

LABORATORY DATA CONSULTANTS, INC.

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

Northgate Environmental Management, Inc.

June 21, 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 3, 2010. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 23310:

SDG#

Fraction

280-3100-7, 280-3153-1, 280-3153-3 Semivolatiles, Chlorinated Pesticides, 280-3153-4, 280-3197-1, 280-3197-7 Metals, Perchlorate 280-3264-1, 280-3264-3, 280-3264-6 280-3624-2

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

Attachment 1

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

LDC #: 23310

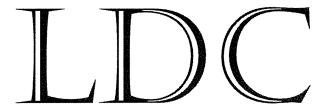
SDG #: 280-3100-7, 280-3153-1, 280-3153-3, 280-3153-4, 280-3197-1 280-3197-7, 280-3264-1, 280-3264-3, 280-3264-6, 280-3624-2

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		ı	T	
Were EDD anomalies identified?		X		
If yes, were they corrected or documented for the client?			Х	See EDD_discrepancy_ form_LDC23310_061810.doc
IV. EDD Delivery				
Was the final EDD sent to the client?	X			

Tronox LLC Facility, PCS, Henderson, Nevada Data Validation Reports LDC #23310

Semivolatiles



Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS, Henderson, Nevada

Collection Date:

April 30, 2010

LDC Report Date:

June 16, 2010

Matrix:

Soil

Parameters:

Semivolatiles

Validation Level:

Stage 2B

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-3100-7

Sample Identification

SSAK6-02-5BPC

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.

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

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

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

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

V. Blanks

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

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

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB-04072010-RZD	4/7/10	Bis(2-ethylhexyl)phthalate	2.2 ug/L	All samples in SDG 280-3100-7

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-3100-7	All compounds reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

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

XVI. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG 280-3100-7

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-3100-7	SSAK6-02-5BPC	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 280-3100-7

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Field Blank Data Qualification Summary - SDG 280-3100-7

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

 LDC #:
 23310A2a
 VALIDATION COMPLETENE

 SDG #:
 280-3100-7
 Stage 2B

 Laboratory:
 Test America

Date! 10 /10 /10
Page: lof)
Reviewer: N/2
2nd Reviewer: A

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

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

	Validation Area		Comments
l.	Technical holding times	A	Sampling dates: 4 /20 /10
II.	GC/MS Instrument performance check	Á	,
111.	Initial calibration	À	2 RSD IT
IV.	Continuing calibration/ICV	A	2 RSD 17 CW/W = 257
V.	Blanks	Á	
VI.	Surrogate spikes	Ă	
VII.	Matrix spike/Matrix spike duplicates	N	Client Spec
VIII.	Laboratory control samples	A	Lies spec
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	SN)	#B = FB-04072010 - RZD (280 - 2216-2)

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

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1+ SSAK6-02-5BPC	11	MB 280-15242 /1-A	21	31	
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3	13		23	33	
4	14		24	34	
5	15		25	35	
6	16		26	36	
7	17		27	37	
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9	19		29	39	
10	20		30	40	

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DC #:	DG #:

VALIDATION FINDINGS WORKSHEET Field Blanks

Page: of /	Reviewer:	2nd Reviewer:
		2

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

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

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

Blank units: 10 / Associated sample units: 10 / Ks

Sampling date: 4/07/10

Y N N/A Y N N/A Blank units:

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

(92)

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Sample Identification Associated Samples: bista-ethylheryl)phthalate FB-04072010-RZD Blank 1D 7.7 EFF jį Compound 444 CROL

Associated sample units: Blank units:

Sampling date:_

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

Sample Identification Associated Samples: Blank ID Compound CROL

5x Phthalates 2x All others

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS, Henderson, Nevada

Collection Date:

May 3, 2010

LDC Report Date:

June 16, 2010

Matrix:

Soil

Parameters:

Semivolatiles

Validation Level:

Stage 2B

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-3153-3

Sample Identification

SSAK7-06-1BPC

SSAL2-03-1BPC

SSAK7-06-1BPCMS

SSAK7-06-1BPCMSD

Introduction

This data review covers 4 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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- 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 Date		Compound TIC (RT in minutes)	Concentration	Associated Samples		
MB280-14276/1-A 5/6/10		Bis(2-ethylhexyl)phthalate	60.1 ug/Kg	All samples in SDG 280-3153-3		

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

Sample	Compound	Reported	Modified Final	
	TIC (RT in minutes)	Concentration	Concentration	
SSAK7-06-1BPC	Bis(2-ethylhexyl)phthalate	79 ug/Kg	79U ug/Kg	

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 280-3153-3		

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-3153-3	All compounds reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

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

XVI. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG 280-3153-3

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-3153-3	SSAK7-06-1BPC SSAL2-03-1BPC	All compounds reported below the PQL.	J (all detects)	Α	Project Quantitation Limit (sp)

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-3153-3

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
280-3153-3	SSAK7-06-1BPC	Bis(2-ethylhexyl)phthalate	79U ug/Kg	А	bl

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Field Blank Data Qualification Summary - SDG 280-3153-3

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 6/10 /	b
Page: ☐ of ☐	_
Reviewer: 3VC	
2nd Reviewer: 🗥 🗸	

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

LDC #: 23310C2a

SDG #: 280-3153-3 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
1.	Technical holding times	A	Sampling dates: 5/0 > /10
11.	GC/MS Instrument performance check	<u> </u>	
III.	Initial calibration	Α	7. RSD r~ CW/W = 25]
IV.	Continuing calibration/ICV	A	CW/W = 25]
V.	Blanks	SU)	
VI.	Surrogate spikes	<u> </u>	
VII.	Matrix spike/Matrix spike duplicates	Α	
VIII.	Laboratory control samples	A	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A_	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	Á	
XVI.	Field duplicates	N	
XVII.	Field blanks	SW	FB = FB-04072010. RZD (280-2216-2)

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

Sail

	201					
1	SSAK7-06-1BPC	† 11	MB >80-14276/-A	21	 31	
2	SSAL2-03-1BPC	12	/	22	32	
3	SSAK7-06-1BPCMS	13		23	33	
4	SSAK7-06-1BPCMSD	14		24	34	
5		15		25	35	
6		16		26	36	
7		17		27	37	
8		18		28	38	
9		19		29	39	
10		20		30	40	

VALIDATION FINDINGS WORKSHEET

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

A. Phenol™	P. Bis(2-chloroethoxy)methane	EE, 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C, 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene**	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene™	T. 4-Chioroaniline	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	000. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methyinaphthalene	LL. Diethylphthalate	AAA. Butyibenzyiphthalate	PPP. Benzoic Acid
I. 4-Methyiphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine⁴	Y. 2,4,6-Trichlorophenoi**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	00. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	111.
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	ກກກ
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	WV.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	ННН. Benzo(k)fluoranthene	WWW.

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

LDC# 227/0 CX 3 SDG #:

VALIDATION FINDINGS WORKSHEET Blanks

2nd Reviewer: Page: 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". YN N/A

Was a method blank analyzed for each concentration preparation level? Was a method blank analyzed for each matrix? V/N N/A

Was a method blank associated with every sample?

Y /N N/A

Associated Samples: V/N N/A Was the blank contaminated? If yes, please see qualification below. Blank extraction date: $5/66/\Phi$ Blank analysis date: $5/3/\Phi$

=

J	Conc. units: "2 /€<			Associa	Associated Samples.					1
	Vamound V	Blank ID				Sar	Sample Identification	tion		-
1000	purpoduro (Mt 200-1d to -1 /) - J - G		٨					_
7	£EE	(60.)	X-V0/ X	79 /	(28.5)					
				,						
*										
										i

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

Compound	Blank	Sample Identification
Pupodino		

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

BLANKS1.wpd

SDG #: Carry LDC# 7>>10 C 34

VALIDATION FINDINGS WORKSHEET Field Blanks

Page: 1 of 1

2nd Reviewer. Reviewer:_

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

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

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

Blank units: 4/67/42

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

Associated Samples:

A

Sample Identification TB <u>K</u> bis (2-ethal hoxy) phthathet Blank ID F3-0467 2610- R2D 7 ß 产产工 444 Compound CROL

Associated sample units: Blank units:

Sampling date:

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

Sample Identification Associated Samples: Blank ID Compound CRQL

5x Phthalates 2x All others

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS, Henderson, Nevada

Collection Date:

May 3, 2010

LDC Report Date:

June 16, 2010

Matrix:

Soil

Parameters:

Semivolatiles

Validation Level:

Stage 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-3153-4

Sample Identification

SSAL2-02-4BPC

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 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
MB280-14475/1-A	5/7/10	Bis(2-ethylhexyl)phthalate	62.7 ug/Kg	All samples in SDG 280-3153-4

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

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 280-3153-4	

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

All target compound identifications were within validation criteria.

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 280-3153-4	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 280-3153-4

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-3153-4	SSAL2-02-4BPC	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-3153-4

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Field Blank Data Qualification Summary - SDG 280-3153-4

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

23310D2a	VALIDATION COMPLETENESS
280-3153-4	Stage 2B 4

Date: 6/16/10
Page: 1 of 1
Reviewer: 3/6
2nd Reviewer: 4

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 5 /0 > /10
11.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	2 RSD 1
IV.	Continuing calibration/ICV	A	CW/1W = 25 }
V.	Blanks	WZ	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	SS AQ5.02-5BPC
VIII.	Laboratory control samples	A	us
IX.	Regional Quality Assurance and Quality Control	N	
Χ.	Internal standards	<u> </u>	
XI.	Target compound identification	Ак	
XII.	Compound quantitation/CRQLs	MA	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	* ¥	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	SW	FB = FB-04072010-RZD (280-2216-2)

Note: A = Acceptable

N = Not provided/applicable SW = See worksheet ND = No compounds detected

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

Validated Samples:

LDC #:

SDG #:

Laboratory: Test America

Smil

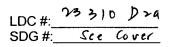
	<u> </u>			
1	SSAL2-02-4BPC	11	21	31
2	SSAL2-02-4BPC MB 280-14475/-A	12	22	32
3		13	23	33
4		14	24	34
5		15	25	35
6		16	26	36
7		17	27	37
8		18	28	38
9		19	29	39
10		20	30	40

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2 Reviewer: 3V6 2nd Reviewer: 1

Method: Semivolatiles (EPA SW 846 Method 8270C)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	_			
Cooler temperature criteria was met. II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	_			
Were all samples analyzed within the 12 hour clock criteria?				West Artists and the second
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?	<u> </u>			
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	/			
Were all percent differences (%D) \leq 25% and relative response factors (RRF) \geq 0.05?				
V. Blanks				
Was a method blank associated with every sample in this SDG?				
Was a method blank analyzed for each matrix and concentration?				
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		_ .		
VI. Surrogate spikes				
Were all surrogate %R within QC limits?				
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?			_	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?			1	
VII. Matrix spike/Matrix spike diukicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.				
Was a MS/MSD analyzed every 20 samples of each matrix?				
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?				
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	1			



VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: 1

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				A first the second of the seco
Were performance evaluation (PE) samples performed?		/		
Were the performance evaluation (PE) samples within the acceptance limits?				
X. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?				
Were retention times within ± 30 seconds from the associated calibration standard?				
XI. Target compound identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?				
Did compound spectra meet specified EPA "Functional Guidelines" criteria?				
Were chromatogram peaks verified and accounted for?		. *************************************		
XII. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?				
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?		,		
XIII. Tentatively identified compounds (TIOs)			11	
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?			/	
Were relative intensities of the major ions within \pm 20% between the sample and the reference spectra?			/	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?				
XIV. System performance				
System performance was found to be acceptable.				
				Giller, Ellett getare Sozial vente kalkonist i 1900.
XV Overall assessment of data \$ 4. **********************************				
Overall assessment of data was found to be acceptable.				
XVI: Field dupticates				
Field duplicate pairs were identified in this SDG.		_		
Target compounds were detected in the field duplicates.			1	
XVII. Field blanks				
Field blanks were identified in this SDG.				
Target compounds were detected in the field blanks.				

VALIDATION FINDINGS WORKSHEET

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

1	3			
A. Phenol	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene⁴
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-Dinltrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene**	T. 4-Chloroaniline	II. 4-Nitrophenoi*	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
ال N-Nitroso-di-n-propylamine الم	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	00. 4-Nitroaniline	DDD. Chrysene	SSS, Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	111.
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)***	FFF. Di-n-octylphthalate**	ກກກ
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.

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LDC #:	SDG #:

VALIDATION FINDINGS WORKSHEET Blanks

Page: Lot	Reviewer: N6	2nd Reviewer:
		2nd

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".

Was a method blank analyzed for each matrix? Y N N/A

Was a method blank analyzed for each concentration preparation level?

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

 $\frac{\sqrt{N/A}}{8 \text{lank extraction date:}} \frac{\sqrt{N/A}}{\sqrt{N^2 N^3}} \frac{\sqrt{N/A}}{8 \text{lank analysis date:}} \frac{\sqrt{N/A}}{\sqrt{N^2 N^3}}$

=

K

Sample Identification Associated Samples: 200 475 MB 286-19 Blank ID 62.7 FFF x/x Compound Conc. units:

Blank extraction date:_

Conc. units:

Blank analysis date:

Associated Samples:

Sample Identification Blank ID Compound

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

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VALIDATION FINDINGS WORKSHEET Field Blanks

Page: of Reviewer: 2nd Reviewer:_

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

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

Blank units: US /L Associated sample units: US /L Associated S

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

Associated Samples:

=

Sample Identification AL X La RZD FB-04072010-Blank ID y Y **3 3 3** Compound CROL

Associated sample units:_ Blank units:

Sampling date:

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

Associated Samples:

Compound	Blank ID		Sar	Sample Identification	ion		
CROL		-					

5x Phthalates 2x All others

LDC #: 73310 Dry SDG#:

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

/ of / Page: Reviewer:

2nd Reviewer:

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

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

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

 $C_x = Concentration of compound,$ $A_x = Area of Compound$

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

> average RRF = sum of the RRFs/number of standards %RSD = 100 * (S/X)

S= Standard deviation of the RRFs,

Recalculated %RSD 3.49 7.22 6.18 8.69 7.06 8.07 Reported %RSD 3.5 6.2 8.1 7.2 8.7 7.1 Average RRF Recalculated 0.6180 1.2373 0.2488 1.0410 1.0369 1.0287 (Initial) Average RRF Reported 0.6180 1.0369 1.2373 0.2487 1.0410 1.0287 (Initial) Recalculated 50 std) 0.6144 1.0782 1.3039 0.2568 1.1004 1.0391 RRF 50 std) Reported 0.6144 1.0782 1.3039 0.2568 1.1004 1.0391 RRF (183) (IS1) (182) (184) (185) (186) Compound (Internal Standard) Hexachiorobenzene Benzo(a)pyrene Naphthalene 4/30/2010 | 1,4-Dioxane Chrysene Fluorene Calibration Date Standard ID MSS B ICAL #

	-				_	
Area IS	361148	1431528	820708	1334038	1488789	1433541
Area cpd	277357	1929425	1337620	428206	1933691	1971811
nc IS/Cpd	40/20	40/50	40/50	40/50	40/50	40/50

Conc	1,4-Dioxane	Naphthalene	Fluorene	Hexachlorob	Chrysene	Benzo(a)py
4.00	0.7314	1.1235	1.3073	0.2613	1.1789	0.8958
10.00	0.6399	1.1005	1.2691	0.2452	1.1157	0.9510
20.00	0.6119	1.0879	1.3046	0.2572	1.1100	1.0198
50.00	0.6144	1.0782	1.3039	0.2568	1.0391	1.1004
80.00	0.5875	1.0390	1.2554	0.2441	1.0374	1.0995
120.00	0.5915	0.9971	1.2055	0.2473	0.9838	1.0793
160.00	0.5793	0.9530	1.1343	0.2411	0.9498	1.0491
200.00	0.5880	0.9156	1.1184	0.2370	0.9131	1.0345
×	0.6180	1.0369	1.2373	0.2488	1.0410	1.0287
S	0.0499	0.0748	0.0765	0.0087	0.0905	0.0726
						Contract of the Contract of th

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.

23 × 10 Dra LDC # 2010 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:

Where:

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

Ais = Area of associated internal standard ave. RRF = initial calibration average RRF RRF = continuing calibration RRF Ax = Area of compound

Cis = Concentration of internal standard Cx = Concentration of compound

		Calibration		Average RRF	Reported	Recalculated	Reported	Recalculated
#	Standard ID	Date	Compound (Reference IS)	(Initial RRF)	(CC RRF)	(CC RRF)	%D	%D
1	B7318	05/12/10	1,4-Dioxane (IS1)	0.6180	0.5683	0.5683	8.0	8.0
			Naphthalene (IS2)	1.0369	1.0471	1.0471	1.0	1.0
			Fluorene (IS3)	1.2373	1.2615	1.2615	2.0	2.0
			Hexachlorobenzene (IS4)	0.2487	0.2530	0.2530	1.7	1.7
			Chrysene (IS5)	1.0410	1.0246	1.0246	1.6	1.6
			Benzo(a)pyrene (IS6)	1.0287	1.1047	1.1047	7.4	7.4

Compound (Reference IS)	(SI	Concentration	Area Cpd	Area IS
		(IS/Cpd)		
1,4-Dioxane	(IS1)	40/80	401060	352839
Naphthalene	(182)	40/80	2927544	1397951
Fluorene	(183)	40/80	2119328	840002
Hexachlorobenzene	(184)	40/80	671556	1327446
Chrysene	(185)	40/80	2965580	1447209
Benzo(a)pyrene	(981)	40/80	2997507	1356655
:				

LDC#: >3310 Dra SDG #: Ste Cover

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Reviewer: JVC 2nd reviewer:

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

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

% Recovery: SF/SS * 100

Where: SF = Surrogate Found SS = Surrogate Spiked

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	100	76.6	77	77	0
2-Fluorobiphenyl		74.3	74	74	1
Terphenyl-d14		81.1	8)	81	
Phenol-d5	120	11 8.1	79	79	
2-Fluorophenol		115.8	77	77	
2,4,6-Tribromophenol	1	117.9	79	79	
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					

SDG #: Su Con LDC #: 7331 @ DZA

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

Page: of

2nd Reviewer. Reviewer:

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

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

% Recovery = 100 * (SC/SA

Where: SSC = Spike concentration SA = Spike added

RPD = ILCS - LCSD 1* 2/(LCS + LCSD)

LCS = Laboratory control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

US 280- 14475 LCS/LCSD samples:

	3S	ike.	S	ike	01	CS	וט	GSD	I CS/I	LCS/I CSD
Compound	\$ <u>\$</u>	Added (20)	Concer	Concentration	Percent F	Percent Recovery	Percent Recovery	}ecovery	æ	RPD
	108	l CSD	108	/ LCSD	Reported	Recalc	Renorted	Recalc	Renorted	Recalculated
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene	230	*	2080	Ž	79	79			\	
Pentachlorophenol										
Pyrene	04 %	AX.	2190	}	83	83				

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. 7

LDC #:	73310	Dra
SDG #: <u>Sc</u>	e Cover	•

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	l_of1_
Reviewer:	176
2nd reviewer:	

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

Percent solids, applicable to soil and solid matrices only.

(Y	N	N/A
/	Y	Ν	N/A

%S

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	ntratio	$n = \frac{(A_{s})(I_{s})(V_{s})(DF)(2.0)}{(A_{s})(RRF)(V_{s})(V_{s})(%S)}$	Example:
A_{x}	=	Area of the characteristic ion (EICP) for the compound to be measured	Sample I.D. 4
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard	
l _s	=	Amount of internal standard added in nanograms (ng)	Conc. = $(172.56)_1$ (40) $(1.2487)_1$ (100) $(1476887)_1$ (0.2487) $(0.2487)_1$ (31.09) $(0.2487)_1$
V_{\circ}	=	Volume or weight of sample extract in milliliters (ml) or grams (g).	•
V,	=	Volume of extract injected in microliters (ul)	= 654.0 ng/kg
V_{ι}	=	Volume of the concentrated extract in microliters (ul)	- D
Df	=	Dilution Factor.	

2.0	= Factor of 2 to accour	nt for GPC cleanup				
#	Sample ID	Compound		Reported Concentration ()	Calculated Concentration ()	Qualification
	A. C.					

	······································					
				,		
			-			

1 1					1	1

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS, Henderson, Nevada

Collection Date:

May 5 through May 6, 2010

LDC Report Date:

June 16, 2010

Matrix:

Soil

Parameters:

Semivolatiles

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-3264-1

Sample Identification

SSAQ5-02-1BPC**

SSAQ5-02-1BPC-FD

SSAQ5-02-3BPC

SSAQ5-02-5BPC

SSAQ5-02-7BPC

SSAQ5-02-9BPC

SA156-1BPC

SA156-2BPC**

SA175-8BPC**

SA84-6BPC**

SSAL2-01-4BPC**

SSAQ5-02-5BPCMS

SSAQ5-02-5BPCMSD

^{**}Indicates sample underwent Stage 4 review

Introduction

This data review covers 13 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

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

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

V. Blanks

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

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
MB280-14475/1-A	B280-14475/1-A 5/7/10 Bis(2-ethylhexyl)phthalate		62.7 ug/Kg	All samples in SDG 280-3264-1

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

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
SSAQ5-02-1BPC**	Bis(2-ethylhexyl)phthalate	75 ug/Kg	75U ug/Kg
SSAQ5-02-1BPC-FD	Bis(2-ethylhexyl)phthalate	76 ug/Kg	76U ug/Kg
SSAQ5-02-3BPC	Bis(2-ethylhexyl)phthalate	78 ug/Kg	78U ug/Kg
SSAQ5-02-5BPC	Bis(2-ethylhexyl)phthalate	73 ug/Kg	73U ug/Kg
SSAQ5-02-7BPC	Bis(2-ethylhexyl)phthalate	72 ug/Kg	72U ug/Kg
SSAQ5-02-9BPC	Bis (2-ethylhexyl) phthalate	71 ug/Kg	71U ug/Kg

Samples FB04062010-RZB (from SDG 280-2131-2), FB-04072010-RZD (from SDG 280-2216-2), and FB-04132010-RIG2-RZE (from SDG 280-2400-2) were identified as field blanks. No semivolatile contaminants were found in these blanks with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB04062010-RZB	4/6/10	Bis(2-ethylhexyl)phthalate	2.7 ug/L	SSAQ5-02-1BPC** SSAQ5-02-1BPC-FD SSAQ5-02-3BPC SSAQ5-02-5BPC SSAQ5-02-7BPC SSAQ5-02-9BPC SA156-1BPC SA156-2BPC** SA84-6BPC**
FB-04132010-RIG2-RZE	4/13/10	Bis(2-ethylhexyl)phthalate Di-n-octylphthalate	1.1 ug/L 1.6 ug/L	SA175-8BPC**
FB-04072010-RZD	4/7/10	Bis(2-ethylhexyl)phthalate	2.2 ug/L	SSAL2-01-4BPC**

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Stage 4 review was performed. Raw data were not evaluated for the samples reviewed by Stage 2B criteria.

XII. Project Quantitation Limit

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Finding	Flag	A or P
SA84-6BPC**	Benzo(b)fluoranthene Benzo(k)fluoranthene	Due to lack of resolution between these compounds in the samples, the laboratory performed the quantitation using the total peak area.	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	Р

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-3264-1	All compounds reported below the PQL.	J (all detects)	Α

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

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

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

XV. Overall Assessment

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

XVI. Field Duplicates

Samples SSAQ5-02-1BPC** and SSAQ5-02-1BPC-FD were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentration (ug/Kg)					
Compound	SSAQ5-02-1BPC**	SSAQ5-02-1BPC-FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Bis(2-ethylhexyl)phthalate	75	76	-	1 (≤360)	•	-

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG 280-3264-1

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-3264-1	SA84-6BPC**	Benzo(b)fluoranthene Benzo(k)fluoranthene	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	Р	Project Quantitation Limit (q)
280-3264-1	SSAQ5-02-1BPC** SSAQ5-02-1BPC-FD SSAQ5-02-3BPC SSAQ5-02-5BPC SSAQ5-02-7BPC SSAQ5-02-9BPC SA156-1BPC SA156-2BPC** SA175-8BPC** SA84-6BPC** SSAL2-01-4BPC**	All compounds reported below the PQL.	J (all detects)	А	Project Quantitation Limit (sp)

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-3264-1

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
280-3264-1	SSAQ5-02-1BPC**	Bis(2-ethylhexyl)phthalate	75U ug/Kg	А	bl
280-3264-1	SSAQ5-02-1BPC-FD	Bis(2-ethylhexyl)phthalate	76U ug/Kg	А	bl
280-3264-1	SSAQ5-02-3BPC	Bis(2-ethylhexyl)phthalate	78U ug/Kg	А	bl
280-3264-1	SSAQ5-02-5BPC	Bis(2-ethylhexyl)phthalate	73U ug/Kg	А	bl
280-3264-1	SSAQ5-02-7BPC	Bis(2-ethylhexyl)phthalate	72U ug/Kg	А	bl
280-3264-1	SSAQ5-02-9BPC	Bis(2-ethylhexyl)phthalate	71U ug/Kg	А	bl

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Field Blank Data Qualification Summary - SDG 280-3264-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson EET

LDC #:	23310G2a	VALIDATION COMPLETENESS WORKSHI
SDG #:	280-3264-1	Stage 2B /4
Laborator	v: Test America	, ,

Page: lof / Reviewer: JW 2nd Reviewer:

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 5/05 - 06/10
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	Ä	2 RSD r
IV.	Continuing calibration/ICV	A	2 RSD 12 Cay/14 = 25 6
V.	Blanks	Sw	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	us
IX.	Regional Quality Assurance and Quality Control	N	
Х.	Internal standards	A	
XI.	Target compound identification	WA	
XII.	Compound quantitation/CRQLs	SW.	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	MA	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D = 1, ~
XVII.	Field blanks	SM	FB = FB 04 06 2010 - R2B (280 - 2131 - 2) = FB 04 07 2010 - R2D (280 - 2216 - 7) = FB 04 13 2010 - RFG2 - RZF (280 - 2400 - 2)

Note:

A = Acceptable

N = Not provided/applicable

ND = No compounds detected D = Duplicate R = Rinsate

TB = Trip blank

SW = See worksheet

FB = Field blank

EB = Equipment blank

Validated Samples:

	# 370496 7					
1	SSAQ5-02-1BPC ** D	11	SSAL2-01-4BPC	1 21	MB 280-14475/1-A	31
2	SSAQ5-02-1BPC-FD	12	SSAQ5-02-5BPCMS	22	. /	32
3	SSAQ5-02-3BPC	13	SSAQ5-02-5BPCMSD	23		33
4	SSAQ5-02-5BPC	14		24		34
5	SSAQ5-02-7BPC	15		25		35
6	SSAQ5-02-9BPC	16		26		36
7	SA156-1BPC	17		27		37
8	SA156-2BPC **	18		28		38
9	SA175-8BPC ► ¥	19		29		39
10	SA84-6BPC * *	20		30		40

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2 Reviewer: 5% 2nd Reviewer: A

Method: Semivolatiles (EPA SW 846 Method 8270C)

Metriod. Serrivolatiles (Er A SW 640 Metriod 6270C)	Ī			
Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	_			
Cooler temperature criteria was met.				
II. GC/MS Instrument performance check				
Were the DFTPP performance results reviewed and found to be within the specified		_		
criteria?				
Were all samples analyzed within the 12 hour clock criteria?			76.76.76.7°	
III. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?				
Were all percent relative standard deviations (%RSD) and relative response factors				
(RRF) within method criteria for all CCCs and SPCCs?				
Was a curve fit used for evaluation?				
Did the initial calibration meet the curve fit acceptance criteria of > 0.990?				
Were all percent relative standard deviations (%RSD) ≤ 30% and relative response				
factors (RRF) > 0.05?				
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?				
Were all percent differences (%D) and relative response factors (RRF) within	/			
method criteria for all CCCs and SPCCs?				
Were all percent differences (%D) \leq 25% and relative response factors (RRF) \geq 0.05?				·
A COLUMN TO THE PERSON OF THE PERSON				
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.		-		
A CONTRACT OF THE PROPERTY OF				
Word all ourregate 9/ Purithin OC limits?			*****	No. 18 18 19 18 18 ALERTHON SHOULD
Were all surrogate %R within QC limits?				
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?				
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?				
VII Manx spike/Manx spike dupilcates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each		A SA	rational and the	
matrix in this SDG? If no, indicate which matrix does not have an associated				
MS/MSD. Soil / Water.				
Was a MS/MSD analyzed every 20 samples of each matrix?	(
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	\nearrow			
VIII Leboreupy control samples (15 / 15 / 15 / 15 / 15 / 15 / 15 / 15				Opportunity of the Children Commence of the
Was an LCS analyzed for this SDG?		1	l	

LDC #: >3310 6>9 SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2 Reviewer: 3/6 2nd Reviewer: 4

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

VALIDATION FINDINGS WORKSHEET

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

A. Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene**	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene™	T. 4-Chloroaniline	II. 4-Nitrophenoi*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	000. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP, Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	00. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	ТТ.
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)™	FFF. Di-n-octylphthalate**	ກກດ
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.

LDC#: 27310 GX 3 SDG #:

VALIDATION FINDINGS WORKSHEET Blanks

Page: | of / 2nd Reviewer: 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"

Was a method blank analyzed for each matrix? AN NA Y N N/A

Was a method blank analyzed for each concentration preparation level? Was a method blank associated with every sample?

Y N N/A

 $\frac{1}{N}$ N N/A Was the blank contaminated? If yes, please see qualification below. Blank extraction date: $\frac{5}{N}$ Ab

Associated Samples:

(79) =

		و	71/4				
	on	۷	72/4				
	Sample Identification	4	73/4	-			
		3	h/8L				
Associated Samples:		٨	h/ 12	-			
Associa			4/56				
		4-y'sL)					
	Blank ID	A-1/21/1085 8M	62.7				
کد	ا		EEE				
Conc. units: 45 /E	Compound		ť				

Blank extraction date:_

Blank analysis date:_

Associated Samples: Conc. units:

Compound	Blank ID	Sample Identification
	The state of the s	

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:

Common contaminants such as the phthalates and TICs noted above that were detected in samples within ten times the associated method blank concentration were qualified as not detected, "U". Other contaminants within five times the method blank concentration were also qualified as not detected, "U".

pr 9 016 25 LDC #: SDG#:

VALIDATION FINDINGS WORKSHEET Field Blanks

of Page: Reviewer:

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

2

00 Sample Identification TB) Associated Samples: X 49 1 ξ B Y N N/A Were field blanks identified in this ouce:

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

Blank units: いん L Associated sample units: いった ため しん 人も しん しん とう Sampling date: サイト しん しゅう Field Blank (Rinsate / Other: FB 04062010- RZB Blank ID 2.7 EEE Compound

Associated sample units: 49 /kg Blank units: 5 / Associated sample units: 49 / Sampling date: 4 / 13 / 16 | Field blank type: (circle one) Field Blank / Rinsate / Other. え イ

9

Associated Samples:

Compound	Blank ID				Sa	Sample Identification	tion		
	FB-0413	FB -04132010- RZE RIG2-RZE	R162-R	2 E					
EFE	1.1								
FFF	1.6								
CRaL									

5x Phthalates 2x All others

1# xxx10 Gx	SDG #: [Ly (Lord)
#	#
Ö	G
Ă	Ö
	(V)

VALIDATION FINDINGS WORKSHEET

Page: Y of Y

Reviewer: 3V6 2nd Reviewer: 347

	VALIDALION FINDINGS W
SDG#:	Field Blanks
METHOD: GC/MS BNA (EPA SW 846 Method 8270C)	

Associated Samples: YN N/A Were field blanks identified in this SDG?

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

Blank units: 2/L Associated sample units: 2/R Sampling date: 4/6.2 Ap

Sampling date: 4/6.2 Ap

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

	Sampling date: # 167 / 19 Field blank type: (circle one) Field Compound EEE 2	Blank ID FB -04072	Kinsate / Other.	Associated Sample	identification	(QW)	
	CROL						
		FB-04072	410-22D				
毘	Compound	Blank ID		Sample	Identification		
Sample identification	ield blank type: (circle one	e Field Blank	以 Rinsate / Other:	Associated Sample	lt se	(an)	
Blank/ Rinsate / Other: Associated Samples: 1/ Sample Identification 4072010- & 2 D	vampling date: 4/67		/			(

Associated sample units:	
Blank units:	Sampling date:

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

Sample Identification Associated Samples: Blank ID Compound CRQL

5x Phthalates 2x All others

2330 624	my my
±±'	#
LDC	SDG

Compound Quantitation and Reported CRQLs VALIDATION FINDINGS WORKSHEET

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

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

Y N N/A

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

Y N N/A

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

	(*)	<i>D</i>								
Qualifications	J/N3/14	[,								
Associated Samples	4									
Finding	666 HHH unresolved									
Sample ID	٥		-							
Date										
#										

Comments: See sample calculation verification worksheet for recalculations

LDC#: 23310 624 SDG#: Lalow

VALIDATION FINDINGS WORKSHEET **Field Duplicates**

Page:	<u>of</u> _
Reviewer:_	0/4
2nd reviewer:	A_1

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

(\widehat{Y}	N	N/A
ĺ	Y	N	N/A

N N/A Were field duplicate pairs ider N N/A Were target compounds ident	ntified in this SDG? ified in the field duplicate	pairs?	
Compound	Concentratio	n (us/kg)	RPD
	 		
EFF	75	76	\ (<u>←</u> 360 Þ)
	Concentration	p ()	
Compound			RPD

	<u> </u>		
	Concentration	n ()	
Compound			RPD
		·	
•			
	Concentration	2()	
Compound			RPD
	-		

LDC# 23310 626 SDG #: _____

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

. م Page: _

2nd Reviewer: Reviewer:

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

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

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

 C_x = Concentration of compound, A_x = Area of Compound

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

> average RRF = sum of the RRFs/number of standards %RSD = 100 * (S/X)

S= Standard deviation of the RRFs,

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	4/30/2010	4/30/2010 1,4-Dioxane (IS1)	0.6144	0.6144	0.6180	0.6180	8.1	8.07
	MSS B		Naphthalene (IS2)	1.0782	1.0782	1.0369	1.0369	7.2	7.22
			Fluorene (IS3)	1.3039	1.3039	1.2373	1.2373	6.2	6.18
			Hexachlorobenzene (IS4)	0.2568	0.2568	0.2487	0.2488	3.5	3.49
			Chrysene (IS5)	1.0391	1.0391	1.0410	1.0410	8.7	8.69
			Benzo(a)pyrene (IS6)	1.1004	1.1004	1.0287	1.0287	7.1	7.06

Area IS	361148	1431528	820708	1334038	1488789	1433541	
Area cpd	277357	1929425	1337620	428206	1933691	1971811	
nc IS/Cpd	40/20	40/50	40/20	40/20	40/20	40/20	

Conc 1,4-						
	1,4-Dioxane	Naphthalene	Fluorene	Hexachlorob	Chrysene	Benzo(a)py
4.00	0.7314	1.1235	1.3073	0.2613	1.1789	0.8958
10.00	0.6399	1.1005	1.2691	0.2452	1.1157	0.9510
20.00	0.6119	1.0879	1.3046	0.2572	1.1100	1.0198
50.00	0.6144	1.0782	1.3039	0.2568	1.0391	1.1004
80.00	0.5875	1.0390	1.2554	0.2441	1.0374	1.0995
120.00	0.5915	0.9971	1.2055	0.2473	0.9838	1.0793
160.00	0.5793	0.9530	1.1343	0.2411	0.9498	1.0491
200.00	0.5880	0.9156	1.1184	0.2370	0.9131	1.0345
 X	0.6180	1.0369	1.2373	0.2488	1.0410	1.0287
S =	0.0499	0.0748	0.0765	0.0087	0.0905	0.0726

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#: 2310 674 SDG#: 54. Cm/

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Page: Y of Y

2nd Reviewer: Reviewer:

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

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

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

 A_x = Area of Compound

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

> average RRF = sum of the RRFs/number of standards %RSD = 100 * (S/X)

S= Standard deviation of the RRFs, C_x = Concentration of compound,

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	5/12/2010	5/12/2010 1,4-Dioxane (IS1)	0.5630	0.5630	0.5686	0.5686	2.7	2.68
	MSS K		Naphthalene (IS2)	1.0281	1.0281	1.0211	1.0211	9.9	09:9
			Fluorene (IS3)	1.3033	1.3033	1.2978	1.2978	7.0	96.9
			Hexachlorobenzene (IS4)	0.2320	0.2322	0.2313	0.2312	2.4	2.45
			Chrysene (IS5)	1.0597	1.0597	1.0588	1.0588	7.7	7.74
			Benzo(a)pyrene (IS6)	1.0950	1.0950	1.0629	1.0629	4.0	4.02

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

Conc	1,4-Dioxane	Naphthalene	Fluorene	Hexachlorob	Chrysene	Benzo(a)py
4.00	0.5835	1.1259	1.4452		1.1823	0.9940
10.00	0.5929	1.0644	1.3682	0.2384	1.1293	1.0380
20.00	0.5646	1.0578	1.3466	0.2340	1.1090	1.0835
50.00	0.5630	1.0281	1.3033	0.2320	1.0597	1.0950
80.00	0.5874	1.0313	1.2950	0.2362	1.0775	1.1324
120.00	0.5574	1.0018	1,2565	0.2294	0.9858	1.0769
160.00	0.5566	0.9425	1.1967	0.2264	0.9750	1.0450
200.00	0.5559	0.9170	1.1712	0.2222	0.9515	1.0380
	0.5559					
×	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 # 23310 G 29 SDG # See Cover

Continuing Calibration Results Verification VALIDATION FINDINGS WORSHEET

Page 7 of 7 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:

Where:

ave. RRF = initial calibration average RRF

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

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

RRF = continuing calibration RRF

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

Cis = Concentration of internal standard Cx = Concentration of compound

Recalculated 6. 2.9 2.2 0.4 2.5 7.2 6.4 2.9 1.6 4.7 Reported 2.9 4.6 2.9 2.5 2.2 4.0 4.9 1.6 7.2 Recalculated (CC RRF) 0.5809 1.0848 0.9918 0.2205 1.0259 1.3270 0.2323 1.1394 0.5421 1.2768 Reported CC RRF) 1.3270 1.0848 0.2205 0.5809 0.2323 1.1394 0.9918 1.2768 1.0507 Average RRF (Initial RRF) 1.0629 0.2313 0.5700 1.2978 0.2313 1.2978 1.0211 1.0588 1.0211 (181) (181) (183) (182) (183) (1S2)(184) (185) (IS4) (IS5) (186) (Reference IS) Hexachlorobenzene Hexachlorobenzene Benzo(a)pyrene Naphthalene Naphthalene Compound 1,4-Dioxane 1,4-Dioxane Chrysene Fluorene Fluorene Calibration 05/12/10 05/13/10 Date Standard ID K3697 K3652 ~ #

		CCV1		CCV2		
Compound (Reference IS)	9)	Concentration	Area Cpd	Area IS	Area Cpd	Area IS
		(IS/Cpd)				
1,4-Dioxane	(IS1)	40/80	280135	241131	333161	307267
Naphthalene	(IS2)	40/80	1955602	930630	2438514	1229307
Fluorene	(183)	40/80	1467082	552792	1906872	746739
Hexachlorobenzene	(184)	40/80	430763	927227	568451	1288916
Chrysene	(185)	40/80	2115549	975059	2871671	1399556
Benzo(a)pyrene	(981)	40/80	2111923	926789	2806342	1288674
	,					1

3.1

3.1 2.4

1.0259 1.0888

1.0888

1.0629

(186)

Benzo(a)pyrene

Chrysene

LDC # 77310 G xq SDG # See Cover

Continuing Calibration Results Verification VALIDATION FINDINGS WORSHEET

Page 2 of Y 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:

% 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

		Calibration		Average RRF	Reported	Recalculated	Reported	Recalculated
#	Standard ID	Date	Compound (Reference IS)	(Initial RRF)	(CC RRF)	(CC RRF)	Q%	%D
1	B7318	05/12/10	(IS1)	0.6180	0.5683	0.5683	8.0	8.0
			Naphthalene (IS2)	1.0369	1.0471	1.0471	1.0	1.0
			Fluorene (IS3)	1.2373	1.2615	1.2615	2.0	2.0
			Hexachlorobenzene (IS4)	0.2487	0.2530	0.2530	1.7	1.7
			Chrysene (IS5)	1.0410	1.0246	1.0246	1.6	1.6
			Benzo(a)pyrene (IS6)	1.0287	1.1047	1.1047	7.4	7.4

Compound (Reference IS)	S)	Concentration	Area Cpd	Area IS
		(IS/Cpd)		
1,4-Dioxane	(IS1)	40/80	401060	352839
Naphthalene	(IS2)	40/80	2927544	1397951
Fluorene	(183)	40/80	2119328	840002
Hexachlorobenzene	(IS4)	40/80	671556	1327446
Chrysene	(185)	40/80	2965580	1447209
Benzo(a)pyrene	(186)	40/80	2997507	1356655

LDC#: 0371062a SDG #: Sre Cover

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:__ Reviewer: 2nd reviewer:__

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

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

% Recovery: SF/SS * 100

Where: SF = Surrogate Found

SS = Surrogate Spiked

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	100	81.0	81	8)	0
2-Fluorobiphenyl		77.8	78	78	
Terphenyl-d14		85.)	85	85	
Phenol-d5	150	124.2	83	83	
2-Fluorophenoi		123.8	83	83	
2,4,6-Tribromophenol	1	123.7	82	82	
2-Chlorophenol-d4					1
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					an '
2-Fluorobiphenyl	ŕ				
Terphenyl-d14					
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

LDC #: 32 310 G 24 SDG #: See Care

Matrix Spike/Matrix Spike Duplicates Results Verification VALIDATION FINDINGS WORKSHEET

2nd Reviewer: Page: lof 1 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

SSC = Spiked sample concentration SA = Spike added Where:

SC = Sample concentation

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

MSC = Matrix spike concentration

MSDC = Matrix spike duplicate concentration

MS/MSD samples:

12/3

	ds	ike	Sample	Spiked 5	ample	Matrix Spike	Spike	Matrix Spik	Matrix Spike Duplicate	MS/MSD	g
Compound	\$ 3	Added (WS/AE)	Concentration (パ) /た)	Concentration	tration	Percent Recovery	Recovery	Percent F	Percent Recovery	RPD	
	MS	O MSD	0	MS	MSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol											
N-Nitroso-di-n-propylamine										_	
4-Chloro-3-methylphenol											
Acenaphthene	2750	2720	0	1960	2000	7	747	74	74	٨	λ
Pentachiorophenol									,		
Pyrene	2750	0€1€		2170	(acc	79	79	(8)	81	7	-
			>								

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#: 27210 G24

SDG #: See Corer

VALIDATION FINDINGS WORKSHEET

Page: lof 1 Reviewer:_

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

3/6 2nd Reviewer:

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

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

% Recovery = 100 * (SC/SA

SSC = Spike concentration SA = Spike added Where:

4-5/ 574+1-08c 27 LCS/LCSD samples: _

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

	J. J.	oika	5	iko		35	_	CsD	GSC FSC I	290
Compound		Added	Concentr	Concentration	Percent Recovery	Recovery	Percent Recovery	Accident	a	Uda
·	l CS) I CSD	SJ) J Csn	Reported	Porsic	Ponorted	Docalc	Denorted	Docalminator
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene	2340	MA	0800	\$	79	7.5				
Pentachlorophenol										1
Pyrene	2860	- →	0512		48	63				

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 #:_	<u> 73310</u>	G2a
	Suco	

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:	1 of 1
Reviewer:	M
2nd reviewer:	N

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

Y	И	N/A
∇	N	N/A

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

Concentration = $(A_{\bullet})(I_{\bullet})(V_{\bullet})(DF)(2.0)$ $(A_{is})(RRF)(V_o)(V_i)(%S)$

Area of the characteristic ion (EICP) for the compound to be measured

Area of the characteristic ion (EICP) for the specific internal standard

Amount of internal standard added in nanograms (ng)

Volume or weight of sample extract in milliliters (ml) or grams (g).

Volume of extract injected in microliters (ul)

Volume of the concentrated extract in microliters (ul)

Dilution Factor.

Percent solids, applicable to soil and solid matrices only.

Example:

Conc. = $\frac{(108811)(40)(100)(100)(100)}{(140105)(0.2313)(32.43)(6.889)(0)}$

= 572.0 ug/kg

2.0	= Factor of 2 to accoun	t for GPC cleanup	- ".		
#	Sample ID	Compound	Reported Concentration ()	Calculated Concentration ()	Qualification
			,		
<u> </u>					
 					

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS, Henderson, Nevada

Collection Date:

May 5, 2010

LDC Report Date:

June 16, 2010

Matrix:

Soil

Parameters:

Semivolatiles

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-3264-3

Sample Identification

SSAM7-05-1BPC** SSAO3-02-1BPC

SSAO3-02-1BPC_FD

^{**}Indicates sample underwent Stage 4 review

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.

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

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

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

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

V. Blanks

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

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
MB280-14738-/9-A	5/10/10	Bis(2-ethylhexyl)phthalate	72.7 ug/Kg	All samples in SDG 280-3264-3

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

Sample	Compound	Reported	Modified Final
	TIC (RT in minutes)	Concentration	Concentration
SSAM7-05-1BPC**	Bis(2-ethylhexyl)phthalate	110 ug/Kg	110U ug/Kg

Samples FB-04072010-RZC (from SDG 280-2280-2) and FB-04132010-RIG2-RZE (from SDG 280-2400-2) were identified as field blanks. No semivolatile contaminants were found in these blanks with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB-04132010-RIG2-RZE	4/13/10	Bis(2-ethylhexyl)phthalate Di-n-octylphthalate	1.1 ug/L 1.6 ug/L	SSAM7-05-1 BPC**

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

All target compound identifications were within validation criteria for samples on which a Stage 4 review was performed. Raw data were not evaluated for the samples reviewed by Stage 2B criteria.

XII. Project Quantitation Limit

All compound quantitation and CRQLs were within validation criteria with the following exceptions:

Sample	Compound	Finding	Flag	A or P
SSAO3-02-1BPC SSAO3-02-1BPC_FD	Benzo(b)fluoranthene Benzo(k)fluoranthene	Due to lack of resolution between these compounds in the samples, the laboratory performed the quantitation using the total peak area.	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	Р

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-3264-3	All compounds reported below the PQL.	J (all detects)	Α

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

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

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

XV. Overall Assessment

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

XVI. Field Duplicates

Samples SSAO3-02-1BPC and SSAO3-02-1BPC_FD were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentral	ion (ug/Kg)				
Compound	SSAO3-02-1BPC	SSAO3-02-1BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
2-Methylnaphthalene	340	310	-	30 (≤460)	-	•
Benzo(a)anthracene	35	41	-	6 (≤460)	-	-
Benzo(b)fluoranthene	53	52	-	1 (≤460)	-	-
Chrysene	76	73	-	3 (≤460)	-	-
Fluoranthene	160	150	•	10 (≤460)	-	-
Octachlorostyrene	5800	6200	7 (≤50)	-	-	_
Phenanthrene	420	420	•	0 (≤460)	-	-
Pyrene	95	98	_	3 (≤460)	-	-
Hexachlorobenzene	28000	29000	4 (≤50)	-	-	-

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG 280-3264-3

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-3264-3	SSAO3-02-1BPC SSAO3-02-1BPC_FD	Benzo(b)fluoranthene Benzo(k)fluoranthene	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	Р	Project Quantitation Limit (q)
280-3264-3	SSAM7-05-1BPC** SSAO3-02-1BPC SSAO3-02-1BPC_FD	All compounds reported below the PQL.	J (all detects)	А	Project Quantitation Limit (sp)

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-3264-3

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
280-3264-3	SSAM7-05-1BPC**	Bis(2-ethylhexyl)phthalate	110U ug/Kg	А	bl

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Field Blank Data Qualification Summary - SDG 280-3264-3

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

LDC #:	23310H2a	VALIDATION COMPLETENESS WORKSHEET
SDG #:	280-3264-3	Stage 2B /4
Laborato	rv: Test America	

Date: 16/10/	, 0
Page: Lof L	
Reviewer: 544	_
2nd Reviewer: A	_

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

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

	Validation Area		Comments
1.	Technical holding times	A	Sampling dates: 105 ho
11.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	2 RSD r
IV.	Continuing calibration/ICV	A	2 RSD r- CW/W = 250
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	Chient Spec
VIII.	Laboratory control samples	<u> </u>	us
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	Α	
XI.	Target compound identification	MA	
XII.	Compound quantitation/CRQLs	SM	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N A	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D = 2,3
XVII.	Field blanks	SW	FB = FB - 04132010 - RIG2 - RZE (280 - 2400-2) - + 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:

_ 	701				 	
14	SSAM7-05-1BPC ► ★	11	MB 246-14738-/g-A	21	 31	
2	SSAO3-02-1BPC	12		22	 32	
3	SSAO3-02-1BPC_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	

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2 Reviewer: 10 2nd Reviewer: 10

Method: Semivolatiles (EPA SW 846 Method 8270C)

Validation Area	Yes	No	NA	Findings/Comments
L Technical holding times			· · · · · · · · · · · · · · · · · · ·	Actives to the second s
All technical holding times were met.				
Cooler temperature criteria was met.				A SHEDWAY AND SHEDWAY
II. GC/MS Instrument performance check			l 2	
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				The state of the s
Was a method blank associated with every sample in this SDG?	/			
Was a method blank analyzed for each matrix and concentration?	_			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.				
VI. Surrogate spikes				
Were all surrogate %R within QC limits?				
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?	;			
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?				
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	•			
Was a MS/MSD analyzed every 20 samples of each matrix?				
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?				
VIII. Laboratory control samples (#1575) - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -				
Was an LCS analyzed for this SDG?				

LDC#: 3710 H29 SDG#: See Cover

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: W
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				Land The Control of t
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	1			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	/			
Were chromatogram peaks verified and accounted for?				N G 40
XII. Compound quantitation/CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	(
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	/			
XIII. Tentatively identified compounds (TICs)	1 a a	4 4 3		and the second of the second o
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?			/	
Were relative intensities of the major ions within \pm 20% between the sample and the reference spectra?			_	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?				
XIV. System performance				All Control of the Co
System performance was found to be acceptable.	/	ľ		
XV: Overall assessment of data as the second				
Overall assessment of data was found to be acceptable.				
XVI. Field duplicates.				100 mark 100 (100 (100 (100 (100 (100 (100 (100
Field duplicate pairs were identified in this SDG.		·		
Target compounds were detected in the field duplicates.	/	<u> </u>		
XVII. Field blanks				
Field blanks were identified in this SDG.				
Target compounds were detected in the field blanks.				

VALIDATION FINDINGS WORKSHEET

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

A. 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. Acenaphthene**	W. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene™	T. 4-Chloroaniline	II. 4-Nitrophenol⁵	XX. Di-n-butylphthalate	MMM. Bis(2-Chioroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ, Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	000. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP, Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	00. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TTT.
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	ກກກ
N. 2-Nitrophenoi**	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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LDC #:	SDG #:

VALIDATION FINDINGS WORKSHEET Blanks

of 2nd Reviewer: Reviewer:_ Page:

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" YN N/A

Was a method blank analyzed for each matrix?

Was a method blank analyzed for each concentration preparation level?

Y N/A

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

Y/N N/A Was the blank contaminated? If yes, please see qualification below. Blank analysis date: 5/12/10 Conc. units:

A11 (62)

Conc. units: 45 /Ex			Associated	Associated Samples:		H H	7 0)		
Compound	Blank ID				Sampl	Sample Identification	on		
	MP 180-147 84 JOH	¥6/8€							
组习	72.7 T2.7		110/4						

Blank extraction date:

Blank analysis date:

Associated Samples:	Sample Identification				
Associated Samples:					
	Blank ID				
Conc. units:	Compound				

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

SDG #: Sre Con LDC# 23310 429

VALIDATION FINDINGS WORKSHEET

Field Blanks

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

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

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

/L Associated sample units: 17 Blank units: M

Sampling date: 4/12/10 Field Blank / Rinsate / Other:

Associated Samples:

			,	recognated carriples.	anipico.		
Compound	Blank ID			S	Sample Identification	Ľ	
	FB-0413 201	FB-0413 2010 - RIG2 - RZBE					
EEE	1, 1		ND OF	ND OF >5x FB	FB		
FFF	۱. ه		J				
CROL							

Associated sample units:_ Blank units:

Sampling date: Field Blank / Rinsate / Other:

Associated Samples:

			***************************************			KATAL WATERWAY THE PARTY OF THE	
Compound	Blank ID		ZS.	Sample Identification	fon		
CROL							

5x Phthalates 2x All others

LDC#: 22310 HM SDG#:

Compound Quantitation and Reported CRQLs VALIDATION FINDINGS WORKSHEET

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

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

Y N N/A

Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used

Y N N/A

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

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	(3)									
Qualifications	d	-								
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Associated Samples										
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	666									
Sample ID										
Sa	8	,								
	2									
Date										
*										

Comments: See sample calculation verification worksheet for recalculations

LDC#: 23310H2a SDG#:See cover

VALIDATION FINDINGS WORKSHEET Field Duplicates

Reviewer: 2nd Reviewer:

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

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

	Conc	(ug/Kg)	RPD	Diff	Diff Limits	Quals
Compound Name	2	3	(≤50%)			(Parent Only)
2-Methylnaphthalene	340	310		30	≤460	
Benzo(a)anthracene	35	41		6	≤460	
Benzo(b)fluoranthene	53	52		1	≤460	
Chrysene	76	73		3	≤460	
Fluoranthene	160	150		10	≤460	
Octachlorostyrene	5800	6200	7			
Phenanthrene	420	420		0	≤460	
Pyrene	95	98		3	≤460	
Hexachlorobenzene	28000	29000	4			

V:\FIELD DUPLICATES\23310H2a.wpd

LDC#: 23310 H29 2002 SDG #:

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

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2nd Reviewer: Reviewer:

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

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

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

average RRF = sum of the RRFs/number of standards %RSD = 100 * (S/X)

 C_x = Concentration of compound, A_x = Area of Compound

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

S= Standard deviation of the RRFs,

X = Mean of the RRFs

				Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration		RRF	RRF	Average RRF	Average RRF	%RSD	%RSD
#	Standard ID	Date	Compound (Internal Standard)	(50 std)	(50 std)	(Initial)	(Initial)		
-	ICAL	5/8/2010	5/8/2010 1,4-Dioxane (IS1)	0.5851	0.5851	0.5791	0.5791	6.8	6.82
	MSS D		Naphthalene (IS2)	1.0818	1.0818	1.0917	1.0917	2.8	2.83
			Fluorene (IS3)	1.3573	1.3573	1.3205	1.3205	6.7	99:9
			Hexachlorobenzene (IS4)	0.2608	0.2608	0.2633	0.2633	9.5	9.48
			Chrysene (IS5)	1.0472	1.0472	1.0309	1.0309	3.1	3.14
			Benzo(a)pyrene (IS6)	1.0983	1.0983	1.0834	1.0834	13.3	13.28

Conc	1,4-Dioxane	Naphthalene	Fluorene	Hexachlorob	Chrysene	Benzo(a)py
4.00	0.5215	1.1002	1.1947		1.0331	0.8317
10.00	0.6382	1.0477	1.2120	0.2263	1.0128	0.9476
20.00	0.6300	1.0478	1.2639	0.2397	1.0223	1.0101
50.00	0.5851	1.0818	1.3573	0.2608	1.0472	1.0983
80.00	0.5842	1.0953	1.3253	0.2600	1.0539	1.1259
120.00	0.5666	1.1092	1.3832	0.2754	1.0748	1.1887
160.00	0.5529	1.1267	1.3955	0.2815	1.0367	1.2251
200.00	0.5544	1.1249	1.4319	0.2996	0.9663	1.2400
×	0.5791	1.0917	1.3205	0.2633	1.0309	1.0834
S	0.0395	0.0309	0.0879	0.0250	0.0324	0.1439

1678262 1546473

2196814

2123114

40/20

1381076

450249

1281626

305776

223629

40/20

Area IS

Area cpd

onc IS/Cpd

1135207 755377

1535127

40/20 40/20 40/20 40/20

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Comments: Refer

SDG# 22 Crr

VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

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0.3296

0.4359

0.5129

0.5957

0.6312

0.5433

Ave

0.6071

METHOD: GC

GC EPA SW 846 Method 8270C

Parameter:

Bis(2-ethylhexyl)phthalate

X^2		A A A MINISTER								
>	conc ratio	0.100	0.250	0.500	1.250	2.000	3.000	4.000	5.000	
×	area ratio	0.03296	0.10897	0.25643	0.74457	1.23205	1.89372	2.42838	3.08978	
	Compound	Bis(2-ethylhexyl)phthalate	,							
	Column	Not specified				-	MSD			
	Date	05/08/2010								

Regression Output:		Reported WLR	
Constant	-0.03649	11	0.05090
Std Err of Y Est	0.02921		
R Squared	0.99944	r2 =	0.9968000
No. of Observations	8.00000		
Degrees of Freedom	00000		
	Control of the Contro		
X Coefficient(s) 0.6	0.62601	ı. E	0.61540
Std Err of Coef. 0.00	0.006027	1 Canada Campanana	

LDC # 27716 Hre. SDG # See Cover

Continuing Calibration Results Verification VALIDATION FINDINGS WORSHEET

2nd Reviewer: Page __ 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

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

Cis = Concentration of internal standard

Cx = Concentration of compound

		Calibration			Average RRF	Reported	Recalculated	Reported	Recalculated
#	Standard ID	Date	Compound	Compound (Reference IS)	(Initial RRF)	(CC RRF)	(CC RRF)	Q%	WD
-	D4891	05/12/10	1,4-Dioxane	(IS1)	0.5791	0.5249	0.5249	9.4	9.4
			Naphthalene	(182)	1.0917	1.0945	1.0945	0.3	0.3
			Fluorene	(ESI)	1.3205	1.3456	1.3456	1.9	1.9
			Hexachlorobenzene	enzene (IS4)	0.2633	0.2713	0.2713	3.0	3.1
			Chrysene	(185)	1.0309	1.0161	1.0161	1.4	4:1
			Benzo(a)pyrene	ene (IS6)	1.0834	1.1127	1.1127	2.7	2.7

Compound (Reference IS)	s)	Concentration	Area Cpd	Area IS
		(IS/Cpd)		
1,4-Dioxane	(IS1)	40/80	383501	365302
Naphthalene	(IS2)	40/80	2883187	1317169
Fluorene	(IS3)	40/80	2383317	885592
Hexachlorobenzene	(IS4)	40/80	850720	1567635
Chrysene	(185)	40/80	4037721	1986787
Benzo(a)pyrene	(981)	40/80	4197272	1886084

LDC#: 23310 Hra SDG#: Ste Cover

VALIDATION FINDINGS WORKSHEET <u>Surrogate Results Verification</u>

Page:	<u>lof 1</u>
Reviewer	N
2nd reviewer:	AA

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	ردا	75.3	75	75	0
2-Fluorobiphenyl		78.6	79	79	1
Terphenyl-d14		93.7	94	94	
Phenol-d5	150	174.4	83	83	
2-Fluorophenol		122,9	82	8~	
2,4,6-Tribromophenol	X	83.0	55	35	1
2-Chlorophenol-d4			·		
1,2-Dichlorobenzene-d4					

Sample ID:

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

Sample ID:

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

LDC#: 77310 Hra SDG #: See Cover

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

Reviewer: 3%

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 and laboratory control sample duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SC/SA

Where: SSC = Spike concentration SA = Spike added

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

LCS/LCSD samples:

MS 280- 14738 /10- A

	aS	, in the second	š	Spike	31	CS	USDI	SD	1 CS/	I CS/I CSD
Compound	Added (My /k.)	ded	Conce (145	Concentration (145 / 6×7)	Percent F	Percent Recovery	Percent Recovery	Recovery	RI	RPD
	1.08	1 CSD	SUI	l CSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene	25.70	#M	1590	1.A	77	77			-	
Pentachlorophenol					/					
Pyrene	2570	_	0920		88	88				

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 #:_	733	10	426
SDG #:			

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	of)_
Reviewer:_	W
2nd reviewer: 4	1

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

Y	N	N/A
∇	N	N/A

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

•		_		
Conce	entratio	(A) (DDE) (A) (A (A) (O) (C)	Example:	EFF
A_{x}	==	Area of the characteristic ion (EICP) for the compound to be measured	Sample I.D. # ,	<u> </u>
A_is	=	Area of the characteristic ion (EICP) for the specific internal standard	Caro (29145)	
l _s	=	Amount of internal standard added in nanograms (ng)	Conc ((16 008 247))()()()()
V _o	=	Volume or weight of sample extract in milliliters (ml) or grams (g).	0,61524	+(0,0509) (40)
V_i	=	Volume of extract injected in microliters (ul)	=	1
V,	=	Volume of the concentrated extract in microliters (ul)		
Df	=	Dilution Factor.	V 3 5 51	
%S	=	Percent solids, applicable to soil and solid matrices only.	$ \Lambda =24 $	_
			^	2 221 (1. 1) (100)

fred conc = Factor of 2 to account for GPC cleanup 2.0 , 46 Palculated (0, 946) Concentration Reported Concentration Qualification Compound Sample ID 112. 110

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS, Henderson, Nevada

Collection Date:

May 5, 2010

LDC Report Date:

June 16, 2010

Matrix:

Soil

Parameters:

Semivolatiles

Validation Level:

Stage 2B

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-3264-6

Sample Identification

SSAO3-03-9BPC SSAO3-03-9BPCMS SSAO3-03-9BPCMSD

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.

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

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

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

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

V. Blanks

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

Sample FB-04072010-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. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-3264-6	All compounds reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

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

XVI. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG 280-3264-6

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-3264-6	SSAO3-03-9BPC	All compounds reported below the PQL.	J (all detects)	Α	Project Quantitation Limit (sp)

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-3264-6

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Field Blank Data Qualification Summary - SDG 280-3264-6

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

Stage 2B

	Date:	ho ho
	Page:_	(of)
	Reviewer:	344
nd	Reviewer:	AL

SDG #: 280-3264-6 Laboratory: Test America

LDC #: 23310l2a

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 5/05 /10
II.	GC/MS Instrument performance check	<u> </u>	
111.	Initial calibration	Α	J KIP LA
IV.	Continuing calibration/ICV	À	COV/W = 252
V.	Blanks	À	·
VI.	Surrogate spikes	À	
VII.	Matrix spike/Matrix spike duplicates	SM	
VIII.	Laboratory control samples	A	us
IX.	Regional Quality Assurance and Quality Control	N N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A-	
XVI.	Field duplicates	Ŋ	
XVII.	Field blanks	ND	FB = FB-04072010-RZC (380-2280.2)

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:

Soi)

	2011				 	
1	SSAO3-03-9BPC	11	MB 280- 15592/1-A	21	31	
2	SSAO3-03-9BPCMS	12		22	32	
3	SSAO3-03-9BPCMSD	13		23	33	
4		14		24	34	
5		15		25	35	Westerland to the second secon
6		16		26	36	
7		17		27	37	
8		18		28	38	
9		19		29	39	
10		20		30	40	

VALIDATION FINDINGS WORKSHEET

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

A. Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene**	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene**	T. 4-Chloroaniline	II. 4-Nitrophenol*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY, Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP. Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	00. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TIT. 1,4- Dioxane
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	usu octa chimo shymene
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	VVV.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	www.

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

LDC# 23310 IZa SDG #:_

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1 Reviewer. 2nd Reviewers

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.

Y N N/A

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?

Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	2/3	777	()	()	(06) 62	_	No grade (2, & 4)
		RKK	()	()	(t) 8/		
			()	()	()	2	
			()	()	()		
				()	()		
			()	(()		
			()	()	()		
			()	()	()		
			()	()	()		
			()	()	()		
			()	())		
			(()	()		
				()	()		
			()	()	()		
			()	()	()		
			()	()	()		
			(()	()		

											4
	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	KPD (Soil)	QC Limits (Water)	(Water)
Ą	Phenol	26-90%	< 35%	12-110%	< 42%	99	Acenaphthene	31-137%	< 19%	46-118%	< 31%
ن	2-Chlorophenol	25-102%	2 50%	27-123%	< 40%	-:	4-Nitrophenol	11-114%	< 50%	10-80%	< 50%
ші	1,4-Dichlorobenzene	28-104%	< 27%	36-97%	< 28%	χ Υ	2,4-Dinitrotoluene	28-89%	< 47%	24-96%	< 38%
J.	N-Nitroso-di-n-propylamine	41-126%	< 38%	41-116%	< 38%	Ë.	Pentachlorophenol	17-109%	< 47%	9-103%	< 50%
Α.	1,2,4-Trichlorobenzene	38-107%	< 23%	39-98%	< 28%	77	Pyrene	35-142%	< 36%	26-127%	< 31%
>	4-Chloro-3-methyiphenol	26-103%	< 33%	23-97%	< 42%						

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS, Henderson, Nevada

Collection Date:

May 17, 2010

LDC Report Date:

June 16, 2010

Matrix:

Soil

Parameters:

Semivolatiles

Validation Level:

Stage 2B

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-3624-2

Sample Identification

RSAJ5-7BPC RSAJ5-8BPC

RSAJ5-8BPCMS

RSAJ5-8BPCMSD

Introduction

This data review covers 4 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

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

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

V. Blanks

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

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
MB280-16304/1-A	5/19/10	Di-n-octylphthalate	58.8 ug/Kg	All samples in SDG 280-3624-2

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

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 280-3624-2

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. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-3624-2	All compounds reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

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

XVI. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG 280-3624-2

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-3624-2	RSAJ5-7BPC RSAJ5-8BPC	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 280-3624-2

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Semivolatiles - Field Blank Data Qualification Summary - SDG 280-3624-2

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 6/10/0
Page: 10f)
Reviewer: 5/1
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
l.	Technical holding times	A	Sampling dates: 5/17 /b
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	2 RSD 17 CW /W = 25]
IV.	Continuing calibration/ICV	<u> </u>	CW /W = 25]
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	<u> </u>	
VIII.	Laboratory control samples		LES
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards		
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	SW	FB = FB-04072010- KZD (280-22/6-2

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:

LDC #:___

23310J2a

SDG #: 280-3624-2

Laboratory: Test America

soil

	-	5011					
1	RSAJ5-7BPC	†	MB 280- 16704 1-A	21		31	
2	RSAJ5-8BPC	12		22	32	32	
3	RSAJ5-8BPCMS	13		23		33	
4	RSAJ5-8BPCMSD	14		24		34	
5		15		25		35	
6		16_		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

VALIDATION FINDINGS WORKSHEET

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

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

23311 Ja 1 2 2 x SDG #: LDC #:

VALIDATION FINDINGS WORKSHEET Blanks

of 2nd Reviewer Page: 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".

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?

 $\frac{Y}{N}$ N/A Was the blank contaminated? If yes, please see qualification below. Blank analysis date: $\frac{Y}{N}$ / $\frac{N}{N}$

Sample Identification 411 (ND) Associated Samples: MB 280- 16304 Blank ID 58.8 뷀 15 /FU Compound 下十十 Conc. units:

Blank analysis date: Blank extraction date: Conc. units:

Associated Samples:

tion				
Sample Identification				
Blank ID				
Compound				

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

LDC#: 3310 Jok SDG#: Sta Ca

VALIDATION FINDINGS WORKSHEET Field Blanks

l of	M	X
Page:	Reviewer:	2nd Reviewer:

***** Sample Identification Associated Samples: Y N N/A Were field blanks identified in this SDG?

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

Were target compounds detected in the field blanks? METHOD: GC/MS BNA (EPA SW 846 Method 8270C) FB-04072010- RZD u Y Blank ID EFE Compound Y N N/A Y N N/A Blank units:

Blank units: Associated sample units:

CROL

Sampling date: Field Blank / Rinsate / Other

Associated Samples:

	,	ייספים מיים מיים יים		
Compound	Blank ID	Sample Identification	ation	
CRQL				

5x Phthalates 2x All others

Tronox LLC Facility, PCS, Henderson, Nevada Data Validation Reports LDC #23310

Chlorinated Pesticides



Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS, Henderson, Nevada

Collection Date:

May 4, 2010

LDC Report Date:

June 16, 2010

Matrix:

Soil

Parameters:

Chlorinated Pesticides

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-3197-1

Sample Identification

SSAL3-05-1BPC

SSAL3-05-3BPC

SSAL3-05-5BPC

SSAL3-05-7BPC

SSAL3-05-9BPC**

SSAM5-03-1BPC

SSAM5-03-1BPC FD

SSAM5-03-3BPC

SSAM5-03-5BPC

SSAM5-03-7BPC

SSAM5-03-9BPC**

SSAM5-03-5BPCMS

SSAM5-03-5BPCMSD

^{**}Indicates sample underwent Stage 4 review

Introduction

This data review covers 13 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8081A for Chlorinated Pesticides.

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

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

Blank results are summarized in Section V.

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. GC/ECD Instrument Performance Check

Instrument performance was acceptable unless noted otherwise under initial calibration and continuing calibration sections.

III. Initial Calibration

Initial calibration of single compounds were performed for the primary (quantitation) column and confirmation column as required by this method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for selected compounds.

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

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

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) of calibration factors in continuing standard mixtures were within the 20.0% QC limits.

The percent difference (%D) of the second source calibration standard were less than or equal to 20.0% for all compounds.

Retention times (RT) of all compounds in the calibration standards were within QC limits for samples on which a Stage 4 review was performed. Raw data were not evaluated for the samples on which a Stage 2B review was performed.

The individual 4,4'-DDT and Endrin breakdowns (%BD) were less than or equal to 15.0%.

V. Blanks

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

Samples FB-04072010-RZD (from SDG 280-2216-2) and FB-04132010-RIG2-RZE (from SDG 280-2400-2) were identified as field blanks. No chlorinated pesticide contaminants were found in these blanks.

VI. Surrogate Spikes

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

Sample	Column	Surrogate	%R (Limits)	Compound	Flag	A or P
SSAM5-03-5BPC	Col. 1	Decachlorobiphenyl	130 (63-124)	All TCL compounds	J+ (all detects)	А

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Pesticide Cleanup Checks

a. Florisil Cartridge Check

Florisil cleanup was not required and therefore not performed in this SDG.

b. GPC Calibration

GPC cleanup was not required and therefore not performed in this SDG.

XI. Target Compound Identification

All target compound identifications were within validation criteria for samples on which a Stage 4 review was performed. Raw data were not evaluated for the samples reviewed by Stage 2B criteria.

XII. Project Quantitation Limit

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

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-3197-1	All compounds reported below the PQL.	J (all detects)	А

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

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

Samples SSAM5-03-1BPC and SSAM5-03-1BPC _FD were identified as field duplicates. No chlorinated pesticides were detected in any of the samples with the following exceptions:

	Concentra	ition (ug/Kg)	555	Difference		
Compound	SSAM5-03-1BPC	SSAM5-03-1BPC _FD	RPD (Limits)	(Limits)	Flag	A or P
4,4'-DDE	490	370	•	120 (≤650)	•	-
4,4'-DDT	410	280	-	130 (≤650)	-	-
Hexachlorobenzene	6500	4100	45 (≤50)	-	-	_

Tronox LLC Facility, PCS, Henderson, Nevada Chlorinated Pesticides - Data Qualification Summary - SDG 280-3197-1

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-3197-1	SSAM5-03-5BPC	All TCL compounds	J+ (all detects)	A	Surrogate spikes (%R) (s)
280-3197-1	SSAL3-05-1BPC SSAL3-05-3BPC SSAL3-05-5BPC SSAL3-05-7BPC SSAL3-05-9BPC** SSAM5-03-1BPC SSAM5-03-1BPC _FD SSAM5-03-3BPC SSAM5-03-5BPC SSAM5-03-7BPC SSAM5-03-9BPC**	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, PCS, Henderson, Nevada Chlorinated Pesticides - Laboratory Blank Data Qualification Summary - SDG 280-3197-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Chlorinated Pesticides - Field Blank Data Qualification Summary - SDG 280-3197-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

Stage 2B /4

Date: 6/10 /10 Page: __lof_/ 2nd Reviewer:

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 5/64 /10
II.	GC/ECD Instrument Performance Check	A	
111.	Initial calibration	A	? RSD 12 CW/164 € 252
IV.	Continuing calibration/ICV	<u> </u>	Ca/14 = 252
V.	Blanks	À	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	<u> </u>	LS 23
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	N A	
XII.	Compound quantitation and reported CRQLs	NA	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	Sh)	D = 6,7
XV.	Field blanks	M	FB = FB-0467 2010. RZD (260-2216-2) = FB-04152010- RIG2-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:

LDC #: 23310E3a

SDG #: 280-3197-1

Laboratory: Test America

* ¥	Stage 4 Soil						1
1	SSAL3-05-1BPC	11	SSAM5-03-9BPC **	21	MB 280 - 14291/-A	31	
4 2 +	SSAL3-05-3BPC	12	SSAM5-03-5BPCMS	22	/	32	
+ 3	SSAL3-05-5BPC	13	SSAM5-03-5BPCMSD	23		33	
4	SSAL3-05-7BPC	14		24		34	
3 + 4 + 5	SSAL3-05-9BPC	15		25		35	
6	SSAM5-03-1BPC 7	16		26		36	
7	SSAM5-03-1BPC_FD \$	17		27		37	
8	SSAM5-03-3BPC	18		28		38	
9	SSAM5-03-5BPC	19		29		39	
10	SSAM5-03-7BPC	20		30		40	

LDC #: 73 310 E3a SDG #: See Cores

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: 176
2nd Reviewer:

Method: Pesticides/PCBs (EPA SW 846 Method 8081/8082)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.				
Cooler temperature criteria was met.				
II. GC/ECD Instrument performance check				
Was the instrument performance found to be acceptable?				
III. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?				
Was a linear fit used for evaluation? If yes, were all percent relative standard deviations $(\%RSD) \le 20\%$?	/			
Was a curve fit used for evaluation? If Yes, what was the acceptance criteria used?				
Did the initial calibration meet the curve fit acceptance criteria?	/			
Were the RT windows properly established?				
Were the required standard concentrations analyzed in the initial calibration?				
IV. Continuing calibration				
What type of continuing calibration calculation was performed?%D or%R	/			
Were Evaluation mix standards analyzed prior to the initial calibration and sample analysis?	/			
Were endrin and 4,4'-DDT breakdowns ≤ 15% for individual breakdown in the Evaluation mix standards?	/			
Was a continuing calibration analyzed daily?				
Were all percent differences (%D) ≤ 20% or percent recovieries 80-120%?	/			
Were all the retention times within the acceptance windows?		·		
V Blanks				
Was a method blank associated with every sample in this SDG?				
Was a method blank analyzed for each matrix and concentration?	/			
Were extract cleanup blanks analyzed with every batch requiring clean-up?				
Was there contamination in the method blanks or clean-up blanks? If yes, please see the Blanks validation completeness worksheet.		/		
VI. Surrogate spikes				
Were all surrogate %R within the QC limits?				
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?	1			
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?	/			
VII. Matrix spike/Matrix spike duplicates	7			

LDC#: 73310 F 36 SDG#: <u>Cee Civer</u>

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: 11/6
2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	/			
Was a MS/MSD analyzed every 20 samples of each matrix?	/			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?				
VIII. Laboratory control samples				
Was an LCS analyzed for this SDG?	/			
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?				
IX. Regional Quality Assurance and Qualify Control				
Were performance evaluation (PE) samples performed?				
Were the performance evaluation (PE) samples within the acceptance limits?			/	
X. Target compound identification				
Were the retention times of reported detects within the RT windows?			***********	
XI. Compound quantitation/CRQLs				
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions, dry weight factors, and clean-up activities applicable to level IV validation?				
XII System performance				
System performance was found to be acceptable.		•		
XIII. Overall assessment of data		,		
Overall assessment of data was found to be acceptable.				
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.	/			
Target compounds were detected in the field duplicates.				
XV: Field blanks	·			
Field blanks were identified in this SDG.			_	
Target compounds were detected in the field blanks.				

LDC#: -33/0 F34 Sa Gran SDG #:

VALIDATION FINDINGS WORKSHEET Surrogate Spikes

lof 2nd Reviewer: Page: Reviewer:_

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

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

VACINA WERE SURVIGATES Spiked into all samples, standards and blanks?

N NA Did all surrogate percent recoveries (%R) meet the QC limits?

Qualifications	No suc								J+ 16th / *	No mal	6					
%R (Limits)	210 (59-116)		()	280 (59-1K)		())	763 ())	() oe/	139 (59-115)	(45/-63) (21	(()	
Surrogate Compound	Ą	a		¥	B		82		В	Ą	B					
Column	C. 1															
Sample ID	((450x)			7 (250x)			(xasz) 8		(X0'S) b	(×0) of						
Date																
#																

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

LDC#: >3310 F34 SDG#: SPE Comy

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Page: 1_of__ Reviewer: 3

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

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

Was a MS/MSD analyzed every 20 samples for each matrix or whenever a sample extraction was performed? Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits? Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG?

*	Date	DI DS/WSD ID	Compound	MS %R (Limits)	(8)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		61/21	Several		unde		Himits ()	5	No sund
		. ,	for	`	and	3 KRD	()	,	(either MS MS
				J	î	(()		ريس ورو يسر)
))	()	()		/
)	_	()		
)	(()	()		
)		()	()		
))	()	()		
)	,	()	()		
				J		()			
)	(()	()		
))	()	()		
)	(()	()		
))	()	()		
				,	î	()	()		
)	,	()	()		
)	(()	()		
))	()	()		
))	()	()		
)		()	()		
))	()	()		
)	(()	()		
				.	(()	()		
[_	^)	()		
				~	^))		
)		(

LDC#: 23310E3a SDG#:See cover

Y/N NA

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	<u> </u>
Reviewer:	.16
2nd Reviewer:	A

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

Y N NA

Were field duplicate pairs identified in this SDG?

Were target analytes detected in the field duplicate pairs?

	Conc (ug/Kg)	RPD	Diff	Diff Limits	Quals
Compound Name	6	7	(≤50%)			(Parent Only)
4,4'-DDE	490	370		120	≤650	
4,4'-DDT	410	280		130	≤650	
Hexachlorobenzene	6500	4100	45			

V:\FIELD DUPLICATES\23310E3a.wpd

LDC# 23310 E34

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Page: 1 of 4

Reviewer: DV

GC EPA SW 846 Method 8081A METHOD:

100.00 Conc 10.00 25.00 50.00 75.00 4.00 597478.00 139559.00 294636.00 443277.00 22286.00 54850.00 Area × Compound 4,4'-DDT GCS_P2 Column CLP1 4,4'-DDT 04/26/2010 Parameter: Date

	Local Market Control of the Control
	THE REAL PROPERTY OF THE PERSON OF THE PERSO

Regression Output:			Reported	
Constant		0.00000	= 0	0.0000
Std Err of Y Est		4961.04943		
R Squared		0.99953	- 21	0.998900
No. of Observations		0000009		, and a second second
Degrees of Freedom		2.00000		
			m1 =	5850
X Coefficient(s)	5928.760416	0.444903	COLORODO TO	
Std Err of Coef.	36.118827	0.11		

5485.00 5582.36 5892.72 5910.36 5974.78

5571.50

X₂2

5736.12 Ave RF

LDC # 29316 EM SDG#

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Page: $\sqrt{}$ of $\frac{4}{}$

Reviewer: \(\sum_1 \)

GC EPA SW 846 Method 8081A METHOD:

Hexachlorobenzene

Parameter:

X^2	
Y Conc	4.00 10.00 25.00 50.00 75.00
X Area	39031.00 92016.00 218583.00 438324.00 653554.00
Compound	Hexachlorobenzene
Column	CLP1 GCS_P2
Date	04/26/2010

Kegression Output:		00000	ner rode) i	0.00000
COISIGHT		4707 31355		
D Squared		0.99979	12 =	0.999900
No of Observations	ANALYS AND	000000		
Degrees of Freedom	and the second s	5.00000		
	AMADA		m 1 m	8633
X Coefficient(s)	8674.807007	0.444903	and delivery to the second sec	
Std Err of Coef.	34.271508	0.11		

8714.05 8618.53 9201.60 8743.32 8766.48

9757.75

Ave RF

8966.96

LDC # 23310 E3A SDG#

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Page: 3 of Reviewer: NG 2nd Reviewer:

> GC FPA SW 846 Method 8081A METHOD:

Parameter:

אופווסס מסוושוא	
GC EFA SVV 040 INELIDA SUSTA	4,4'-DDT
 ב	ter:

Column CLP2	Compound 4,4-DDT	Area Area 26707.00 68045.00	Y Conc 4.00	X^2 16.00
		171312.00	25.00	625.00
		355511.00	20.00	2500.00
		525805.00	75.00	5625.00
		705006.00	100.00	10000.00

6676.75 6804.50 6852.48 7110.22 7010.73 7050.06

	TOTAL CONTRACTOR OF THE PROPERTY OF THE PROPER			A Addition to the second secon
Regression Output:	out:		Reported	
Constant		-2800.24293	II O	A.
Std Err of Y Est		3336.78918		
R Squared		0.99991	r2 =	0.999900
No. of Observations		0000009	The state of the s	a de la companyone de l
Degrees of Freedom		3.00000		
			n 0	NR R
X Coefficient(s)	7098.583493	-0.256471	= q	NR
Std Err of Coef.	159.475846	1.53		

6917.46

Ave RF

LDC # 22310 E 34 SDG# 22 Com

VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

Page: 4 of 1

Reviewer: 2

METHOD: GC EPA SW 846 Method 8081A

eter: Hexachlorobenzene

Parameter:

			×	\	X^2
Date	Column	Compound	Area	Conc	
04/26/2010	CLP2	Hexachlorobenzene	58418.00	4.00	16.00
			134526.00	10.00	100.00
	GCS_P2		312150.00	25.00	625.00
			605013.00	20.00	2500.00
			879444.00	75.00	5625.00
			1132166.00	100.00	10000.00

14604.50 13452.60 12486.00 11725.92 11321.66

12615.16

Ave RF

12100.26

	- Address of the state of the s	- Address of the second		
Regression Output:	ند		Reported	
Constant		8023.22168	= 0	NR
Std Err of Y Est		2267.04743		
R Squared		0.99998	- 2 =	1.000000
No. of Observations		0000009	and the property of the proper	
Degrees of Freedom		3.00000		
			ii ii	NR
X Coefficient(s)	12623.434031	-13.727283	= q	N N
Std Err of Coef.	108.349460	1.04		

LDC # 29.310 E.34 SDG# <u>C.</u> Cw~>

VALIDATION FINDINGS WORKSHEET Continuing Calibration Calculation Verification

Page: of Darwiewer: OAC Dank Reviewer:

METHOD: GC___HPLC___

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

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

Where:

N = Initial Calibration Factor or Nominal Amount

C = Calibration Factor from Continuing Calibration Standard or Calculated Amount

					Reported	Recalculated	Reported	Recalculated
		Calibration		CCV Conc	Conc	Conc	Q %	Q%
#	Standard ID	Date	Compound					
_	005F0501	5/12/2010	Hexachlorobenzene CLP1	1 50	49.60	50.12	0.8	0.2
			4,4'-DDT CLP1	P1 50	52.00	51.70	3.9	3.4
			Hexachlorobenzene CLP2	22 50	50.10	50.13	0.3	0.3
			4,4'-DDT CLP2	P2 50	56.00	55.97	11.9	11.9
2	018F1801	5/13/2010	Hexachlorobenzene CLP1	21 50	49.40	49.96	1.1	1.2
!			4,4'-DDT CLP1	P1 50	53.60	53.33	7.2	7.2
			Hexachlorobenzene CLP2	22 50	50.10	50.10	0.2	0.2
			4,4'-DDT CL	CLP2 50	56.80	56.82	13.6	13.6

				CCV1	CCVZ
Compound		q	υ	Area	Area
HCB CLP1		8633.00		432727	431328
4,4'-DDT CLP1		5850.00		302463	311953
HCB CLP2 -13.727283	283	12623.43	8023.22	606349	606955
4,4'-DDT CLP2 -0.256471	171	7098.58	-2800.24293	393735	399704

LDC#:	233	10	E	34
SDG#:	Ses	Cr	v-e.	/

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:_	
Reviewer:	3/4
2nd reviewer:	

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

The percent recoveries (%R	of surrogates were	recalculated for t	he compounds	identified be	elow using the	following	calculation:
--------------------------	----	--------------------	--------------------	--------------	---------------	----------------	-----------	--------------

% Recovery: SF/SS * 100

Where: SF = Surrogate Found

SS = Surrogate Spiked

Sample ID: #

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
Tetrachloro-m-xylene						
Tetrachloro-m-xylene	Est. CLP1	20	14.78	74	74	0
Decachlorobiphenyl	1		22.34	112	117	
Decachlorobiphenyl					L	

Sample ID:

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

Sample ID:

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

Sample ID:

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

lotes:	_
	-

LDC# 23310 E34 SDG #: See Cover

Matrix Spike/Matrix Spike Duplicates Results Verification VALIDATION FINDINGS WORKSHEET

Page: Lof L 2nd Reviewer Reviewer:

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

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

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

SSC = Spiked sample concentration SA = Spike added Where:

SC = Concentration

MS = Matrix spike percent recovery

MSD = Matrix spike duplicate percent recovery

MS/MSD samples:

RPD = 1 MS - MSD 1 * 2/(MS + MSD)

			<u>_</u>		_==				
MS/MSD	RPD	Recalculated	14	4					
W		Reported	14	+					
Matrix Spike Duplicate	Percent Recovery	Recalc.	81.5	337	,				
Matrix Spik	Percent	Reported	18	362					
Matrix Spike	Recovery	Recalc.	46	2/7					
Matri	Percent Recovery	Reported	94	218					
Sample	Concentration (24/54)	0 MSD	15.5	101					
			17.8	48,0					
Sample	Concentration (MS /(C)	٥.	٥٦	573					
pike	Spike Added (55 Kg.) MSD 19.0								
Ś	 ≰ ম	MS	18.9	>					
	Compound		gamma-BHC	4,4'-DDT					

Comments: Refer of 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# 29310 E34 SDG #: Lee Con

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

Page: 1 of 1 Reviewer:

2nd Reviewer.

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

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

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

Where:

SC = Concentration

RPD = ILCS - LCSD I * 2/(LCS + LCSD)

SSC = Spiked sample concentration SA = Spike added

LCS/LCSD samples:

250-14 291 ğ

1 9	Spiked (Sample	רכ	CS	סח	CCSD	TCS/FCSD	
Addød (45/&_)	Concentration (ぬく/(こ)	tration /احـ)	Percent F	Percent Recovery	Percent	Percent Recovery	RPD	
TCSD	SOT	UCSD	Reported	Recalc.	Reported	Recaic.	Reported F	Recalc.
4.	(2,55	MA	Z	78				(
	(4.9		87	87				

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

LDC #:	~3310	E31
	Sa	

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	1	_of).	
Reviewer:		Ø	Ç_	
2nd reviewer:	4	1		

METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

$\langle \mathbf{Y} \rangle$	N	N/A
$\sqrt{\chi}$	N	N/A
7		

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

Example:	
Sample I.D.	Hexach Loro beneura
Conc. = (450697)	(10 ml) (10)
Conc. = $\frac{(956697)}{8633}$	30.8 5) (0.87
= 194.8	
~ 195 ng/kg	

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

Note:	

Tronox LLC Facility, PCS, Henderson, Nevada Data Validation Reports LDC #23310

Metals



Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS, Henderson, Nevada

Collection Date:

May 3, 2010

LDC Report Date:

June 16, 2010

Matrix:

Soil

Parameters:

Arsenic

Validation Level:

Stage 2B

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-3153-1

Sample Identification

SSAK8-06-1BPC

SSAK8-06-5BPC

SSAK8-07-1BPC

SSAK8-07-5BPC

SSAK8-06-1BPCMS

SSAK8-06-1BPCMSD

Introduction

This data review covers 6 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 6020 for Arsenic.

This review follows the Standard Operating Procedures (SOP) 40, Data Review/Validation (BRC 2009), the Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada (June 2009), NDEP guidance (May 2006), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004).

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

Blanks are summarized in Section IV.

Field duplicates are summarized in Section XIV.

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

The following are definitions of the data qualifiers:

- J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.
- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- B The analytical result may be a false positive totally attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.
- JB The analytical result may be biased high and partially attributable to blank contamination.

 This qualifier is applicable to radiochemistry analysis only.
- JK The analytical result is an estimated maximum possible concentration (EMPC).
- X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.
- J-TDS The analytical result is estimated based on failure of the Total Dissolved Solids (TDS) correctness check performed in accordance with the Standard Method 1030E.
- J-CAB The analytical result is estimated based on failure of the cation-anion balance correctness check performed in accordance with Standard Method 1030E.
- J-TDS & CAB The analytical result is unreliable based on the failure of the cation-anion balance and TDS correctness check performed in accordance with standard Method 1030E.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. ICPMS Tune

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

III. Calibration

An initial calibration was performed.

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

IV. Blanks

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

Sample FB-04072010-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 analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-3153-1	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 280-3153-1

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-3153-1	SSAK8-06-1BPC SSAK8-06-5BPC SSAK8-07-1BPC SSAK8-07-5BPC	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 280-3153-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Arsenic - Field Blank Data Qualification Summary - SDG 280-3153-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

	VALIDATION COMPLETENESS WORKSHEET	Date: 6-15-16
	Stage 2B	Page: <u>l</u> of <u>l</u>
	-	Reviewer:
_		2nd Reviewer: 1

METHOD: As (EPA SW 846 Method 6020)

23310B4

Laboratory: Test America

280-3153-1

LDC #:___

SDG #:___

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	P	Sampling dates: 5/3/10
II.	ICP/MS Tune	9	
111.	Calibration	Þ	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	A	MSID
VII.	Duplicate Sample Analysis	N	
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	A	
X.	Furnace Atomic Absorption QC	\mathcal{N}	Notublized
XI.	ICP Serial Dilution	A	
XII.	Sample Result Verification	N	
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	\wedge	
XV	Field Blanks	NO	FB=FB-04072010- RZD CZ80-2216-2)

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate FB = Field blank D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

	<u> </u>				 	
1	SSAK8-06-1BPC	11	<u>୧</u> ଓ୬	21	31	
2	SSAK8-06-5BPC	12		22	 32	
3	SSAK8-07-1BPC	13		23	33	
4	SSAK8-07-5BPC	14		24	34	
5	SSAK8-06-1BPCMS	15		25	35	
6	SSAK8-06-1BPCMSD	16		26	36	
7		17		27	37	
8		18		28	38	
9		19		29	39	
10		20		30	40	

Notes:			
	,		

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS, Henderson, Nevada

Collection Date:

May 4, 2010

LDC Report Date:

June 16, 2010

Matrix:

Soil

Parameters:

Metals

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-3197-1

Sample Identification

SSAN8-02-1BPC

SSAN8-02-5BPC

SSA08-03-1BPC

SSA08-03-5BPC

SSAN8-01-1BPC**

SSAN8-01-5BPC

SSAN8-01-5BPC FD

SSAM5-03-1BPC

SSAM5-03-1BPC FD

SSAM5-03-5BPC

SSAN8-01-1BPCMS

SSAN8-01-1BPCMSD

SSAM5-03-5BPCMS

SSAM5-03-5BPCMSD

^{**}Indicates sample underwent Stage 4 review

Introduction

This data review covers 14 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 6020 for Metals. The metals analyzed were Arsenic, Cobalt, Lead, and Manganese.

This review follows the Standard Operating Procedures (SOP) 40, Data Review/Validation (BRC 2009), the Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada (June 2009), NDEP guidance (May 2006), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004).

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

Blanks are summarized in Section IV.

Field duplicates are summarized in Section XIV.

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 metal contaminants were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Cobalt	0.142 ug/L	SSAO8-03-5BPC SSAN8-01-1BPC**
ІСВ/ССВ	Lead	0.373 ug/L	SSAM5-03-1BPC SSAM5-03-1BPC _FD SSAM5-03-5BPC
PB (prep blank)	Cobalt Manganese	0.0113 mg/Kg 0.372 mg/Kg	SSAN8-02-1BPC SSAN8-02-5BPC SSAO8-03-1BPC SSAO8-03-5BPC SSAN8-01-1BPC** SSAN8-01-5BPC SSAN8-01-5BPC_FD

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

Samples FB-04132010-RIG2-RZE (from SDG 280-2400-2) and FB-04072010-RZC (from SDG 280-2280-2) were identified as field blanks. No metal contaminants were found in these blanks with the following exceptions:

Field Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
FB-04072010-RZC	4/8/10	Cobalt	0.016 ug/L	SSAN8-02-1BPC SSAN8-02-5BPC SSAO8-03-1BPC SSAO8-03-5BPC SSAN8-01-1BPC** SSAN8-01-5BPC SSAN8-01-5BPC_FD

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

V. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

VI. Matrix Spike Analysis

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

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
SSAN8-01-1BPCMS/MSD (SSAN8-02-1BPC SSAN8-02-5BPC SSAO8-03-1BPC SSAO8-03-5BPC SSAN8-01-1BPC** SSAN8-01-5BPC SSAN8-01-5BPC_FD)	Cobait	71 (75-125)	-	-	J- (all detects) UJ (all non-detects)	A

VII. Duplicate Sample Analysis

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

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	Sample Finding		A or P
All samples in SDG 280-3197-1	All analytes reported below the PQL.	J (all detects)	А

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

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

Samples SSAN8-01-5BPC and SSAN8-01-5BPC_FD and samples SSAM5-03-1BPC and SSAM5-03-1BPC _FD were identified as field duplicates. No metal contaminants were detected in any of the samples with the following exceptions:

	Concentra	tion (mg/Kg)	DDD	D#4		
Compound	SSAN8-01-5BPC	SSAN8-01-5BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Arsenic	3.7	3.2	14 (≤50)	-	•	-
Cobalt	14	10	33 (≤50)		.,,,,,,,	
Manganese	880	630	33 (≤50)	-	-	-

	Concentra	tion (mg/Kg)				
Compound	SSAM5-03-1BPC	SSAM5-03-1BPC _FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Arsenic	19	15	24 (≤50)	-	-	•
Lead	410	290	34 (≤50)	-	_	-

Tronox LLC Facility, PCS, Henderson, Nevada Metals - Data Qualification Summary - SDG 280-3197-1

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-3197-1	SSAN8-02-1BPC SSAN8-02-5BPC SSAO8-03-1BPC SSAO8-03-5BPC SSAN8-01-1BPC** SSAN8-01-5BPC SSAN8-01-5BPC_FD	Cobalt	J- (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R) (m)
280-3197-1	SSAN8-02-1BPC SSAN8-02-5BPC SSAO8-03-1BPC SSAO8-03-5BPC SSAN8-01-1BPC** SSAN8-01-5BPC SSAN8-01-5BPC_FD SSAM5-03-1BPC SSAM5-03-1BPC_FD SSAM5-03-5BPC	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)

Tronox LLC Facility, PCS, Henderson, Nevada Metals - Laboratory Blank Data Qualification Summary - SDG 280-3197-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Metals - Field Blank Data Qualification Summary - SDG 280-3197-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #:___ 23310E4 Stage 2B / J SDG #: 280-3197-1 Laboratory: Test America

Page: I of I Reviewer: CZ 2nd Reviewer: ___

METHOD: Metals (EPA SW 846 Method 6020)

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

	Validation Area		, Comments
1.	Technical holding times	A	Sampling dates: 5/4/10
11.	ICP/MS Tune	A	
111.	Calibration	A	
IV.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	M	
VI.	Matrix Spike Analysis	SW	ms/D
VII.	Duplicate Sample Analysis	N	
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	A	
Χ.	Furnace Atomic Absorption QC	\mathcal{N}	Noturitized
XI.	ICP Serial Dilution	A	
XII.	Sample Result Verification	A	Not reviewed for ZB
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	Sw	(6,7), (8,9)
ΧV	Field Blanks	SW	FB=FB-04132010-RIGA-RZE, FB-04072010-RZI CZ80-2400-2) CZ80-2280-3

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Fjeld blank ** Leve14

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

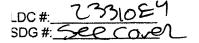
31 11 SSAN8-01-1BPCMS SSAN8-02-1BPC 32 22 12 SSAN8-01-1BPCMSD SSAN8-02-5BPC 33 23 SSAO8-03-1BPC 13 SSAM5-03-5BPCMS 34 SSAM5-03-5BPCMSD 24 4 SSAO8-03-5BPC 14 SSAN8-01-1BPC 25 35 15 36 16 26 SSAN8-01-5BPC 27 37 17 SSAN8-01-5BPC_FD 38 18 28 SSAM5-03-1BPC 39 29 SSAM5-03-1BPC_FD 19

30

Notes:	

SSAM5-03-5BPC

20

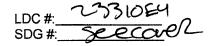


VALIDATION FINDINGS CHECKLIST

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

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

Method:Metals (EPA SW 846 Method 6010/7000/6020)				
Validation Area	Yes	No	NA	Findings/Comments
I rechitical hold if countries in the countries of the co				
All technical holding times were met.				
Cooler temperature criteria was met.		en or "Anna dag" (
Hi Califorentino				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?				
Were %RSD of isotopes in the tuning solution < 5%?				
Were all instruments calibrated daily, each set-up time?				
Were the proper number of standards used?	_			
Were all initial and continuing calibration verification %Rs within the 90-110% (80- 120% for mercury and 85-115% for cyanide) QC limits?				
Were all initial calibration correlation coefficients ≥ 0.995?				
ui Bians				
Was a method blank associated with every sample in this SDG?	$\frac{1}{2}$			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.				
IV ICP Intercence Check Sample 200			2	
Were ICP interference check samples performed daily?	/			
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?				
IV. MatrixespikerMacrospikerelapitcatess				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.				·
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.		_		
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were ≤ 5X the RL, including when only one of the duplicate sample values were ≤ 5X the RL.	/			
V. Laboratory control samples on				
Was an LCS anaylzed for this SDG?		<u>_</u>		
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?	/			



VALIDATION FINDINGS CHECKLIST

Page: Zof Z Reviewer: C 2nd Reviewer: V

Validation Area	Yes	No	NA	Findings/Comments
W. Felmat HAlond 7Ab Sorbion (CC)				
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% OC limits?	*****	(NATIONAL)		
VILLIGE Setablifore (A. S. September 1985) and the second				20 (24) 1 (20) 1
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the IDL?				
Were all percent differences (%Ds) < 10%?			-	
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.	Edward Spile Fred & F. S. F. B. B.			
VIII Interral Scholards (EPASW:846Methiografi20).				
Were all the percent recoveries (%R) within the 30-120% of the intensity of the internal standard in the associated initial calibration?				
If the %Rs were outside the criteria, was a reanalysis performed?				
IX Regional chainy-Assurance and Quanty Control				
Were performance evaluation (PE) samples performed?	<u></u>	_		
Were the performance evaluation (PE) samples within the acceptance limits?	200			
X Samplé Résultivérification (************************************		ı	l e	
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?				
Xt Overalls as go ment of delignostic Day 2007				
Overall assessment of data was found to be acceptable.	/			
XIIstailo dingicales				
Field duplicate pairs were identified in this SDG.		<u> </u>		
Target analytes were detected in the field duplicates.	/			
XIII (Teld blonks)				
Field blanks were identified in this SDG.	/	1		
Target analytes were detected in the field blanks.	/	<u> </u>	<u> </u>	

LDC #: 2331084 SDG #: 580 CO PC

VALIDATION FINDINGS WORKSHEET Sample Specific Element Reference

Page: 1 of
Reviewer: 2nd reviewer:

All circled elements are applicable to each sample.

	N4 - 4 - 4 - 4	Target Analyte List (TAL)
Sample ID	Matrix	Al, Sb,(A), Ba, Be, Cd, Ca, Cr, Co Cu, Fe, Pb, Mg,(Mn)Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
7 15		Al, Sb.(As) Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
6-10		Al, Sb(As, Ba, Be, Cd, Ca, Cr, 6) Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
30:11,12		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb. Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
13,14		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al. Sb. As. Ba. Be. Cd. Ca. Cr. Co. Cu. Fe. Pb. Mg. Mn. Hg. Ni. K. Se. Ag. Na. Tl. V. Zn, Mo, B, Si, CN.
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al. Sb. As. Ba. Be. Cd. Ca. Cr. Co. Cu, Fe. Pb. Mg. Mn, Hg. Ni, K, Se, Ag. Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN'.
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	T	Analysis Method Analysis Method Analysis Method Analysis Method Analysis Method Analysis Method
ICP	-	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
ICP Trace		Ai, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN, Ai, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mr, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
ICP-MS		
GFAA	<u></u>	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,

Comments: Mercury by CVAA if performed

METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000) SDG #: See Cover LDC #: 23310E4

Sample Concentration units, unless otherwise noted: mg/Kg

VALIDATION FINDINGS WORKSHEET PB/ICB/CCB QUALIFIED SAMPLES

Soil preparation factor applied: 100x x 5xdiil Associated Samples: 4, 5

No Qualifiers Action Limit Maximum ICB/CCB^a (ug/L) 0.142 Maximum PB^a (ug/L) Maximum PB^a (mg/Kg) Analyte

Sample Co	Sample Concentration units, unless otherwise noted: mg/Kg	nits, unless c	therwise not	ed: mg/Kg	Associated Samples: 8-10	
Analyte	Maximum PB ^a (mg/Kg)	Maximum PB³ (ug/L)	Maximum ICB/CCB ^a (ug/L)	Action	No Qualifiers	
Pb			0.373			
Sample Co	Sample Concentration units, unless otherwise noted: mg/Kg	nits, unless c	therwise not	ed: mg/Kg	Associated Samples: 1-7	
		Season de la responsación de la companyación de la companyación de la companyación de la companyación de la co				
Analyte	Maximum PB ^a (mg/Kg)	Maximum PB ^a (ug/L)	Maximum ICB/CCB ^a (ug/L)	Action Limit	No Qualifiers	
රි	0.0113					
Z	0.372			3.72		

a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element. Note:

LDC #: 23310E4

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET

Page: └_of_

Reviewer:_ 2nd Reviewer:

Field Blanks

METHOD: Trace Metals (EPA SW846 6010B/7000)

Were target analytes detected in the field blanks? Were field blanks identified in this SDG?

YN N/A N/N N/A

Field Blank: (bf)

100x Sampling date: 4/8/10 Sekfector applied 100 Field blank type: (circle one)/Field Blank / Rinsate / Other: Blank units: ug/L Associated sample units: mg/Kg Sampling date: 4/8/10 Soltactor applied 1

Sample Identification 1-7 Associated Samples: Blank ID

100 # 22210 EH 806 # SEO COVER

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

2nd Reviewer._ Reviewer.

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

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

Was a matrix spike analyzed for each matrix in this SDG?

Were matrix spike percent recoveries (%R) within the control limits of(75-125?) If the sample concentration exceeded the spike concentration by a factor Y N/A

of 4 or more, no action was taken.

Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤35% for soil samples?

EVEL IV ONLY: N N/A

Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

Y)N N/A

Qualifications	J-/UJ/A (m)											
RPD (Limits) Associated Samples	1-7											
RPD (Limits) Assoc												
MSD %Recovery												
MS %Recovery	71											
Analyte	S											
Matrix	Soil											
MS/MSD ID	21/11											
#										<u></u>		Ш

Comments:

LDC#:	23310E4	
SDG#:	See Cove	r

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

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

METHOD: Metals (EPA Method 6020/7000)

(YN NA YN NA 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	6	7	RPD	Difference	Limits	(Parent Only)
Arsenic	3.7	3.2	14			
Cobalt	14	10	33			
Manganese	880	630	33			

V:\FIELD DUPLICATES\FD_inorganic\23310E4.wpd

	Concentration	on (mg/Kg)	(≤50)	(mg/Kg)	(mg/Kg)	Qualifications
Compound	8	9	RPD	Difference	Limits	(Parent Only)
Arsenic	19	15	24			
Lead	410	290	34			

SDG# SECOVER

VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification

Page: of Devicement: Q2

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

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

%R = <u>Found</u> x 100 True

Where, Found = concentration (in ug/L) of each analyte 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)						
#C1	ICP/MS (initial calibration)	Co	39.3	20H	25	86)-
CCY CKEST	CO (16.05) ICP/MS (Continuing calibation)	M	613	200	507	103	7

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#. 2730£9

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 confrol sample and a matrix spike sample were recalculated using the following formula:

%R = Found x 100

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

True = Concentration of each analyte in the source.

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

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

RPD = <u>IS-DI</u> × 100 (S+D)/2

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 K	True / D / SDR (unite)	%R / RPD / %D	%R / RPD / %D	Acceptable (V/N)
JUSAB	ICP interference check	E	103rpl	10 roll	(03	201)
53	Laboratory control sample	کے	7'97	200	, (0)	10	
6	Matrix spike	9	2'9,]	612	83	23 84	
11/12	Duplicate	175	1:12	545	0	0	
2	(CP serial dilution	بحج	3500	3540		8.0	\rightarrow

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

LDC #: 7331084 SDG #: Secore

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page: _____of \\
Reviewer: ______
2nd reviewer: _____

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

Please W N Y N Y N	N/A N/A	mave results been reported ar	range of the instruments and within the linear range of the ICP?	
	ed analy ng equat	te results for	were recalculated and verified using the	he
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	(106 mg/L)(5)(100 mL) = 51 mg/k (0.877)(1.19g)	E

Sample ID	Analyte	Reported Concentration (MS/RS/)	Calculated Concentration (MX \ C X)	Acceptable (Y/N)
5	A5	9,5	9.5	7
	mo	3500	3500	
	Co	5\	5	
			·	
			:	

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS, Henderson, Nevada

Collection Date:

May 4, 2010

LDC Report Date:

June 16, 2010

Matrix:

Soil

Parameters:

Arsenic

Validation Level:

Stage 2B

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-3197-7

Sample Identification

SSAN8-01-2BPC SSAN8-01-2BPCMS SSAN8-01-2BPCMSD

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 review was based on QC data.

The following are definitions of the data qualifiers:

- J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.
- J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.
- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- B The analytical result may be a false positive totally attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.
- JB The analytical result may be biased high and partially attributable to blank contamination.

 This qualifier is applicable to radiochemistry analysis only.
- JK The analytical result is an estimated maximum possible concentration (EMPC).
- X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.
- J-TDS The analytical result is estimated based on failure of the Total Dissolved Solids (TDS) correctness check performed in accordance with the Standard Method 1030E.
- J-CAB The analytical result is estimated based on failure of the cation-anion balance correctness check performed in accordance with Standard Method 1030E.
- J-TDS & CAB The analytical result is unreliable based on the failure of the cation-anion balance and TDS correctness check performed in accordance with standard Method 1030E.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. ICPMS Tune

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

III. Calibration

An initial calibration was performed.

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

IV. Blanks

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

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

V. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

VI. Matrix Spike Analysis

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

VII. Duplicate Sample Analysis

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

VIII. Laboratory Control Samples (LCS)

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

IX. Internal Standards

All internal standard percent recoveries (%R) were within QC limits.

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met.

XII. Sample Result Verification and Project Quantitation Limit

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-3197-7	All analytes reported below the PQL.	J (all detects)	Α

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 280-3197-7

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-3197-7	SSAN8-01-2BPC	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 280-3197-7

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Arsenic - Field Blank Data Qualification Summary - SDG 280-3197-7

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET Stage 2B

Date: 6-15-16
Page: <u></u> of <u></u>
Reviewer: CC
2nd Reviewer:

SDG #: 280-3197-7 Laboratory: Test America

23310F4

LDC #:

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: 5/4///
II.	ICP/MS Tune	A	
III.	Calibration	P	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	A	MS/D
VII.	Duplicate Sample Analysis	W	
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	A	
X.	Furnace Atomic Absorption QC	N	No+ utilized
XI.	ICP Serial Dilution	A	
XII.	Sample Result Verification	N	
XIII.	Overall Assessment of Data	M	
XIV.	Field Duplicates	\mathcal{N}	
XV	Field Blanks	NO	FB=FB-04072010-RZC

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

	<u> </u>					
1	SSAN8-01-2BPC	11	PB5	21	31	
2	SSAN8-01-2BPCMS	12		22	 32	
3	SSAN8-01-2BPCMSD	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:

May 5, 2010

LDC Report Date:

June 16, 2010

Matrix:

Soil

Parameters:

Metals

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-3264-1

Sample Identification

SSAM7-05-1BPC

SSAM7-05-5BPC**

SSAO3-02-1BPC

SSAO3-02-1BPC FD

SSAO3-02-5BPC

SSA03-03-1BPC

SSAO3-03-5BPC

SSA07-03-1BPC

SSA07-03-5BPC**

SSAQ4-05-1BPC

SSAQ4-05-5BPC

SSAQ5-02-1BPC**

SSAQ5-02-1BPC-FD

SSAQ5-02-5BPC

SA156-1BPC

SA156-2BPC**

SSAQ5-02-5BPCMS

SSAQ5-02-5BPCMSD

^{**}Indicates sample underwent Stage 4 review

Introduction

This data review covers 18 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 6020 for Metals. The metals analyzed were Arsenic and 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.

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 metal contaminants were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Magnesium	6.70 ug/L	SSAO3-02-1BPC SSAO3-02-1BPC_FD SSAO3-02-5BPC
ICB/CCB	Magnesium	1.19 ug/L	SSAO3-03-1BPC SSAO3-03-5BPC
PB (prep blank)	Magnesium	5.86 mg/Kg	SSAO3-02-1BPC SSAO3-02-1BPC_FD SSAO3-02-5BPC SSAO3-03-1BPC SSAO3-03-5BPC

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

Samples FB04062010-RZB (from SDG 280-2131-2), FB-04132010-RIG2-RZE (from SDG 280-2400-2), and FB-04072010-RZC (from SDG 280-2280-2) were identified as field blanks. No metal contaminants were found in these blanks.

V. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

VI. Matrix Spike Analysis

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

VII. Duplicate Sample Analysis

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

VIII. Laboratory Control Samples (LCS)

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

IX. Internal Standards

All internal standard percent recoveries (%R) were within QC limits.

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met.

XII. Sample Result Verification and Project Quantitation Limit

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

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P	
All samples in SDG 280-3264-1	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 SSAO3-02-1BPC and SSAO3-02-1BPC_FD and samples SSAQ5-02-1BPC** and SSAQ5-02-1BPC-FD were identified as field duplicates. No metal contaminants were detected in any of the samples with the following exceptions:

	Concentrat	ion (mg/Kg)	220	D'''		
Compound	SSA03-02-1BPC	SSAO3-02-1BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Arsenic	5.2	5.2	0 (≤50)	-	-	-
Magnesium	10000	10000	0 (≤50)	-	-	<u>-</u>

	Concentrat	ion (mg/Kg)	222	D:#		A or P	
Compound	SSAQ5-02-1BPC**	SSAQ5-02-1BPC-FD	RPD (Limits)	Difference (Limits)	Flags		
Arsenic	3.6	3.6	0 (≤50)	-	-	-	

Tronox LLC Facility, PCS, Henderson, Nevada Metals - Data Qualification Summary - SDG 280-3264-1

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-3264-1	SSAM7-05-1BPC SSAM7-05-5BPC** SSAO3-02-1BPC SSAO3-02-1BPC_FD SSAO3-02-5BPC SSAO3-03-1BPC SSAO7-03-1BPC SSAO7-03-1BPC SSAQ4-05-1BPC SSAQ4-05-5BPC SSAQ5-02-1BPC** SSAQ5-02-1BPC-FD SSAQ5-02-5BPC SA156-1BPC SA156-2BPC**	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)

Tronox LLC Facility, PCS, Henderson, Nevada Metals - Laboratory Blank Data Qualification Summary - SDG 280-3264-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Metals - Field Blank Data Qualification Summary - SDG 280-3264-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET Stage 2B /

LDC #: 23310G4 SDG #: 280-3264-1 Laboratory: Test America

Page: __of__1 Reviewer: C 2nd Reviewer:___

METHOD: As & Mg (EPA SW 846 Method 6020)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 5/5/10
II.	ICP/MS Tune	A	. •
111.	Calibration	A	
IV.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	A	MS/D
VII.	Duplicate Sample Analysis	Λ	
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	A	
Χ.	Furnace Atomic Absorption QC	\mathcal{N}_{-}	Noturized
XI.	ICP Serial Dilution	A	
XII.	Sample Result Verification	A	Notreviewed for 2B
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	SW	(3,4), (14,13)
XV	Field Blanks	NO	FB=FB-04132010-RIGQ-RZE, FB-04072010-RZC, (280-2400-2) (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

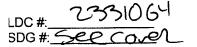
EB = Equipment blank

FBO4062010-RZB (250-2131-2)

Validated Samples:

	₩ , (
1	SSAM7-05-1BPC	11	SSAQ4-05-5BPC	21	PBS	31		
2	SSAM7-05-5BPC	12	SSAQ5-02-1BPC	22		32	·	
3	SSAO3-02-1BPC	13	SSAQ5-02-1BPC-FD	23		33		
4	SSAO3-02-1BPC_FD	14	SSAQ5-02-5BPC	24		34		
5	SSAO3-02-5BPC	15	SA156-1BPC	25		35		
6	SSAO3-03-1BPC	16	SA156-2BPC	26		36	- Allatradore Anno Anno Anno Anno Anno Anno Anno Ann	
7	SSAO3-03-5BPC	17	SSAQ5-02-5BPCMS	27		37		
8	SSAO7-03-1BPC	18_	SSAQ5-02-5BPCMSD	28		38		
9	SSAO7-03-5BPC ★★	19		29		39		
10	SSAQ4-05-1BPC	20		30		40		

Notes:		. ,	



VALIDATION FINDINGS CHECKLIST

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

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

Method:Metals (EPA SW 846 Method 6010/7000/6020)				
Validation Area	Yes	No	NA	Findings/Comments
Technica noising times				
All technical holding times were met.	\Box			
Cooler temperature criteria was met.		Market 1975	######################################	
I Сайбуаногр				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?		Ļ		
Were %RSD of isotopes in the tuning solution < 5%?				
Were all instruments calibrated daily, each set-up time?				
Were the proper number of standards used?	_		<u> </u>	
Were all initial and continuing calibration verification %Rs within the 90-110% (80-	/			
120% for mercury and 85-115% for cyanide) QC limits?	/			
Were all initial calibration correlation coefficients ≥ 0.995?				
III. Blanks Was a method blank associated with every sample in this SDG?				Adjusted Adjusted from press of Street, and Street, an
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	_			
IV-16P Interference Chack/Sumplement				
Were ICP interference check samples performed daily?			ļ	
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?		1		
IV Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.				·
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	_			
Were the MS/MSD or duplicate relative percent differences (RPD) \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.	/			
V. Eaboratop, control samples				
Was an LCS anaylzed for this SDG?	1]_		
Was an LCS analyzed per extraction batch?	<u> </u>			
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?	ر	1		



VALIDATION FINDINGS CHECKLIST

Page: Zof Z Reviewer: 2nd Reviewer: ______

Volidation Area	Yes	No	NA	Findings/Comments
Validation Area Validation Area	. 55	110		
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% OC limits? VIERE Separation				
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the IDL?				
Were all percent differences (%Ds) < 10%?				
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.				
Vijih takenjar Standards (GEA S)/VI845 Nieltinso (GE20)/65				
Were all the percent recoveries (%R) within the 30-120% of the intensity of the internal standard in the associated initial calibration?				
If the %Rs were outside the criteria, was a reanalysis performed?				
IX_Regional surainy Assurance and equality Gonirol services				
Were performance evaluation (PE) samples performed?			_	
Were the performance evaluation (PE) samples within the acceptance limits?				
X. Sample Result Verification				T
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?				
XI-Overali assessment of delar sales				
Overall assessment of data was found to be acceptable.	/			
XII/ARABAMINING NE				
Field duplicate pairs were identified in this SDG.		F		
		_	\vdash	
Target analytes were detected in the field duplicates.				
XIII. Elelostiánikos en elemente elemen		t i		
Field blanks were identified in this SDG.	-	/	1-	
Target analytes were detected in the field blanks.		<u>L'</u>	<u> </u>	

LDC #: 2331064 SDG #: 5800007

VALIDATION FINDINGS WORKSHEET Sample Specific Element Reference

Page: of Reviewer: 2nd reviewer:

All circled elements are applicable to each sample.

		Target Analyte List (TAL)
Sample ID	Matrix	
1,2,8-16		Al, Sb.(As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
3-5		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg/Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
6.7		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
QC:17.18		Al, Sb(A), Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
1000		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni; K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al. Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
		Al. Sb. As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	-	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
<u>.</u>	<u> </u>	
	<u> </u>	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	<u> </u>	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	<u> </u>	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Analysis Method
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
ICP Trace	 	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
ICP-MS	ļ	Al, Sb(As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, (Mg) Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,

Comments: Mercury by CVAA if performed

LDC #: 23310G4 SDG #: See Cover METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)

Sample Concentration units, unless otherwise noted: mg/Kg

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES
Soil preparation factor applied: 100x x 5xdil

Page: of Reviewer: Of 2nd Reviewer: L

Associated Samples: 3-5

6,7 Associated Samples:_ No Qualifiers Sample Concentration units, unless otherwise noted: mg/Kg Action Limit Maximum ICB/CCB^a (ug/L) 6.70 Maximum PB^a (ng/L) Maximum PB^a (mg/Kg) Analyte

Analyte	Mg	ample Conc		Analyte
Maximum PB ^a (mg/Kg)		sentration ur		Maximum Maximum Maximum PB³ ICB/CCB³ (mg/L)
Maximum Maximum PB* ICB/CCB* (ug/L)		its, unless o		Maximum PB ^a (ug/L)
Maximum ICB/CCB ^a (ug/L)	1.19	Sample Concentration units, unless otherwise noted: mg/Kg		Maximum ICB/CCB ^a (ug/L)
Action Limit		ted:_mg/Kg		Action Limit
No Qualifiers				No Qualifiers
		Associated Samples:3-7	Alband British British Bar	
		mples: 3-7		
	,			
	:			

a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element. Note:

58.6

5.86

ξ

LDC#: 23310G4 SDG#: See Cover

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:	of
Reviewer: <u>C</u>	30
2nd Reviewer:	

METHOD: Metals (EPA Method 6020/7000)

<u>Y) N NA</u>

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	3	4	RPD	Difference	Limits	(Parent Only)
Arsenic	5.2	5.2	0			
Magnesium	10000	10000	0			

V:\FIELD DUPLICATES\FD_inorganic\23310G4.wpd

	Concentration (mg/Kg)		(≤50)	(mg/Kg)	(mg/Kg)	Qualifications
Compound	12	13	RPD	Difference	Limits	(Parent Only)
Arsenic	3.6	3.6	0			

SDG #: 5660ve/

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 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)						
ICV	ICP/MS (Initial calibration)	ρS	0'lh	0h	103	701	<u>۲</u>
73	ICP/MS (Continuing calibation)	AS	1,05	20	001	8	-)

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 #SERCE LDC # 23306 4

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:

%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> × 100 (S+D)/2

S = Original sample concentration D = Duplicate sample concentration

Where,

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)

					Receiptand	Reported	
Sample ID	Type of Analysis	Element	Found 1871	True / D / SDR (units)	%R/RPD/%D	%R/RPD/%D	Acceptable (Y/N)
ICSAS	ICP interference check	Æ	98 ugh	100 mg/L	36	98)-
527	Laboratory control sample		0,61	20,	96	95	
_	Matrix spike		(ssr-sr)	209	96	26	
17(1S Duplicate	Duplicate		h'82	23,3	0	0	
2	ICP serial dilution	\rightarrow	5,3	3,45	7,5	<i>['</i> _b	·

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 #: 237064 SDG #: <u>Secover</u>

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page: _____of Reviewer: ______ 2nd reviewer: _____

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

YN	N/A	riave results been reported and	i calculated correctly? range of the instruments ar	ole questions are identified as "N/A".
	ed analy ng equat	te results for	A5	were recalculated and verified using the
Concent	ration =	(RD)(FV)(Dil) (In. Vol.)(%S)	Recalculation:	4 () (
RD	=	Raw data concentration	(11329)	9(100mL)(5)
FV	=	Final volume (ml)	1000	=3.9 me/kg
In. Vol.	=	Initial volume (ml) or weight (G)	,	7.00
Dil	=	Dilution factor	(0.935)	(101a)
%S	=	Decimal percent solids	(0,433)	(1.5.9)

Sample ID	Analyte	Reported Concentration (MS/IC)	Calculated Concentration (MK KK)	Acceptable (Y/N)
	A5	3.9	3,9	7
	·		,	
***	·			
			·	

Tronox LLC Facility, PCS, Henderson, Nevada Data Validation Reports LDC #23310

Wet Chemistry



Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS, Henderson, Nevada

Collection Date:

May 4, 2010

LDC Report Date:

June 16, 2010

Matrix:

Soil

Parameters:

Perchlorate

Validation Level:

Stage 2B

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-3197-1

Sample Identification

SSAM5-03-1BPC

SSAM5-03-1BPC FD

SSAM5-03-5BPC

SSAM5-03-5BPCMS

SSAM5-03-5BPCMSD

SSAM5-03-5BPCDUP

Introduction

This data review covers 6 soil samples listed on the cover sheet. The analyses were per EPA Method 314.0 for Perchlorate.

This review follows the Standard Operating Procedures (SOP) 40, Data Review/Validation (BRC 2009), the Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada (June 2009), NDEP guidance (May 2006), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004).

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met.

III. Blanks

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

Sample FB-04132010-RIG2-RZE (from SDG 280-2400-2) was identified as a field blank. No perchlorate was found in this blank.

IV. Matrix Spike/Matrix Spike Duplicates

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

V. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VI. Laboratory Control Samples

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

VII. Sample Result Verification and Project Quantitation Limit

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-3197-1	All analytes reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

VIII. Overall Assessment

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

IX. Field Duplicates

Samples SSAM5-03-1BPC and SSAM5-03-1BPC _FD were identified as field duplicates. No perchlorate was detected in any of the samples with the following exceptions:

	Concentral	tion (mg/Kg)	RPD	Difference		
Analyte	SSAM5-03-1BPC	SSAM5-03-1BPC _FD		(Limits)	Flags	A or P
Perchlorate	2.4	1.5	46 (≤50)	-	-	-

Tronox LLC Facility, PCS, Henderson, Nevada Perchlorate - Data Qualification Summary - SDG 280-3197-1

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-3197-1	SSAM5-03-1BPC SSAM5-03-1BPC _FD SSAM5-03-5BPC	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Perchlorate - Laboratory Blank Data Qualification Summary - SDG 280-3197-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Perchlorate - Field Blank Data Qualification Summary - SDG 280-3197-1

No Sample Data Qualified in this SDG

SDG#	t:23310E6 #:280-3197-1 atory:_Test America	VA				NES:	nderson S WORKS	HEET	21	Date: 6-15-1 Page:of Reviewer:
METH	IOD: (Analyte) Perchl	orate	(EPA Meth	od 314.0)						
The sa	amples listed below were tion findings worksheets.	revie	ewed for ea	ch of the f	ollowing	valida	ation areas. \	Validation	findings a	are noted in attached
	Validation	Area						Comme	nts	
1.	Technical holding times			A	Samplin	g dates	5/4/10)		
IIa.	Initial calibration			ゎ						
IIb.	Calibration verification			A		····				
111.	Blanks			A	ļ <u>.</u>	., .				
IV	Matrix Spike/Matrix Spike D	uplicat	es	A	ms	12				
V	Duplicates			A	la	<u></u>				
VI.	Laboratory control samples			A	LC	5				
VII.	Sample result verification			N						
VIII.	Overall assessment of data		· Maria	A						
IX.	Field duplicates			5~	Ch	<u>し)</u>				000
L _X	Field blanks			NO	FB:	= FC	5-04 320	210-K	769	-K 3F
Note: Validate	A = Acceptable N = Not provided/applicable SW = See worksheet ed Samples:)	R = Rir	lo compound isate ield blank	ds detecte	d	C C BO 240 D = Duplice TB = Trip b EB = Equip	ate)		
	SSAM5-03-1BPC	11			21]3	31	
	SSAM5-03-1BPC _FD	12			22	2		3	32	
		1	1					<u> </u>		

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

Notes:		

LDC#:_	23310E6_
SDG#	See Cover

VALIDATION FINDINGS WORKSHEET

Field Duplicates

< 1	,
Page:_	of
Reviewer:	(Z
2nd Reviewer:	$\overline{}$

Inorganics, Method: See Cover

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

	Concentrati	on (mg/Kg)				Qualification
Analyte	1	2	RPD (≤50)	Difference	Limits	(Parent only)
Perchlorate	2.4	1.5	46			

V:\FIELD DUPLICATES\FD_inorganic\23310E6.wpd

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS, Henderson, Nevada

Collection Date:

May 5, 2010

LDC Report Date:

June 16, 2010

Matrix:

Soil

Parameters:

Perchlorate

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-3264-1

Sample Identification

SSAM7-05-1BPC

SSAM7-05-5BPC**

SSA07-03-1BPC

SSA07-03-5BPC**

SSAQ5-02-1BPC**

SSAQ5-02-1BPC-FD

SSAQ5-02-5BPC

SA156-1BPC

SA156-2BPC**

SSAQ5-02-5BPCMS

SSAQ5-02-5BPCMSD

SSAQ5-02-5BPCDUP

^{**}Indicates sample underwent Stage 4 review

Introduction

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

This review follows the Standard Operating Procedures (SOP) 40, Data Review/Validation (BRC 2009), the Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada (June 2009), NDEP guidance (May 2006), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004).

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

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

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met.

III. Blanks

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

Samples FB04062010-RZB (from SDG 280-2131-2), FB-04132010-RIG2-RZE (from SDG 280-2400-2), and FB-04072010-RZC (from SDG 280-2280-2) were identified as field blanks. No perchlorate were found in these blanks with the following exceptions:

Field Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
FB04062010-RZB	4/6/10	Perchlorate	92 ug/L	SSAQ5-02-1BPC** SSAQ5-02-1BPC-FD SSAQ5-02-5BPC SA156-1BPC SA156-2BPC**

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

IV. Matrix Spike/Matrix Spike Duplicates

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

V. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits.

VI. Laboratory Control Samples

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

VII. Sample Result Verification and Project Quantitation Limit

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

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-3264-1	All analytes reported below the PQL.	J (all detects)	A

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

VIII. Overall Assessment

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

IX. Field Duplicates

Samples SSAQ5-02-1BPC** and SSAQ5-02-1BPC-FD were identified as field duplicates. No perchlorate was detected in any of the samples with the following exceptions:

	Concentrat	ion (mg/Kg)				
Analyte	SSAQ5-02-1BPC**	SSAQ5-02-1BPC-FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Perchlorate	0.14	0.15	7 (≤50)	-	-	-

Tronox LLC Facility, PCS, Henderson, Nevada Perchlorate - Data Qualification Summary - SDG 280-3264-1

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-3264-1	SSAM7-05-1BPC SSAM7-05-5BPC** SSAO7-03-1BPC SSAO7-03-5BPC** SSAQ5-02-1BPC** SSAQ5-02-1BPC-FD SSAQ5-02-5BPC SA156-1BPC SA156-2BPC**	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Perchlorate - Laboratory Blank Data Qualification Summary - SDG 280-3264-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Perchlorate - Field Blank Data Qualification Summary - SDG 280-3264-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET Stage 2B

LDC #:_	23310G6	
SDG #:	280-3264-1	
Laborato	ory: Test America	

Date: <u>6 1.</u>	<u> </u>
Page: <u> </u> of_	L
Reviewer:	_
2nd Reviewer: /~	_

METHOD: (Analyte)	Perchlorate (EPA Method 314.0)	
` •		_

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

	Validation Area		Comments
I.	Technical holding times	6	Sampling dates: 5/5/10
lla.	Initial calibration	A	
IIb.	Calibration verification	A	
111.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	ms/D
V	Duplicates	8	OP,
VI.	Laboratory control samples	A	LCSD
VII.	Sample result verification	A	Non reviewed for 2B
VIII.	Overall assessment of data	R	
IX.	Field duplicates	SW	(5,6) 13
x	Field blanks	SW	(5,6) 13 FB=FB-04)32010-RI62-RZE, FB-04072010-RZC (280-2400-2 (280-2288-2)
			(280-2400-2 (280-2280-2)

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

LEVELY

D = Duplicate

TB = Trip blank

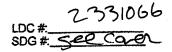
EB = Equipment blank

FB04062010-RZB (280-2131-2)

Validated Samples: 50

E	SSAM7-05-1BPC	11	SSAQ5-02-5BPCMS	21	PBS	31	
2	SSAM7-05-5BPC	12	SSAQ5-02-5BPCMSD	22		32	
3	SSAO7-03-1BPC	13	SSAQ5-02-5BPCDUP	23		33	
4	SSA07-03-5BPC **	14		24		34	
© 5	SSAQ5-02-1BPC	15		25		35	
6	SSAQ5-02-1BPC-FD	16		26		36	
7	SSAQ5-02-SBPC	- 17		27		37	
8	SSAQ5-02-5BPC	18		28		38	
9	SA156-1BPC	19		29		39	SCHOOL STATE OF THE STATE OF TH
10	SA156-2BPC **	20		30		40	

Notes:			



VALIDATION FINDINGS CHECKLIST

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

Method: Inorganics (EPA Method Section)

Method: Inorganics (EPA Method Section 2)							
Validation Area	Yes	No	NA	Findings/Comments			
Conduct and Opinion 2012							
All technical holding times were met.			L				
Cooler temperature criteria was met.		<u> </u>					
January Company Compan							
Were all instruments calibrated daily, each set-up time?							
Were the proper number of standards used?							
Were all initial calibration correlation coefficients > 0.995?	/						
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	/						
Were titrant checks performed as required? (Level IV only)			\angle				
Were balance checks performed as required? (Level IV only)							
1000000							
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.		/					
and the state of t				- 10			
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	~	^					
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	/						
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of ≤ CRDL(≤ 2X CRDL for soil) was used for samples that were ≤ 5X the CRDL, including when only one of the duplicate sample values were ≤ 5X the CRDL.	/						
Was an LCS anaytzed for this SDG?			\bot				
Was an LCS analyzed per extraction batch?	4						
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?				ALTEO Province			
VI Resumes and Assurance and Carliny Control 10 This State							
Were performance evaluation (PE) samples performed?			4				
Were the nedomance evaluation (PF) samples within the acceptance limits?			<u> </u>				

LDC #: 2331066 SDG #: <u>See cover</u>

VALIDATION FINDINGS CHECKLIST

Page: Zof Z Reviewer: CC 2nd Reviewer: V

Validation Area	Yes	No	NA	Findings/Comments
VIL Semple Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	/	_		
Were detection limits < RL?				
VIII CYcrell assessment of data				
Overall assessment of data was found to be acceptable.	/			·
IX Field duplicates				
Field duplicate pairs were identified in this SDG.	/			
Target analytes were detected in the field duplicates,	/			
χ Feiβhilerika				
Field blanks were identified in this SDG.	1/			·
Target analytes were detected in the field blanks.	1			

LDC #: 23310G6

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET

Page: _of_

Reviewer: CA 2nd Reviewer: L

Field Blanks

Were target analytes detected in the field blanks? METHOD: Inorganics, EPA Method See Cover Y N/A Were field blanks identified in this SDG?

YN NA

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

Sampling date: 4/6/10 Soil factor applied 10x Field blank type: (circle one) Field Blank / Rinsate / Other

Reason Code: bf

Field blank type: (circle one) Field Blank / Rinsate / Other: Associated Samples: 5, 6, 8-10	Blank ID Action Limit Sample Identification	No Qualifiers	92 9.2			
ircle one) Field Blank	Blank ID	FB04062010-RZB (SDG#: 280-2131-73)	92			
Field blank type: (c	Analyte		CIO4			

LDC#:	23310G6
SDG#	See Cover

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page	_of
Reviewer:	c(-
2nd Reviewer:	1/

Inorganics, Method: See Cover

YN NA YN NA

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

	Concentrati	on (mg/Kg)				Qualification
Analyte	5	6	RPD (≤50)	Difference	Limits	(Parent only)
Perchlorate	0.14	0.15	7			

V:\FIELD DUPLICATES\FD_inorganic\23310G6.wpd

LDC#: 253/066 spc#: <u>Sec ca</u>vel

Initial and Continuing Calibration Calculation Verification Validatin Findings Worksheet

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

Method: Inorganics, Method ___

340

The correlation coefficient (r) for the calibration of $\frac{ClO_{+-}}{ClO_{+-}}$ was recalculated.Calibration date: $\frac{\sqrt{7}2l/lO_{--}}{lO_{+-}}$

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

%R = Found X 100

Found = concentration of each analyte measured in the analysis of the ICV or CCV solution

True = concentration of each analyte in the ICV or CCV source

					Recalculated	Reported	Acceptable
Type of analysis	Analyte	Standard	Conc. (ug/l)	Area	r or r²	r or r²	(Y/N)
Initial calibration		s1	-	0.0025			
		s2	2.5	0.00841	0.998765	0.998771	700
		s3	5	0.01661			
),)	84	10	0.03291) —
		SS	20	0.06345			-
	:	9s	40	0.14097			
Calibration verification		ICV	02	Fond (1816)	hb		
Calibration verification		CCV	30	18.727	96		
Calibration verification	\geqslant	200	<u>Q</u>	7250	60))	>

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. 390K 82 :# DOT SECONER

VALIDATION FINDINGS WORKSHEET **Level IV Recalculation Worksheet**

Page: 2nd Reviewer:

METHOD: Inorganics, Method Selcover

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

Where, %R = Found x 100

Found =

True ==

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

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

RPD = 1S-D1 x 100 Where, (S+D)/2

Original sample concentration Duplicate sample concentration

					Recalculated	Reported	
Sample ID	Type of Analysis	Element	Found / S (unites) (mx)(K5)	True / D (units) MX (C)	%R / RPD	%R / RPD	Acceptable (Y/N)
7	Laboratory control sample						
	•	C/07	0,0908	0.0985	45	26)
	Mairk spike sample		(8SR-SR)				
			1/2.0	0.221	<u>0</u>	93	
	Duplicate sample						
(2))	رن ارز	0 V	0		\rightarrow

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

LDC #:	1331061 500000	0
SDG #:	Secrot	32

VALIDATION FINDINGS WORKSHEET

Page:	
Reviewer:	de
2nd reviewer:	

sdg #: <u>see(o</u> ve)	Sample Calculation Verification	2nd reviewer:
METHOD: Inorganics, Method	secall	
Y N N/A Have results been re	Il questions answered "N". Not applicable question ported and calculated correctly? a calibrated range of the instruments? Its below the CRQL?	ns are identified as "N/A".
Compound (analyte) results for recalculated and verified using the form		eported with a positive detect were
Concentration = CGSet (Preo Factor)(OF)	Recalculation: (0,07437 +0.0008)	2) (10)(10) = 2.36 mg/kg
Slope Solid	0,93	

#	Sample ID	Analyte	Reported Concentration (MC 12)	Calculated Concentration (MS/CG)	Acceptable (Y/N)
	7_	ClOy	2,3	2,4	4
					·
<u></u>					
<u> </u>					
<u> </u>					
<u> </u>					
-					
-					
-					
			<u>.</u>		

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS, Henderson, Nevada

Collection Date:

May 17, 2010

LDC Report Date:

June 16, 2010

Matrix:

Soil

Parameters:

Perchlorate

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-3624-2

Sample Identification

SSAM5-02-5BPC

SA15-1BPC

SA15-3BPC

SA15-5BPC

SA15-7BPC

SA15-9BPC

SSAN5-03-1BPC

SSAN5-03-5BPC

SA104-7BPC

SSAL5-05-3BPC**

^{**}Indicates sample underwent Stage 4 review

Introduction

This data review covers 10 soil samples listed on the cover sheet. The analyses were per EPA Method 314.0 for Perchlorate.

This review follows the Standard Operating Procedures (SOP) 40, Data Review/Validation (BRC 2009), the Quality Assurance Project Plan Tronox LLC Facility, Henderson, Nevada (June 2009), NDEP guidance (May 2006), and a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October 2004).

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

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

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met.

III. Blanks

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

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

IV. Matrix Spike/Matrix Spike Duplicates

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

V. Duplicates

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

VI. Laboratory Control Samples

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

VII. Sample Result Verification and Project Quantitation Limit

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

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-3624-2	All analytes reported below the PQL.	J (all detects)	Α

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

VIII. Overall Assessment

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

IX. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, PCS, Henderson, Nevada Perchlorate - Data Qualification Summary - SDG 280-3624-2

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-3624-2	SSAM5-02-5BPC SA15-1BPC SA15-3BPC SA15-5BPC SA15-7BPC SA15-9BPC SSAN5-03-1BPC SSAN5-03-5BPC SA104-7BPC SSAL5-05-3BPC**	All analytes reported below the PQL.	J (all detects)	А	Sample result verification (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Perchlorate - Laboratory Blank Data Qualification Summary - SDG 280-3624-2

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS, Henderson, Nevada Perchlorate - Field Blank Data Qualification Summary - SDG 280-3624-2

No Sample Data Qualified in this SDG

Tronox Northgate Henderson ESS WORKSHEET

LDC #: 23310J6	VALIDATION COMPLETEN
SDG #: 280-3624-2	Stage 2B
Laboratory: Test America	

2nd Reviewer:

/IETHOD: (Analyte)_	Perchlorate (EPA Method 314.0)

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

	Validation Area		Comments
1.	Technical holding times	8	Sampling dates: 5/17/10
ila.	Initial calibration	A	,
IIb.	Calibration verification	9	
111.	Blanks	P,	
IV	Matrix Spike/Matrix Spike Duplicates	N	Client specified
V	Duplicates	N	7
VI.	Laboratory control samples	A	LCS
VII.	Sample result verification	A	Notreviewed for ZB
VIII.	Overall assessment of data	A	
IX.	Field duplicates	N	
x	Field blanks	NO	FB=FB-04072010-RZD, FB-04072010-RZC (280-2216-2) (280-2280-2)
			(280-2216-2) (280-2280-2)

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

(280-2216-2) D = Duplicate

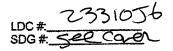
TB = Trip blank

EB = Equipment blank

** Level 4 Validated Samples:

1	SSAM5-02-5BPC	11	21	31	
2	SA15-1BPC	12	22	32	
3	SA15-3BPC	13	23	33	
4	SA15-5BPC	14	24	34	
5	SA15-7BPC	15	25	35	
6	SA15-9BPC	16	26	36	
7	SSAN5-03-1BPC	17	27	37	
8	SSAN5-03-5BPC	18	28	38	
9	SA104-7BPC	19	29	39	
10	SSAL5-05-3BPC	20	30	40	

Notes:	



VALIDATION FINDINGS CHECKLIST

Page: 1 of Z Reviewer: CK 2nd Reviewer: 1

Method: Inorganics (EPA Method Secrose)

Method:Inorganics (EPA Method Section)	T-	_	7	
Validation Area	Yes	No	NA	Findings/Comments
Stocknical bridge water				
All technical holding times were met.				·
	/	_		
Cooler temperature criteria was met.				
Were all instruments calibrated daily, each set-up time?		,	_	
Were the proper number of standards used?				
Were all initial calibration correlation coefficients > 0.995?				
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	/			
Were titrant checks performed as required? (Level IV only)				7
Were balance checks performed as required? (Level IV only)		water transfer manager to		
31.00				
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.		/	,	
Marian Spiritaria seria di Berneri Spiritaria di Spiritari				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.				
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.				
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of ≤ CRDL(≤ 2X CRDL for soil) was used for samples that were ≤ 5X the CRDL, including when only one of the duplicate sample values were ≤ 5X the CRDL.			1	
Was an LCS anayized for this SDG?				
Was an LCS analyzed per extraction batch?	\Box		_	
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?				
VI Recipion Charity Assurance mud Charley Control. 10				
Were performance evaluation (PE) samples performed?		4		
Were the performance evaluation (PF) samples within the acceptance limits?			1	

IDC#: 2331056 SDG#: <u>See care</u>t

VALIDATION FINDINGS CHECKLIST

Page: 7 of 7 Reviewer: 6 2 2nd Reviewer: 1

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

LDC #: 280 CDV8/6 SDG #: 580 CDV8/1

Validatin Findings Worksheet Initial and Continuing Calibration Calculation Verification

Page: of Reviewer: 2nd Reviewer:

:

9140

The correlation coefficient (r) for the calibration of $\overline{C | \bigcirc \lor}$ was recalculated.Calibration date: ___

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

Found = concentration of each analyte measured in the analysis of the ICV or CCV solution True = concentration of each analyte in the ICV or CCV source Where, %R = Found X 100

					Recalculated	Reported	Acceptable
Type of analysis	Analyte	Standard	Conc. (ug/l)	Area	r or r²	r or r²	(Y/N)
Initial calibration		s1	-	0.00137			
		s2	2.5	0.00562	0.999878	0.999700	
		s3	ß	0.01434			\mathcal{C}
	3	84	10	0.03176			~
		s5	20	0.06198			
		98	40	0.12605			
Calibration verification		ICV	92	(Lh:07)	101		
Calibration verification		3	$\mathcal{E}_{\mathcal{S}}$	13331	111		
Calibration varification	7	3	2	b&h'01	ha		
Calibration verification	7	})	-	_		

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.

2336K. SECONOL LDC #:

VALIDATION FINDINGS WORKSHEET **Level IV Recalculation Worksheet**

2nd Reviewer:

METHOD: Inorganics, Method Decover

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

Where, %R = Found x 100

Found =

True ==

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

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

ii ii S O

RPD = $\frac{|S-D|}{|S+D|/2}$ x 100 Where, (S+D)/2

Original sample concentration Duplicate sample concentration

	•	-	-		Recalculated	Reported	
Sample ID	Type of Analysis	Element	Found / S (units)	True / D (units)	%R / RPD	%R / RPD	Acceptable (Y/N)
577	Laboratory control sample	ClO4	0.103	0.098	501	50,)~
2	Matrix spliks sample		(SSR-SR)				
>	Duplicate eample	\					

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 #:_	233100	
SDG #:	secolo	_

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:	r	_01	
Reviewer:	\Box		
2nd reviewer:			_

	2nd reviewei :
METHOD: Inorganics, MethodSec.	all
/ \/ AL AL/A Have results been reported	ated range of the instruments?
recalculated and verified using the following	g equation:
Concentration =	Recalculation: $(0.06191 + 0.0019)(10)(5000)$ = $1101 \frac{mg}{kg}$
Slope (Prep Factor)(Pi)	0.003Z = 1101mg/kg
0 C112	0.905

#	Sample ID	Analyte	Reported Concentration (MS (S)	Calculated Concentration (MV (S)	Acceptable (Y/N)
	10	ClOy	1100	1100	4
	10				
					·
					<u> </u>
	· · · · · · · · · · · · · · · · · · ·				
					<u> </u>
					
ļ					1
				<u> </u>	

Note:	