualification Summary - SDG 280-2836-10

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Arsenic - Field Blank Data Qualification Summary - SDG 280-2836-10

No Sample Data Qualified in this SDG

Tronox Northgate Henderson NORKSHEET

.DC #:	23448G4	VALIDATION COMPLETENESS V
SDG #:	280-2836-10	Stage 4
aborator	y: Test America	•

Reviewer: C? 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
I.	Technical holding times	A	Sampling dates: 4 23/10
H.	ICP/MS Tune	A	
111.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	N,	Client specified
VII.	Duplicate Sample Analysis	Ν	7
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	A	
X.	Furnace Atomic Absorption QC	N	NOTUEINIZED
XI.	ICP Serial Dilution	<i>N</i>	NOTUEINIZED NOTUEINIZED
XII.	Sample Result Verification	A	
XIII.	Overall Assessment of Data	B	
XIV.	Field Duplicates	\sim	
XV	Field Blanks	ND	FB= FB-04072010- RZD

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

(190-2216-2) D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

SSAJ2-01-10BPC

Notes:		

LDC#: Sec cover

VALIDATION FINDINGS CHECKLIST

Page: __of___2 Reviewer: __ÇC__ 2nd Reviewer: _______

Method: Metals (EPA SW 846 Method 60 106/7000/0020)			T	
Validation Area	Yes	No	NA	Findings/Comments
l. 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%?	<u> </u>			
III. Calibration			1	
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	レ	1		
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.	<u> </u>			
V. ICP Interference Check Sample				·
Were ICP interference check samples performed daily?	<u> </u>	1_	_	
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?	٧	上		
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 wishwish of		-	十	
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 spit	(e			
concentration by a factor of 4 or more, no action was taken.	+	+	+	
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was waters and ≤ 35% for soil samples?	;		1	1
used for samples that were ≤ 5X the RL, including when only one of the duplicate sample values were ≤ 5X the RL.				
VII. Laboratory control samples				
	7	1		
Was an LCS anaylzed for this SDG?	Τ.	7		
Was an LCS analyzed per extraction batch?		\overline{X}		
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC				
limits for soils?				

VALIDATION FINDINGS CHECKLIST

Page: __of __ Reviewer: __ <2nd Reviewer: __

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

2344864 SDG#: SECCOVER

VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification

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

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

%R = Found × 100 True

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

					Recalculated	Reported	C 4
		i		True (10/L)	%R	%R	Acceptable (Y/N)
Standard ID	Type of Analysis	Element	round (agre)				
	ICP (Initial calibration)						
	GFAA (initial calibration)						
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
	GFAA (Continuing calibration)						
	CVAA (Continuing calibration)	-					
		\ \	,		00	8	<u>٠</u>
707	ICP/MS (Initial calibration)	£	- R -	70,0	78	78	
^					7	70	
	CCU CONTROL (Continuing calibation)		700	20.0	47	1 1	
2 2 2 2		X					

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.

10C# 23C# 50S

VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

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 × 100 True

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

RPD = <u>IS-DL</u> × 100 (S+D)/2

Where, S = Original sample concentration D = Duplicate sample concentration

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

%D = II-SDR × 100

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

					Recalculated	Reported	
	•	į	Found (S / 1	True / D / SDR (units)	%R / RPD / %D	%R / RPD / %D	Acceptable (Y/N)
Sample ID	Type of Analysis	Clement			00	{).
TTS 00	ICP interference check	7	99 / Jan /	10022	7	7	
インにつ				7000	00	,	
0	Laboratory control sample		19 mg/kg	1200 "3/RS	$\bigcap_{i=1}^{r}$	45	
3							
•	Matrix spike		(SSR-SR)				
//							
> /		-					-
/	Duplicate						
>							
\ <	(CP serial dilution						
<u>></u>							•

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

30

LDC #: 274664 SDG #: <u>Secore</u>1

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	L	_of	
Reviewer:_	0	2	
and reviewer:	_		

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

YNI	Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Y N N/A						
	ed analy g equat	te results forion:	A5	were recalculated and verified using the			
Concent	ration =	(RD)(FV)(Dil) (In. Vol.)(%S)	Recalculation:	13 (8.4)			
RD FV In. Vol. Dil %S	= = = =	Raw data concentration Final volume (ml) Initial volume (ml) or weight (G) Dilution factor Decimal percent solids	(100mL)(5)	13.63 ugl) = 6.6 mg/15 1.10g)			

Sample ID	Analyte	Reported Concontration (MS/kS)	Calculated Concentration (M&1KS)	Acceptable (Y/N)
l	AS	6.6	6.6)_
	٠.			
			:	
			1	i

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:

Arsenic

Validation Level:

Stage 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-3197-8

Sample Identification

SSAM5-03-4BPC

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).

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 280-3197-8	All analytes reported below the PQL.	J (all detects)	А

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, PCS, Henderson, Nevada Arsenic - Data Qualification Summary - SDG 280-3197-8

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-3197-8	SSAM5-03-4BPC	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 280-3197-8

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Arsenic - Field Blank Data Qualification Summary - SDG 280-3197-8

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET Stage 4

LDC #:	23448H4	 VALIDATION	COMPL
SDG #:	280-3197-8		St
Laborator	y: <u>Test America</u>	-	

Date	-29-16
Page:_ <u>\</u>	
Reviewer:_	a
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
I.	Technical holding times	A	Sampling dates: 5410
11.	ICP/MS Tune	A	- ,,
111.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	N	Client specified
VII	Duplicate Sample Analysis	Ν	L 2
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	A	
X.	Furnace Atomic Absorption QC	N	Notutilized
XI.	ICP Serial Dilution	AN	Notutilized Notpresormed
XII.	Sample Result Verification	A	•
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	\sim	
XV	Field Blanks	ND	FB=FB-04132010-RIGZ-RZE (280-2400-2)

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: 56'\

					······································		
1	SSAM5-03-4BPC	11	885	21		31	
2		12	,	22		32	
3		13		23		33	
4		14		24		34	
5		15		25		35	
6	4	16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes:			

VALIDATION FINDINGS CHECKLIST

Wetnod: Metals (EPA SVV 846 Metalod 80 106/7000/0020)	1		T	
Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.				
Cooler temperature criteria was met.				
II. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?				
Were %RSD of isotopes in the tuning solution ≤5%?				
III. Calibration				
Were all instruments calibrated daily, each set-up time?				
Were the proper number of standards used?				
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury) QC limits?				
Were all initial calibration correlation coefficients > 0.995?	/			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	/			
Was there contamination in the method blanks? If yes, please see the Blanks		/	1	
validation completeness worksheet.		<u> </u>		
V. ICP Interference Check Sample		T	T	
Were ICP interference check samples performed daily?				
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?	<u></u>	<u> </u>	Т	
VI. Matrix spike/Matrix spike duplicates	T	Т	1	Γ
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.		/	<u>† </u>	
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.	3			
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were ≤ 5X the RL, including when only one of the duplicate sample values were ≤ 5X the RL.			_	
VII. Laboratory control samples				
Was an LCS anayized for this SDG?	/	1_		
Was an LCS analyzed per extraction batch?	/	1_		
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?		1_		

LDC#: 23448H4 SDG#: SEC. COVERT

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?			\			
Do all applicable analysies have duplicate injections? (Level IV only)						
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%? (Level IV only)			_			
Were analytical spike recoveries within the 85-115% QC limits?			_			
IX. ICP Serial Dilution						
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?						
Were all percent differences (%Ds) < 10%?			/			
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.						
X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)						
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?	/	_				
If the %Rs were outside the criteria, was a reanalysis performed?			<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?			_			
XII. Sample Result Verification			,			
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	/	r				
XIII. Overall assessment of data						
Overall assessment of data was found to be acceptable.	/					
XIV. Field duplicates						
Field duplicate pairs were identified in this SDG.		/	<u> </u>			
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.						

SDG #: 234148#14 SDG #: 56600ve/

Initial and Continuing Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Page: 2nd Reviewer: Reviewer:

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

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

%R = Found × 100 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

					Becalculated	Reported	
Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	%R	%R	Acceptable (Y/N)
	ICP (Initial calibration)						
	GFAA (Initial calibration)						
	CVAA (Initial calibration)						
	ICP (Continuing calibration)			-			
	GFAA (Continuing calibration)					-	
	CVAA (Continuing calibration)						
A FC	ICP/MS (Initial calibration)	H5	5'0h	U0.0	101	10)) -
CCV (B):02)	ICP/MS (Continuing calibation))	50.7	50.0	101	101	

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

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VALIDATION FINDINGS WORKSHEET **Level IV Recalculation Worksheet**

Reviewer: 2nd Reviewer:

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

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

%R = Found × 100 True

Where, Found = Concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).

True = Concentration of each analyte in the source.

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

RPD = <u>IS-DL</u> x 100 (S+D)/2

Where, S = Original sample concentration
D = Duplicate sample concentration

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

%D = |-SDR| x 100

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

					Recelculated	Reported	
Sample ID	Type of Analysis	Element	Found 18/1	True / D / SDR (units)	%R / RPD / %D	%R / RPD / %D	Acceptable (Y/N)
ICS (A)	ICP interference check	Ŷ\$	lotuell	100 relu	HOI	h01)-
8	Laboratory centrol sample	7	('02	20.02	ופו	101	7
	Matrix spike		(SSR-SR)				,
	Duplicate						
	ICP serial dilution	·					

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

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SDG #: <u>Secover</u>	نـــ

VALIDATION FINDINGS WORKSHEET <u>Sample Calculation Verification</u>

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2nd reviewer:_		ì	_

METH	OD: Trad	ce Metals (EPA SW 846 Metho	d 6010/7000)		-
Please Y N Y N Y N	see qua N/A N/A N/A	i wie i coalto neell leholled a	ed range of the instruments and		
Detect following	ng equat		AS	were recalculated	and verified using the
CONCENT	ranon =	(RD)(FV)(Dil) (In. Vol.)(%S)	Recalculation:		
RD FV In. Vol. Dil %S	= = = =	Raw data concentration Final volume (ml) Initial volume (ml) or weight (G) Dilution factor Decimal percent solids	(100m2)(5)	(16.531g/L) 1000 (1.16g)	_= 8.5mg/kg

		0302(110)						
Sample ID	Analyte	Reported Concontration (MS/KC)	Calculated Concentration (MS/KS)	Acceptable (Y/N)				
	H5	8,5	8.5	V				
	·							
			·					

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS, Henderson, Nevada

Collection Date:

May 5, 2010

LDC Report Date:

July 7, 2010

Matrix:

Soil

Parameters:

Magnesium

Validation Level:

Stage 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-3264-7

Sample Identification

SSAO3-03-9BPC

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 Magnesium.

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.

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 magnesium was found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Magnesium	1.19 mg/Kg	All samples in SDG 280-3264-7
ICB/CCB	Magnesium	4.58 ug/L	All samples in SDG 280-3264-7

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

Sample FB-04072010-RZC (from SDG 280-2280-2) was identified as a field blank. No magnesium 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 280-3264-7	All analytes reported below the PQL.	J (all detects)	Α

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, PCS, Henderson, Nevada Magnesium - Data Qualification Summary - SDG 280-3264-7

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-3264-7	SSAO3-03-9BPC	All analytes reported below the PQL.	J (all detects)	А	Sample result verification (PQL) (sp)

Tronox LLC Facility, PCS, Henderson, Nevada Magnesium - Laboratory Blank Data Qualification Summary - SDG 280-3264-7

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Magnesium - Field Blank Data Qualification Summary - SDG 280-3264-7

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 4

	Date:	6-29-10
	Page:_	<u>\</u> of <u>\</u>
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2nd	Reviewer:	

METHOD: Mg (EPA SW 846 Method 6020)

2344814

SDG #: 280-3264-7 Laboratory: Test America

LDC #:___

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: 5/5/10
11.	ICP/MS Tune	10	
III.	Calibration	A	
IV.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	\mathcal{N}	Client specified
VII.	Duplicate Sample Analysis	\mathcal{N}	
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	A	
X.	Furnace Atomic Absorption QC	N	Notucitized
XI.	ICP Serial Dilution	N	Noturitzed Not personned
XII.	Sample Result Verification	P	Z.
XIII.	Overall Assessment of Data	P	
XIV.	Field Duplicates	N	
XV	Field Blanks	NO	FB= FB-04072010-BZC(28022802

A = Acceptable Note:

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:

	Sol					
1	SSAO3-03-9BPC	11	205	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#: 23448TY SDG#: Sec Cover

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: 9
2nd Reviewer: 1

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

Method:Metals (EPA SW 846 Method 6010B/7000/6020)						
Validation Area	Yes	No	NA	Findings/Comments		
I. Technical holding times						
All technical holding times were met.	/					
Cooler temperature criteria was met.						
II. ICP/MS Tune	,					
Were all isotopes in the tuning solution mass resolution within 0.1 amu?						
Were %RSD of isotopes in the tuning solution ≤5%?						
III. Calibration						
Were all instruments calibrated daily, each set-up time?						
Were the proper number of standards used?						
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury) QC limits?						
Were all initial calibration correlation coefficients ≥ 0.995?	/					
IV. Blanks						
Was a method blank associated with every sample in this SDG?						
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.						
V. ICP Interference Check Sample						
Were ICP interference check samples performed daily?						
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?						
VI. Matrix spike/Matrix spike duplicates						
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.						
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.						
Were the MS/MSD or duplicate relative percent differences (RPD) \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			,	1		
Was an LCS anaylzed for this SDG?						
Was an LCS analyzed per extraction batch?			ļ			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	/					

LDC#: 23448TY SDG#: Sec Caret

VALIDATION FINDINGS CHECKLIST

Page: __of __ Reviewer: __< 2nd Reviewer: __

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

LDC #: **CC CONSTITUTE**SDG #: **SCO CONSTITUTE**SDG #: LISHE2

Sample Concentration units, unless otherwise noted:

VALIDATION FINDINGS WORKSHEET PB/ICB/CCB QUALIFIED SAMPLES

Reviewer: Q

2nd Reviewer:

Soil preparation factor applied: 100X

Associatec Samples:

AI

Sample Identification

8 Q 8 5 βg ۲ £ Ą 뿔 ₽ ഗ്ഗ 2 8 ů ď z g As 쩞 Ö F ₹ Blank Action Limit O. Maximum ICB/CCB* (ng/L) 4.58 Maximum PB* (ng/L) Maximum PB* (mg/Kg) 1.19 Analyte ပ် ပ္ပ ဝိ S n e ğ Ę 롼 Se Αg g Zu Be 윱 Ва Sb As Ö

1DC# 2547874 1DC# 2560267

VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification

Page: of Reviewer: GZ

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

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

%R = Found x 100 True

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

Acceptable (Y/N) Reported ノロー **%** 107 Recalculated 107 **%**R 107 5000 True (ug/L) 9 09CC Found (ug/L) 300 Element 8 CCVCVC (Continuing calibation) GFAA (Continuing calibration) CVAA (Continuing calibration) CP (Continuing calibration) ICP/MS (Initial calibration) Type of Analysis GFAA (Initial calibration) CVAA (Initial calibration) ICP (Initial calibration) Standard ID

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.

LBC#, 2344879 SDG #SERCELON

VALIDATION FINDINGS WORKSHEET **Level IV Recalculation Worksheet**

Reviewer: 2nd Reviewer:

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

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

%R = Found × 100 True

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.

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

RPD = <u>IS-DL</u> x 100 (S+D)/2

Where, S = Original sample concentration
D = Duplicate sample concentration

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

%D = II-SDR × 100

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

					Recelculated	Reported	
Cl classes	Tune of Analysis	Flement	Found / S / 1 A RC	True / D / SDR (unite)	%R / RPD / %D	%R / RPD / %D	Acceptable (Y/N)
Cycle Cycle	ICP interference check	A A	94070 2011 10000 Mg	110000		98) -
537	Laboratory centrol sample		0961	7000	98	86	
>	Matrix spike)	(SSR-SR)				
>	Duplicate						
2	icP serial dilution	·					

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

LDC #: SECOLET

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	C of
Reviewer:	C
2nd reviewer:_	-6

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

MEIN	JU: Irac	ce Metals (EPA SW 846 Method 6	10/7000)
Please W N Y N Y N	N/A N/A	mave results been reported and	inge of the instruments and within the linear range of the ICP?
	ed analy ng equat	te results for	were recalculated and verified using the
Concent	ration =	(RD)(FV)(Dil) (In. Vol.)(%S)	Recalculation:
RD	=	Raw data concentration	(100my/5) (23160mg/L) = 11364mg/kg
FV	=	Final volume (ml)	= 11)69mg/kg
In. Vol.	=	Initial volume (ml) or weight (G)	0)
Dil	=	Dilution factor	(0 9 18 1CL110x)
%S	=	Decimal percent solids	23,110,1=1,119)

Sample ID	Analyte	Reported Concentration (MK (kg)	Calculated Concentration (MCICG)	Acceptable (Y/N)
(M	11,000	11,000	4
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