

LABORATORY DATA CONSULTANTS, INC.

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Northgate Environmental Management, Inc.

November 3, 2010

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

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

Data Validation

Dear Ms. Arnold,

Enclosed are the final validation reports for the fraction listed below. These SDGs were received on October 4, 2010. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project # 24140:

SDG#

Fraction

280-6956-1, 280-6983-1, 280-7103-1 Volatiles, Semivolatiles, Chlorinated 280-7117-1, 280-7183-1, 280-7229-1 Pesticides, Metals, Perchlorate 280-7342-1, 280-7344-1, 280-7047-1

The data validation was performed under Stage 2B/4 guidelines. The analyses were validated using the following documents, as applicable to each method:

- Standard Operating Procedures (SOP) 40, Data Review/Validation, BRC 2009
- Quality Assurance Project Plan Tronox LLC Facility, Henderson Nevada, June 2009
- NDEP Guidance, May 2006
- USEPA, Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, June 2008
- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004

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

Sincerely.

Erlinda T. Rauto

Operations Manager/Senior Chemist

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EDD CHECKLIST

LDC #: 24140

SDG #: 280-6956-1, 280-6983-1, 280-7103-1, 280-7117-1, 280-7183-1

280-7229-1, 280-7342-1, 280-7344-1, 280-7047-1

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

Tronox Northgate Henderson Worksheet

EDD Area	Yes	No	NA	Findings/Comments
I. Completeness				
Is there an EDD for the associated Tronox validation report?	X			
II. EDD Qualifier Population				
Were all qualifiers from the validation report populated into the EDD?	Х			
III. EDD Lab Anomalies				
Were EDD anomalies identified?		X		
If yes, were they corrected or documented for the client?			Х	See EDD_discrepancy_ form_LDC24140_110210.doc
IV. EDD Delivery				
Was the final EDD sent to the client?	Х			

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS Additional Sampling,

Henderson, Nevada

Collection Date:

September 7, 2010

LDC Report Date:

October 22, 2010

Matrix:

Water

Parameters:

Volatiles

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-7117-1

Sample Identification

SSAN8-06-0BPC

SSAN8-06-0.5BPC

SSAN8-05-0BPC

SSAN8-05-0.5BPC

SSAN7-06-0BPC

SSAN7-06-0.5BPC

SSAN7-07-0BPC

SSAN7-07-0.5BPC

SSAN8-03-0BPC SSAN8-03-0.5BPC

SSAN8-04-0BPC

SSAN8-04-0.5BPC**

SSAN8-07-0BPC

SSAN8-07-0.5BPC

SSAN8-07-0BPC FD

SSAN8-04-0.5BPC FD

TB-09072010_1

SSAN7-06-0BPCMS

SSAN7-06-0BPCMSD

^{**}Indicates sample underwent Stage 4 review

Introduction

This data review covers 18 soil samples and one water sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

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 with the following exceptions:

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
9/10/10	tert-Butyl alcohol	0.0361 (≥0.05)	SSAN8-03-0BPC SSAN8-03-0.5BPC SSAN8-04-0.5BPC* SSAN8-04-0.5BPC** SSAN8-07-0BPC SSAN8-07-0.5BPC SSAN8-07-0BPC_FD SSAN8-04-0.5BPC_FD MB 280-31921/6	J (all detects) UJ (all non-detects)	А
8/31/10	tert-Butyl alcohol	0.0243 (≥0.05)	SSAN8-06-0BPC SSAN8-06-0.5BPC SSAN8-05-0.5BPC SSAN7-06-0BPC SSAN7-06-0.5BPC SSAN7-07-08PC SSAN7-07-0.5BPC SSAN7-07-0.5BPC SSAN7-06-0BPCMS SSAN7-06-0BPCMSD MB 280-30996/3-A	J (all detects) UJ (all non-detects)	· A
9/14/10	tert-Butyl alcohol	0.0058 (≥0.05)	TB-09072010_1 MB 280-31772/6	J (all detects) UJ (all non-detects)	А

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 with the following exceptions:

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
9/13/10	tert-Butyl alcohol	0.0373 (≥0.05)	SSAN8-03-0BPC SSAN8-03-0.5BPC SSAN8-04-0.5BPC** SSAN8-04-0.5BPC** SSAN8-07-0BPC SSAN8-07-0.5BPC SSAN8-07-0BPC_FD SSAN8-04-0.5BPC_FD MB 280-31921/6	J (all detects) UJ (all non-detects)	Α .
9/11/10	tert-Butyl alcohol	0.0249 (≥0.05)	SSAN8-06-0BPC SSAN8-06-0.5BPC SSAN8-05-0.5BPC SSAN7-06-0BPC SSAN7-06-0.5BPC SSAN7-07-08PC SSAN7-07-0.5BPC SSAN7-06-0BPCMS SSAN7-06-0BPCMSD MB 280-30996/3-A	J (all detects) UJ (all non-detects)	А
9/15/10	tert-Butyl alcohol	0.0053 (≥0.05)	TB-09072010_1 MB 280-31772/6	J (all detects) UJ (all non-detects)	A

V. Blanks

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

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
MB 280-30996/3-A	9/11/10	1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene Hexachlorobutadiene Methylene chloride Naphthalene	1.70 ug/Kg 1.35 ug/Kg 1.35 ug/Kg 1.86 ug/Kg 1.62 ug/Kg	SSAN8-06-0BPC SSAN8-06-0.5BPC SSAN8-05-0BPC SSAN8-05-0.5BPC SSAN7-06-0BPC SSAN7-06-0.5BPC SSAN7-07-0BPC SSAN7-07-0.5BPC

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
MB 280-31921/6	9/11/10	Methylene chloride	1.10 ug/Kg	SSAN8-03-0BPC SSAN8-03-0.5BPC SSAN8-04-0BPC SSAN8-04-0.5BPC** SSAN8-07-0BPC SSAN8-07-0.5BPC SSAN8-07-0BPC_FD SSAN8-04-0.5BPC_FD

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
SSAN8-06-0BPC	Methylene chloride	1.1 ug/Kg	1.1U ug/Kg
SSAN8-06-0.5BPC	Methylene chloride	1.2 ug/Kg	1.2U ug/Kg
SSAN8-05-0BPC	Methylene chloride	1.0 ug/Kg	1.0U ug/Kg
SSAN8-05-0.5BPC	Methylene chloride	1.4 ug/Kg	1.4U ug/Kg
SSAN7-06-0BPC	Hexachlorobutadiene Methylene chloride	0.45 ug/Kg 0.94 ug/Kg	0.45U ug/Kg 0.94U ug/Kg
SSAN7-06-0.5BPC	Methylene chloride	1.9 ug/Kg	1.9U ug/Kg
SSAN7-07-0BPC	Methylene chloride	1.3 ug/Kg	1.3U ug/Kg
SSAN7-07-0.5BPC	Methylene chloride	1.3 ug/Kg	1.3U ug/Kg
SSAN8-03-0BPC	Methylene chloride	0.71 ug/Kg	0.71U ug/Kg
SSAN8-03-0.5BPC	Methylene chloride	0.52 ug/Kg	0.52U ug/Kg
SSAN8-04-0BPC	Methylene chloride	0.86 ug/Kg	0.86U ug/Kg
SSAN8-04-0.5BPC**	Methylene chloride	0.67 ug/Kg	0.67U ug/Kg
SSAN8-07-0BPC	Methylene chloride	0.44 ug/Kg	0.44U ug/Kg
SSAN8-07-0.5BPC	Methylene chloride	0.50 ug/Kg	0.50U ug/Kg
SSAN8-07-0BPC_FD	Methylene chloride	0.53 ug/Kg	0.53U ug/Kg
SSAN8-04-0.5BPC_FD	Methylene chloride	1.2 ug/Kg	1.2U ug/Kg

Sample TB-09072010_1 was identified as a trip blank. No volatile contaminants were found in this blank with the following exceptions:

Trip Blank ID	Sampling Date	Compound	Concentration	Associated Samples
TB-09072010_1	9/7/10	Acetone Methylene chloride	2.3 ug/L 0.52 ug/L	All soil samples in SDG 280-7117-1

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

Sample	Compound	Reported Concentration	Modified Final Concentration
SSAN8-05-0BPC	Methylene chloride	1.0 ug/Kg	1.0U ug/Kg
SSAN7-06-0BPC	Methylene chloride	0.94 ug/Kg	0.94U ug/Kg
SSAN8-03-0BPC	Methylene chloride	0.71 ug/Kg	0.71U ug/Kg
SSAN8-03-0.5BPC	Methylene chloride	0.52 ug/Kg	0.52U ug/Kg
SSAN8-04-0BPC	Methylene chloride	0.86 ug/Kg	0.86U ug/Kg
SSAN8-04-0.5BPC**	Acetone Methylene chloride	2.7 ug/Kg 0.67 ug/Kg	2.7U ug/Kg 0.67U ug/Kg
SSAN8-07-0BPC	Methylene chloride	0.44 ug/Kg	0.44U ug/Kg
SSAN8-07-0.5BPC	Methylene chloride	0.50 ug/Kg	0.50U ug/Kg
SSAN8-07-0BPC_FD	Methylene chloride	0.53 ug/Kg	0.53U ug/Kg

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

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

XII. Project Quantitation Limit

All project quantitation limits were within validation criteria for samples on which a Stage 4 review was performed.

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-7117-1	All compounds reported below the PQL.	J (all detects)	А

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

XIII. 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 of Data

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

XVI. Field Duplicates

Samples SSAN8-07-0BPC and SSAN8-07-0BPC_FD and samples SSAN8-04-0.5BPC and SSAN8-04-0.5BPC_FD were identified as field duplicates. No volatiles were detected in any of the samples with the following exceptions:

	Concentr	ation (ug/L)	DDD			A or P	
Compound	SSAN8-04-0.5BPC	SSAN8-04-0.5BPC_FD	RPD (Limits)	Difference (Limits)	Flags		
Acetone	2.7	14U	-	11.3 (≤14)		-	
Methylene chloride	0.67	1.2	-	0.53 (≤3.6)	_	- .	
1,1Dichloroethene	2.5U	1.2	-	1.3 (≤2.5)	-		

	Concentr	ation (ug/L)				
Compound	SSAN8-07-0BPC	SSAN8-07-0BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Methylene chloride	0.44	0.53	•	0.09 (≤3.0)	-	-

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Volatiles - Data Qualification Summary - SDG 280-7117-1

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-7117-1	SSAN8-06-0BPC SSAN8-06-0.5BPC SSAN8-05-0.5BPC SSAN8-05-0.5BPC SSAN7-06-0.5BPC SSAN7-07-0.5BPC SSAN8-03-0BPC SSAN8-03-0.5BPC SSAN8-04-0.5BPC SSAN8-04-0.5BPC SSAN8-07-0BPC SSAN8-07-0BPC SSAN8-07-0.5BPC SSAN8-07-0.5BPC	tert-Butyl alcohol	J (all detects) UJ (all non-detects)	A	Initial calibration (RRF) (c)
280-7117-1	SSAN8-06-0BPC SSAN8-06-0.5BPC SSAN8-05-0.5BPC SSAN8-05-0.5BPC SSAN7-06-0.5BPC SSAN7-07-0.5BPC SSAN7-07-0.5BPC SSAN8-03-0.5BPC SSAN8-04-0BPC SSAN8-04-0.5BPC SSAN8-07-0BPC	tert-Butyl alcohol	J (all detects) UJ (all non-detects)	A	Continuing calibration (RRF) (c)
280-7117-1	SSAN8-06-0BPC SSAN8-06-0.5BPC SSAN8-05-0.5BPC SSAN7-06-0BPC SSAN7-06-0.5BPC SSAN7-07-0.5BPC SSAN7-07-0.5BPC SSAN8-03-0BPC SSAN8-03-0BPC SSAN8-04-0.5BPC SSAN8-04-0.5BPC SSAN8-04-0.5BPC SSAN8-07-0BPC	All compounds reported below the PQL.	J (all detects)	Α	Project Quantitation Limit (PQL) (sp)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Volatiles - Laboratory Blank Data Qualification Summary - SDG 280-7117-1

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
280-7117-1	SSAN8-06-0BPC	Methylene chloride	1.1U ug/Kg	Α	ы

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or	Code
280-7117-1	SSAN8-06-0.5BPC	Methylene chloride	1.2U ug/Kg	А	bi
280-7117-1	SSAN8-05-0BPC	Methylene chloride	1.0U ug/Kg	А	ы
280-7117-1	SSAN8-05-0.5BPC	Methylene chloride	1.4U ug/Kg	А	bl
280-7117-1	SSAN7-06-0BPC	Hexachlorobutadiene Methylene chloride	0.45U ug/Kg 0.94U ug/Kg	А	bl
280-7117-1	SSAN7-06-0.5BPC	Methylene chloride	1.9U ug/Kg	Α	bl
280-7117-1	SSAN7-07-0BPC	Methylene chloride	1.3U ug/Kg	Α	bl
280-7117-1	SSAN7-07-0.5BPC	Methylene chloride	1.3U ug/Kg	Α	bl
280-7117-1	SSAN8-03-0BPC	Methylene chloride	0.71U ug/Kg	А	bl
280-7117-1	SSAN8-03-0.5BPC	Methylene chloride	0.52U ug/Kg	Α	bi
280-7117-1	SSAN8-04-0BPC	Methylene chloride	0.86U ug/Kg	А	bl
280-7117-1	SSAN8-04-0.5BPC**	Methylene chloride	0.67U ug/Kg	А	bl
280-7117-1	SSAN8-07-0BPC	Methylene chloride	0.44U ug/Kg	Α	bi
280-7117-1	SSAN8-07-0.5BPC	Methylene chloride	0.50U ug/Kg	Α	bl
280-7117-1	SSAN8-07-0BPC_FD	Methylene chloride	0.53U ug/Kg	А	ы
280-7117-1	SSAN8-04-0.5BPC_FD	Methylene chloride	1.2U ug/Kg	А	bl

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Volatiles - Trip Blank Data Qualification Summary - SDG 280-7117-1

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
280-7117-1	SSAN8-05-0BPC	Methylene chloride	1.0U ug/Kg	А	bt
280-7117-1	SSAN7-06-0BPC	Methylene chloride	0.94U ug/Kg	А	bt
280-7117-1	SSAN8-03-0BPC	Methylene chloride	0.71U ug/Kg	А	bt
280-7117-1	SSAN8-03-0.5BPC	Methylene chloride	0.52U ug/Kg	А	bt
280-7117-1	SSAN8-04-0BPC	Methylene chloride	0.86U ug/Kg	А	bt
280-7117-1	SSAN8-04-0.5BPC**	Acetone Methylene chloride	2.7U ug/Kg 0.67U ug/Kg	А	bt

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
280-7117-1	SSAN8-07-0BPC	Methylene chloride	0.44U ug/Kg	А	bt
280-7117-1	SSAN8-07-0.5BPC	Methylene chloride	0.50U ug/Kg	Α	bt
280-7117-1	SSAN8-07-0BPC_FD	Methylene chloride	0.53U ug/Kg	А	bt

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #: 24140D1	VALIDATION COMPLETENE
SDG #: 280-7117-1	Stage 2B/4
Laboratory: Test America	-

Page: 1 of 1
Reviewer: 56
2nd Reviewer: 5

METHOD: GC/MS Volatiles (EPA SW 846 Method 8260B)

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: 9 /07 /10
11.	GC/MS Instrument performance check	A	
111.	Initial calibration	SW	1/2 RSD YY
IV.	Continuing calibration/ICV	SW	1/6 RSD Y Y CW /W 425 %
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW)	
VIII.	Laboratory control samples	A	us /p
łX.	Regional Quality Assurance and Quality Control	N	
X.	internal standards	Ă	
XI.	Target compound identification	A	Not reviewed for Stage 2B validation.
XII.	Compound quantitation/CRQLs	A	Not reviewed for Stage 2B validation.
XIII.	Tentatively identified compounds (TICs)	N	Not reviewed for Stage 2B validation.
XIV.	System performance	Á	Not reviewed for Stage 2B validation.
XV.	Overall assessment of data	A	,
XVI.	Field duplicates	SW	D = 12,16 D2 = 13,15
XVII.	Field blanks	SW	TB = 17

Note:

A = Acceptable

N = Not provided/applicable

R = Rinsate

ND = No compounds detected D = Duplicate

TB = Trip blank

SW = See worksheet

FB = Field blank

EB = Equipment blank

Validated Samples: ** Indicates sample underwent Stage 4 validation

	Soil +	1/1/	ज				
1 1	SSAN8-06-0BPC	11	SSAN8-04-0BPC		+ 21	MB 280- 30996/3-A	31
2 1	SSAN8-06-0.5BPC	12	SSAN8-04-0.5BPC**		‡ 7 22	MB 280- 3192 /6	32
3 1	SSAN8-05-0BPC	13	SSAN8-07-0BPC		23	MB 280-31772/6	33
4 !	SSAN8-05-0.5BPC	14	SSAN8-07-0.5BPC		24		34
5	SSAN7-06-0BPC	15	SSAN8-07-0BPC_FD		25		35
6	SSAN7-06-0.5BPC	16	SSAN8-04-0.5BPC_FD	4	26		36
7	SSAN7-07-0BPC	173	TB-09072010_1 W	4	27		37
8	SSAN7-07-0.5BPC	18	SSAN7-06-0BPCMS	1	28		38
9 7	SSAN8-03-0BPC	19	SSAN7-06-0BPCMSD	4	29		39
10 7	SSAN8-03-0.5BPC	20	•		30		40

VALIDATION FINDINGS CHECKLIST

Page: 1 of \succeq Reviewer: \checkmark 2nd Reviewer: \checkmark

Method: Volatiles (EPA SW 846 Method 8260B)

	Ī.,			E. P (O
Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times	r			
All technical holding times were met.	/			
Cooler temperature criteria was met.				
II. GC/MS instrument performance check				
Were the BFB performance results reviewed and found to be within the specified criteria?	/			
Were all samples analyzed within the 12 hour clock criteria?				
III. Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?				
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	/			
Was a curve fit used for evaluation?	/			
Did the initial calibration meet the curve fit acceptance criteria of > 0.990?	/			
Were all percent relative standard deviations (%RSD) \leq 30% and relative response factors (RRF) \geq 0.05?				
IV. Continuing calibration	•			
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?				
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?				
Were all percent differences (%D) < 25% and relative response factors (RRF) > 0.05?				
V Blanks				
Was a method blank associated with every sample in this SDG?				
Was a method blank analyzed at least once every 12 hours 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 the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?				
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	,	<u>/</u>		
Was an LCS analyzed for this SDG?	6			

LDC #: 24140 D1

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: 7/6
2nd Reviewer: 5

Validation Area	Yes	No	NA	Findings/Comments
. Was an LCS analyzed per analytical 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?				<u> </u>
X. Internal standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	/			
Were retention times within + 30 seconds of 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)?				
XIV. System performance				
System performance was found to be acceptable.				
XV. Overall assessment of data				
Overall assessment of data was found to be acceptable.		/		
XVI. Field duplicates				
Field duplicate pairs were identified in this SDG.				
Target compounds were detected in the field duplicates.		1	ı	
XVII Field blanks	7			
Field blanks were identified in this SDG.				
Target compounds were detected in the field blanks.	Δ			

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

A. Chloromethane*	U. 1,1,2-Trichloroethane	OO. 2,2-Dichloropropane	III. n-Butylbenzene	CCCC.1-Chlorohexane
B. Bromomethane	V. Benzene	PP. Bromochloromethane	JJJ. 1,2-Dichlorobenzene	DDDD. Isopropyl alcohol
C. Vinyl choride**	W. trans-1,3-Dichloropropene	QQ. 1,1-Dichloropropene	KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
D. Chloroethane	X. Bromoform⁴	RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF. Acrolein
E. Methylene chloride	Y, 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG, Acrylonitrile
F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN. 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
G. Carbon disulfide	AA. Tetrachloroethene	UU. 1,1,1,2-Tetrachloroethane	OOO. 1,3,5-Trichlorobenzene	IIII. Isobutyi alcohol
H. 1,1-Dichloroethene**	BB. 1,1,2,2-Tetrachloroethane*	VV. Isopropylbenzene	PPP. trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
l. 1,1-Dichloroethane⁴	CC. Toluene**	WW. Bromobenzene	QQQ, cis-1,2-Dichloroethene	KKKK. Propionitrile
J. 1,2-Dichloroethene, total	DD. Chlorobenzene*	XX. 1,2,3-Trichloropropane	RRR. m,p-Xylenes	LLLL. Ethyl ether
K. Chloroform**	€E. Ethylbenzene**	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
L. 1,2-Dichloroethane	FF. Styrene	ZZ. 2-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN.
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000
N. 1,1,1-Trichloroethane	HH. Vinyl acetate	BBB, 4-Chlorotoluene	VVV. 4-Ethyltoluene	рррр.
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW. Ethanol	2000.
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trimethylbenzene	XXX. Di-isopropyl ether	RRRR
Q. 1,2-Dichloropropane**	KK. Trichlorofluoromethane	EEE. sec-Butylbenzene	YYY. tert-Butanol	SSSS,
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohol	TTT.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-lsopropyltoluene	AAAA. Ethyl tert-butyl ether	กกกก
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	ww.

^{* =} System performance check compounds (SPCC) for RRF; ** = Calibration check compounds (CCC) for %RSD.

LDC#: 24140 D/

VALIDATION FINDINGS WORKSHEET Initial Calibration

Page: 1 of / Reviewer: 2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

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

Did the laboratory perform a 5 point calibration prior to sample analysis?

Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's? Was a curve fit used for evaluation?

Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation?__

Did the initial calibration meet the acceptance criteria?

Were all %RSDs and RRFs within the validation criteria of ≤30 %RSD and ≥0.05 RRF?

	<u> </u>	 					 	 	 	 	 	_		 	_	
Qualifications	9		MD 280-30 996 /3-A		·	2/6										
Associated Samples	14918-085 AM 21-P		1-8 18 19 MD 280-3			147715-08C MM 71							,			
Finding %RSD Finding RRF (Limit: <30.0%) (Limit: >0.05)	1980.0	j	0.0243			2500 0										
Compound	222		222			222										
# Date Standard ID Compound	1CAL- MSV G		ICAL- MSV J			TCAL - MSV MSI										
# Date	d/ 0/2		0/14/8			9 1/4 1/0										

LDC# 24140 b/

VALIDATION FINDINGS WORKSHEET

Page: Reviewer: 2nd Reviewer:

Continuing Calibration

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

Was a continuing calibration standard analyzed at least once every 12 hours for each instrument? Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ? Were all %D and RRFs within the validation criteria of <25 %D and >0.05 RRF ?

Finding %D Finding RRF Associated Samples Qualifications 2 2 (Limit: <25.0%) (Limit: >0.05)							
Finding %D Finding RRF (Limit: <25.0%) (Limit: >0.05) Associated % 0.05723 9-16, MB 20 0.6249 1-8,18,19							
Finding %D (Limit: <25.0%)	-						
		· I					1
P 1							
222 222							
Standard ID G855/ J 0866 MS 3423							
# Date 9/12/10 9/15/10							

1	
40	
7 x	
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LDC	

VALIDATION FINDINGS WORKSHEET

of Page: Reviewer. 2nd Reviewer:

> Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

Was a method blank associated with every sample in this SDG?

Y N N/A Y/N N/A

Was a method blank analyzed at least once every 12 hours for each matrix and concentration? Was there contamination in the method blanks? If yes, please see the qualifications below.

Blank analysis date: A/N N/A

(79)

_, マ ∞ <u>-</u> Sample Identification 46 p 0.45 ò Associated Samples: 4 **Z** ď 118 p80 - 20 996 1/3 A 1.67 1.35 .. 85 Blank ID 1.86 1.76 MMM Methylene chloride N N N アドス レン Compound Conc. units: Acetorie

Blank analysis date: 9/15/10 Conc. units: 45/10	no Ino		Asi	Associated Samples:	- 6	16		(p 4)	
Compound	Blank ID		-		Ö	Sample Identifica	ıtion		
PUP PUP	1280-21921	6	Ç	11	12	۲)	71	15	-

Compound	Blank ID		-			Sample Identification	ation			
Pul.	MA 260-31921/6	6 9	0)	1)	12	(۶	71	15	91	
Methylene chloride	1.10	0.71 /y 0.52	1	n/ 98.0	4 0.86 /4 0.67 /4	M ph 0	0,44 /4 0,50 /4 0,53 /4 1.2/	0.53 /u	1.2/4	
Acetone			,		•			•		
CROL										

All results were qualified using the criteria stated below except those circled.

Note: Common contaminants such as Methylene chloride, Acetone, 2-Butanone, Carbon disulfide and TICs 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".

(DC#: 24140 D/

VALIDATION FINDINGS WORKSHEET Field Blanks

Of Page: Reviewer: 2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

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

X

5% b Ō, (bt) 0,50 AII S 0.44 78 29'0 1.0 Sample Identification Associated Samples: 0,86 کے 5 0,52 ナナナ 2 4 V.0 All others Field blank type: (circle one) Field Blank / Rinsate /(frip Blank ∕I Other 7 0,94 Associated sample units:_ 'n <u>.</u> 250 Blank ID a W NO /L ASSOCIA 1 Compound Sampling date: Methylene chloride Blank units: Chloroform Assetone

Associated sample units: Blank units:

Sampling date:

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

Associated Samples:

Sample Identification Blank ID Compound Methylene chloride Chloroform Acetone

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

Common contaminants such as Methylene chloride, Acetone, 2-Butanone and Carbon disulfide that were detected in samples within ten times the associated field blank concentration were also qualified as not detected, "U". Other contaminants within five times the field blank concentration were also qualified as not detected, "U".

LDC #: 241 40 D)

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

2nd Reviewer: Page: Reviewer.

METHOD: GC/MS VOA (EPA SW 846 Method 8260)

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

YN 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.

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?

#	MS/MSD ID	Compound	MS %R (Limits)	(i	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	18 /19	Several	_	nn K	out side)	limits for	Ŋ	No punt
	-	\\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\	and	CARPD	()	()		Ceither MS MSD
			Ú	(()	()		10SD
)	^	()	()		-
)	^	()	()		
)	^	()	()		
))	()	()		and the state of t
	THE PRINCIPLE STATE OF		_	<u> </u>)			
			J			()		
)	(()	()		
			<u></u>)		
				(()	()		
)	(()	()		
			J	^	()	()		
)	<u> </u>	()	()		
)	^	()	()		
)	_	()	()		
)	Ó	()	()		
		Compound			QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	ater) RPD (Water)
	H. 1,1-Dic	1,1-Dichloroethene			59-172%	< 22%	61-145%	
-	S. Trichlo	Trichloroethene			62-137%	< 24%	71-120%	< 14%
	V. Benzene	ne			66-142%	< 21%	76-127%	< 11%
	CC. Toluene	eL			59-139%	< 21%	76-125%	
ليا	DD. Chlorol	Chlorobenzene			60-133%	< 21%	75-130%	< 13%

LDC#: 24140D1

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page:_	
Reviewer:	W
2nd Reviewer:	

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

Y) N NA

Were field duplicate pairs identified in this SDG?

N NA

Were target analytes detected in the field duplicate pairs?

Carra a med Name	Conc (ug/Kg)	RPD	Diff	Diff Limits	Quals
Compound Name	12	16	(≤50%)			(Parent Only)
Acetone	2.7	14U		11.3	≤14	
Methylene chloride	0.67	1.2		0.53	≤3.6	
1,1Dichloroethene	2.5U	1.2		1.3	≤2.5	

Compound Name	Conc (ug/Kg)	RPD	Diff	Diff Limits	Quals
Compound Name	13	15	(≤50%)			(Parent Only)
Methylene chloride	0.44	0.53		0.09	≤3.0	

V:\FIELD DUPLICATES\24140D1.wpd

LDC#: 94140 by

VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

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

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

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

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

average RRF = sum of the RRFs/number of standards

%RSD = 100 * (S/X)

A_x = Area of Compound

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

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

X = Mean of the RRFs

				Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration		RRF	RRF	Average RRF	Average RRF	%RSD	%RSD
#	Standard ID	Date	Compound (IS)	(RRF 50 std)	(RRF 50 std)	(Initial)	(Initial)		
1	ICAL	9/10/2010	Acetone (IS1)	0.0870	0.0870	0.0903	0.0904	10.9	10.94
2	GC MSV G		Ethylbenzene (IS2)	1.1770	1.1770	1.1794	1.1794	7.1	60.7
3			1,1,2,2-TCA (IS3)	1.1603	1.1603	1.1935	1.1935	8.8	8.80
4									
5								der martin ar	
9									

_	<u> </u>	LC.	0	_	
Area IS	2100843	587055	835570		
Area cpd	730995	690944	969526		
Conc IS/Cpd	50/200	50/50	50/50		

Conc	Acetone	Ethylbenzene	1,1,2,2-TCA
N		1.2944	1.3958
വ	0.1084	1.1171	1.2460
0	0.0942	1.2136	1.1775
20	0.0874	1.2646	1.1938
20	0.0870	1.1770	1.1603
100	0.0843	1.0630	1.0877
200	0.0808	1.1264	1.0937
П Ж	0.0904	1.1794	1.1935
S	0.0099	0.0836	0.1050
4			

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.

Continuing Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

JVG Page: 1 of 1 Reviewer:_

2nd Reviewer.

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

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

Where:

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

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

ave. RRF = initial calibration average RRF

RRF = continuing calibration RRF Ax = Area of compound

Ais = Area of associated internal standard Cx = Concentration of compound,

Cis = Concentration of internal standard

Recalculated 6.5 3.9 4.1 Reported ۵ % 3.9 6.5 4.1 Recalculated (ccv) 0.084 1.228 RRF 1.147 Reported (CCV) RRF 0.084 1.228 1.147 Average RRF (Initial) 1.179 060.0 1.194 (181) (182) (183) (3) Compound Ethylbenzene 1,1,2,2-TCA Acetone 9/13/2010 Calibration Date Standard ID GC MSV G G8551 က # ~

	Ais				
CCV3	Ax				
	Ais				
CCV2	Ax				
	Ais	2355637	684189	930626	
CCV1	Ax	795697	840169	1136121	
	Cis/Cx	90/20	90/20	20/20	

LDC#: >4140 D)

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:	lof
Reviewer:_	JVG
2nd reviewer:_	<u></u>

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

The percent recoveries ((%R)	of surrogates were	recalculated for	the compounds	identified below	v using the fo	ollowing calculation
the beinelli recoveries i	/01//	or surrogates were	, reculculated for	are compounted	identance beiet	r asing are n	morning calculation

% Recovery: SF/SS * 100

Where: SF = Surrogate Found

SS = Surrogate Spiked

Sample ID: # 17

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8	55	57.62	105	105	Θ.
Bromofluorobenzene		54.8	100	100	
1,2-Dichloroethane-d4		54.8	140	100	
Dibromofluoromethane		55,4	10)	101	

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4			······································		
Dibromofluoromethane					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4					
Dibromofluoromethane			· ·		

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8		-		·	
Bromofluorobenzene					
1,2-Dichloroethane-d4					
Dibromofluoromethane					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4					
Dibromofluoromethane					

LDC#: 26/140 D) SDG#:

Matrix Spike/Matrix Spike Duplicates Results Verification VALIDATION FINDINGS WORKSHEET

Page: of 2nd Reviewer:_ Reviewer:_

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

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

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

Where:

SSC = Spiked sample concentration SA = Spike added

MSDC = Matrix spike duplicate concentration

SC = Sample concentration

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

MSC = Matrix spike concentration

<u></u> MS/MSD sample:

	Sp		Sample	Spiked Sample	ample	Matrix Spike	Spike	Matrix Spike Duplicate	Duplicate	/SW	MS/MSD
Compound	Ad (2d)	Added (16)	Concentration $({}^{17}_{6})$		ration	Percent Recovery	ecovery	Percent Recovery	scovery	8	RPD
	MS	O MSD	c	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculate d
1,1-Dichloroethene	168	127	0	127	91	27	73	74	77	67	2
Trichloroethene				24	208	20	70	79	59	\$ E	25
Benzene				६८।	, 88	73	73	26	06	33	55
Toluene				α_1	2.08	77	77	49	8 9	4	58
Chlorobenzene	\	7	\ -	211	9'72	22	70	6	45	47	4

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# 24140 17

Laboratory Control Sample Results Verification VALIDATION FINDINGS WORKSHEET

Page: l of / 2nd Reviewer: Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

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

% Recovery = 100 * SSC/SA

Where: SSC = Spiked sample concentration SA = Spike added

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

280-31921 6 100 LCS ID:

	S	pike	Spiked Sa	elame	31	CS	01	CSD	SOI	CS/I CSD
Compound	A M	Added (%)	Concentration $(M < J_k)$	ration	Percent Recovery	Recovery	Percent Recovery	\ecovery	8	RPD
	SUL	l osp	1.08	/ I CSD	Reported	Receic	Renorted	Recalc	Reported	Recalculated
1,1-Dichloroethene	£5	P	575	40,4	105	<i>>₀/</i>	66	66	٩	e
Trichloroethene			675	49.8	40)	pa1	(O)	1 W	*	h
Benzene			48.4	47.8	47	67	96	96		,
Toluene			0.46	48.5	(৩)	901	47	47	M	3
Chlorobenzene	7	1	47.5	46.6	a Po	36	93	93	λ	۶
							·			

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results. LDC #: 24140 b)

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:	l_of
Reviewer:_	JVG
nd reviewer:	1~ /

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

Y N N/A Were all reported results recalculated and verified for all level IV samples?

N N/A Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Concentration = $(A_{\bullet})(I_{\bullet})(DF)$ $(A_{\bullet})(RRF)(V_{\circ})(\%S)$

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

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

= Amount of internal standard added in nanograms (ng)

RRF = Relative response factor of the calibration standard.

V_o = Volume or weight of sample pruged in milliliters (ml) or grams (g).

Df = Dilution factor.

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

Example:

Sample I.D. # 12 , ____ = :

Conc. = (19834) (50) (5M) (2045270) (1.0903) (10.3778) (0,153) = 2.7 ug kg

	only.		Reported Concentration	Calculated Concentration	
#	Sample ID	Compound			Qualification
					·
		and the self-the self			
				, , , , , , , , , , , , , , , , , , ,	
			<u> </u>	<u> </u>	

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS Additional Sampling,

Henderson, Nevada

Collection Date:

September 8, 2010

LDC Report Date:

October 22, 2010

Matrix:

Soil

Parameters:

Volatiles

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-7229-1

Sample Identification

SSAO8-04-0BPC SSAO8-04-0.5BPC SSAO8-07-0BPC SSAO8-07-0.5BPC SSAO7-04-0BPC SSAO7-04-0.5BPC**

^{**}Indicates sample underwent Stage 4 review

Introduction

This data review covers 6 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8260B for Volatiles.

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.

Average relative response factors (RRF) for all compounds were within method and validation criteria with the following exceptions:

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
8/31/10	tert-Butyl alcohol	0.0243 (≥0.05)	All samples in SDG 280-7229-1	J (all detects) UJ (all non-detects)	А

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 with the following exceptions:

Date	Compound	RRF (Limits)	Associated Samples	Flag	A or P
9/15/10	tert-Butyl alcohol	0.0287 (≥0.05)	All samples in SDG 280-7229-1	J (all detects) UJ (all non-detects)	Α

V. Blanks

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

Method Blank ID	Analysis Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
MB 280-31540/3-A	9/15/10	Hexachlorobutadiene Methylene chloride Naphthalene	0.595 ug/Kg 1.74 ug/Kg 0.642 ug/Kg	All samples in SDG 280-7229-1

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
SSAO8-04-0BPC	Methylene chloride	1.0 ug/Kg	1.0U ug/Kg
SSAO8-04-0.5BPC	Methylene chloride	0.93 ug/Kg	0.93U ug/Kg
SSAO8-07-0BPC	Methylene chloride	0.94 ug/Kg	0.94U ug/Kg
SSAO8-07-0.5BPC	Methylene chloride	0.85 ug/Kg	0.85U ug/Kg
SSAO7-04-0BPC	Hexachlorobutadiene Methylene chloride	0.41 ug/Kg 0.84 ug/Kg	0.41U ug/Kg 0.84U ug/Kg
SSAO7-04-0.5BPC**	Methylene chloride	0.82 ug/Kg	0.82U ug/Kg

No field blanks were identified in this SDG.

VI. Surrogate Spikes

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

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) and relative percent differences (RPD) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

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

XII. Project Quantitation Limit

All project quantitation limits were within validation criteria for samples on which a Stage 4 review was performed.

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-7229-1	All compounds reported below the PQL.	J (all detects)	А

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

XIII. 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 of Data

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

XVI. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Volatiles - Data Qualification Summary - SDG 280-7229-1

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-7229-1	SSAO8-04-0BPC SSAO8-04-0.5BPC SSAO8-07-0BPC SSAO8-07-0.5BPC SSAO7-04-0BPC SSAO7-04-0.5BPC**	tert-Butyl alcohol	J (all detects) UJ (all non-detects)	A	Initial calibration (RRF) (c)
280-7229-1	SSAO8-04-0BPC SSAO8-04-0.5BPC SSAO8-07-0BPC SSAO8-07-0.5BPC SSAO7-04-0BPC SSAO7-04-0.5BPC**	tert-Butyl alcohol	J (all detects) UJ (all non-detects)	А	Continuing calibration (RRF) (c)
280-7229-1	SSAO8-04-0BPC SSAO8-04-0.5BPC SSAO8-07-0BPC SSAO8-07-0.5BPC SSAO7-04-0BPC SSAO7-04-0.5BPC**	All compounds reported below the PQL.	J (all detects)	А	Project Quantitation Limit (PQL) (sp)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Volatiles - Laboratory Blank Data Qualification Summary - SDG 280-7229-1

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
280-7229-1	SSAO8-04-0BPC	Methylene chloride	1.0U ug/Kg	А	bl
280-7229-1	SSAO8-04-0.5BPC	Methylene chloride	0.93U ug/Kg	А	ы
280-7229-1	SSAO8-07-0BPC	Methylene chloride	0.94U ug/Kg	А	bl
280-7229-1	SSA08-07-0.5BPC	Methylene chloride	0.85U ug/Kg	А	bl
280-7229-1	SSAO7-04-0BPC	Hexachlorobutadiene Methylene chloride	0.41U ug/Kg 0.84U ug/Kg	Α	bl
280-7229-1	SSAO7-04-0.5BPC**	Methylene chloride	0.82U ug/Kg	А	bl

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Volatiles - Field Blank Data Qualification Summary - SDG 280-7229-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson SHEET

LDC #: 24140F1	VALIDATION COMPLETENESS WORK
SDG #: 280-7229-1	Stage 2B/4
Laboratory: Test America	-

2nd Reviewer:

METHOD: GC/MS Volatiles (EPA SW 846 Method 8260B)

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: 9 /0 8 /10
H.	GC/MS Instrument performance check	A	
III.	Initial calibration	SW	% RSD
IV.	Continuing calibration/ICV	SW	ca hal 6 25 ?
V.	Blanks	SW	·
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	client spec
VIII.	Laboratory control samples	A	Mint spec
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	Д	Not reviewed for Stage 2B validation.
XII.	Compound quantitation/CRQLs	A	Not reviewed for Stage 2B validation.
XIII.	Tentatively identified compounds (TICs)	N	Not reviewed for Stage 2B validation.
XIV.	System performance	A	Not reviewed for Stage 2B validation.
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	Ŋ	

Note:

A = Acceptable

ND = No compounds detected

D = Duplicate

N = Not provided/applicable SW = See worksheet

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

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

	A11 Soils					
1	SSAO8-04-0BPC	11	MB 280-31540/3-A	21	31	
∤ 2	SSAO8-04-0.5BPC	12		22	32	
3	SSAO8-07-0BPC	13		23	33	
4	SSAO8-07-0.5BPC	14		24	 34	
5	SSA07-04-0BPC	15		25	35	
6	SSA07-04-0.5BPC**	16		26	36	
7	<u>'</u>	17		27	37	
8		18		28	38	
9		19		29	39	
10		20		30	40	

VALIDATION FINDINGS CHECKLIST

Page: 1 of \succeq Reviewer: $\sqrt[]{VU}$ 2nd Reviewer: $\sqrt[]{U}$

Method: Volatiles (EPA SW 846 Method 8260B)

motilou. Volunos (El 11 o 11	T		<u> </u>	I and the second
Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times			r	r
All technical holding times were met.				
Cooler temperature criteria was met.			<u> </u>	
II. GC/MS instrument performance check	,	г		
Were the BFB performance results reviewed and found to be within the specified criteria?				
Were all samples analyzed within the 12 hour clock criteria?	1			
III. Initial calibration		1		T
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?	M			
Did the initial calibration meet the curve fit acceptance criteria of > 0.990?	<u> • </u>			
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?				
V Blanks	,			
Was a method blank associated with every sample in this SDG?				
Was a method blank analyzed at least once every 12 hours for each matrix and concentration?	/			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.				
VI. Surrogate spikes	1			
Were all surrogate %R within QC limits?				
If the percent recovery (%R) for one or more surrogates was out of QC limits, was a reanalysis performed to confirm samples with %R outside of criteria?			_	
VII. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.		/		
Was a MS/MSD analyzed every 20 samples of each matrix?				
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?			_	
VIII. Laboratory control samples	,	,		
Was an LCS analyzed for this SDG?				

LDC#: 24140 +1

VALIDATION FINDINGS CHECKLIST

Page: 2of 2
Reviewer: JV6
2nd Reviewer: ______

N-RIA di La Anna	T.,	Γ	Γ	
Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per analytical 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 of the associated calibration standard?				
XI. Target compound identification		,		
Were relative retention times (RRTs) 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)?				
XIV. System performance				
System performance was found to be acceptable.				
XV. Overall assessment of data	1			
Overall assessment of data was found to be acceptable.				
XVI. Field duplicates				
Field duplicate pairs were identified in this SDG.				
Target compounds were detected in the field duplicates.				
XVII Field blanks				
Field blanks were identified in this SDG.		7	7	
Target compounds were detected in the field blanks.				

TARGET COMPOUND WORKSHEET

METHOD: VOA (EPA SW 846 Method 8260B)

A. Chloromethane*	U. 1,1,2-Trichloroethane	OO. 2,2-Dichloropropane	III. n-Butylbenzene	CCCC.1-Chlorohexane
B. Bromomethane	V. Benzene	PP. Bromochloromethane	JJJ, 1,2-Dichlorobenzene	DDDD, Isopropyl alcohol
C. Vinyl choride**	W. trans-1,3-Dichloropropene	QQ. 1,1-Dichloropropene	KKK. 1,2,4-Trichlorobenzene	EEEE. Acetonitrile
D. Chloroethane	X. Bromoform⁴	RR. Dibromomethane	LLL. Hexachlorobutadiene	FFFF. Acrolein
E. Methylene chloride	Y. 4-Methyl-2-pentanone	SS. 1,3-Dichloropropane	MMM. Naphthalene	GGGG, Acrylonitrile
F. Acetone	Z. 2-Hexanone	TT. 1,2-Dibromoethane	NNN, 1,2,3-Trichlorobenzene	HHHH. 1,4-Dioxane
G. Carbon disulfide	AA. Tetrachioroethene	UU. 1,1,1,2-Tetrachloroethane	OOO. 1,3,5-Trichlorobenzene	IIIi, Isobutyi alcohoi
H. 1,1-Dichloroethene**	BB. 1,1,2,2-Tetrachioroethane*	VV. Isopropylbenzene	PPP, trans-1,2-Dichloroethene	JJJJ. Methacrylonitrile
I. 1,1-Dichloroethane*	CC, Toluene**	.WW. Bromobenzene	QQQ, cis-1,2-Dichloroethene	KKKK. Propionitrile
J. 1,2-Dichloroethene, total	DD. Chlorobenzene*	XX. 1,2,3-Trichloropropane	RRR. m.p-Xylenes	LLLL. Ethyl ether
K. Chloroform**	EE. Ethylbenzene**	YY. n-Propylbenzene	SSS. o-Xylene	MMMM. Benzyl chloride
L. 1,2-Dichloroethane	FF. Styrene	ZZ. 2-Chlorotoluene	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	NNNN.
M. 2-Butanone	GG. Xylenes, total	AAA. 1,3,5-Trimethylbenzene	UUU. 1,2-Dichlorotetrafluoroethane	0000
N. 1,1,1-Trichloroethane	HH. Vinyi acetate	BBB. 4-Chlorotoluene	VVV. 4-Ethyltoluene	dddd
O. Carbon tetrachloride	II. 2-Chloroethylvinyl ether	CCC. tert-Butylbenzene	WWW, Ethanol	9000
P. Bromodichloromethane	JJ. Dichlorodifluoromethane	DDD. 1,2,4-Trìmethylbenzene	XXX. Di-isopropyl ether	RRRR
Q. 1,2-Dichloropropane**	KK. Trichlorofluoromethane	EEE. sec-Butylbenzene	YYY. tert-Butanol	SSSS.
R. cis-1,3-Dichloropropene	LL. Methyl-tert-butyl ether	FFF. 1,3-Dichlorobenzene	ZZZ. tert-Butyl alcohol	TTT.
S. Trichloroethene	MM. 1,2-Dibromo-3-chloropropane	GGG. p-kopropyltoluene	AAAA. Ethyl tert-butyl ether	nnnn.
T. Dibromochloromethane	NN. Methyl ethyl ketone	HHH. 1,4-Dichlorobenzene	BBBB. tert-Amyl methyl ether	ww.

^{* =} System performance check compounds (SPCC) for RRF; ** = Calibration check compounds (CCC) for %RSD.

LDC# 74.40 #1

VALIDATION FINDINGS WORKSHEET Initial Calibration

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

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

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

Did the laboratory perform a 5 point calibration prior to sample analysis?

Were percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCC's and SPCC's?

Was a curve fit used for evaluation? If yes, what was the acceptance criteria used for evaluation?__

Did the initial calibration meet the acceptance criteria?

Y. N. N. A

Were all %RSDs and RRFs within the validation criteria of ≤ 30 %RSD and ≥ 0.05 RRF ?

Samples Qualifications The feature of the feature	
Samples	
Associated Samples	
Finding RRF (Limit: >0.05)	
Finding %RSD (Limit: <30.0%)	
Compound 722	
Standard ID	
8 / 20 / 60 8 / 20 / 60	

LDC# 74140 +

VALIDATION FINDINGS WORKSHEET Continuing Calibration

Page: Reviewer:_ 2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B) Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

N/A

Was a continuing calibration standard analyzed at least once every 12 hours for each instrument? Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ? Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?

9/is/io 9 Jog65	ndard ID	Compound Z Z Z	Finding %D Finding RF (Limit: <25.0%) (Limit: >0.0 (Limit: >0.0 2 g)	Finding RRF (Limit: >0.05) 0 . 6 2 8 7	Associated Samples	Qualifications J M5 A (C)

#
40
4
#
LDC

VALIDATION FINDINGS WORKSHEET

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Page: o	Reviewer:	2nd Reviewer:
	Re	2nd Re

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

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

Was a method blank associated with every sample in this SDG?

Was a method blank analyzed at least once every 12 hours for each matrix and concentration? Was there contamination in the method blanks? If yes, please see the qualifications below. date: 9/9

Was under 19/9

A/N N/A

Conc. units: Wo /kz) N		Ä	Associated Samples:	nples:	A11	9	02)	
Compound	Blank ID				V ,	Sample Identification	ıtion		
N.B.	NB 80-31540 /3.A	(3-A)	۲	3	4	5	و		
Methylene chtoride LLL	0.595					N/ 14:0			
Acetone—— E	1.74	1.0/4	6,99	14 0.94 /4 0.85 /4 0.84 /4 0.82/4	n/ 58.0	6.84 /u	0,82/4	ē	
MMM	0.642			,	,	/	,		
		-							
CROI									

Blank analysis date: _ Conc. units:

Conc. units:		Associated Samples:
Compound	Blank ID	Sample Identification
Methylene chloride		
Acetone		
CROI		

All results were qualified using the criteria stated below except those circled.

Note: Common contaminants such as Methylene chloride, Acetone, 2-Butanone, Carbon disulfide and TICs 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".

LDC#: 24140 F1

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

1 of 1 Page: Reviewer:

2nd Reviewer:

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

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

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

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

%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	Compound (IS)	(RRF 50 std)	(RRF 50 std)	(Initial)	(Initial)		
~	ICAL	8/31/2010	Methylene chloride (IS1)	0.2426	0.2426	0.2516	0.2516	12.5	12.53
2	GC MSV J		Ethylbenzene (IS2)	1.3880	1.3880	1.3604	1.3604	6.2	6.17
3			1,1,2,2-TCA (IS3)	1.0214	1.0214	1.0017	1.0017	3.3	3.34
4									
5									
9									

Area IS	2512331	626482	1063598	
Area cpd	609464	869567	1086352	
Conc IS/Cpd	50/50	50/50	50/50	

ouc	MeCI2	Ethylbenzene	1,1,2,2-TCA
7		1.4889	1.0270
J.	0.3098	1.4234	1.0063
10	0.2607	1.3334	0.9683
20	0.2452	1.3421	0.9462
20	0.2426	1.3880	1.0214
100	0.2279	1.3234	1.0029
200	0.2231	1.2238	1.0401
×	0.2516	1.3604	1.0017
S	0.0315	0.0840	0.0335
_			

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.

Continuing Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Page: 1 of 1

JVG Reviewer:_ 2nd Reviewer:__

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

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

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

Ax = Area of compound

Ais = Area of associated internal standard Cis = Concentration of internal standard Cx = Concentration of compound,

0 * (ave. RRF - RRF)/ave. RRF	//(Ais)(Cx)
(ave. RRF - RRI	= (Ax)(Cis)/(Ais)(Cx)
ence = 100 * (ave. RRF - RRF)/ave.	RRF = (Ax)(Cis)/(Ais)(Cx)

					Reported	Recalculated	Reported	Recalculated
		O		Average RRF	RRF	RRF	۵%	Q%
#	Standard ID	Date	Compound (IS)	(Initial)	(CCV)	(ccv)		
-	30965	9/15/2010	Methylene chloride (IS1)	0.252	0.242	0.242	3.8	3.8
	GC MSV J		Ethylbenzene (IS2)	1.360	1.332	1.332	2.1	2.1
			(1,1,2,2-TCA (1S3)	1.002	0.950	0:950	5.1	5.1
2								
					•			
3								
			-					
				-				

	Ais				
CCV3	Ax				
	Ais				
CCV2	Ax				
	Ais	2988082	821735	1545395	
CCV1	Ax	723062	1094410	1468876	
	Cis/Cx	50/50	20/20	20/20	

LDC #: 24 140 +1

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:_	lof
Reviewer:	JVG
2nd reviewer:	<u>~</u>

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

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: # 6

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8	5-0	48.1	96	96	0,
Bromofluorobenzene		53.6	107	107	
1,2-Dichloroethane-d4		45	90	90	
Dibromofluoromethane	1	51.4	103	103	

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4					
Dibromofluoromethane					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4					
Dibromofluoromethane					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4		·			
Dibromofluoromethane					

Sample ID:

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Toluene-d8					
Bromofluorobenzene					
1,2-Dichloroethane-d4					
Dibromofluoromethane					

LDC#: 24140 F

Laboratory Control Sample Results Verification VALIDATION FINDINGS WORKSHEET

2nd Reviewer: Page: l of / Reviewer:__

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

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

% Recovery = 100 * SSC/SA

Where: SSC = Spiked sample concentration SA = Spike added

LCS/0 280-31540/12-A RPD = ILCSC - LCSDC I* 2/(LCSC + LCSDC) LCS ID:

	S	pike	Spiked S	ample	J 1	CS	31	l CSD	/SO	LCS/I CSD
Compound	\$ ₹	Added (VS) (KC)	Concentration (\sqrt{s}/k_c)	ncentration WS/kg)	Percent F	Percent Recovery	Percent	Percent Recovery	R	RPD
	SDI	l CSD	1.08	l CSD	Raportad	Recalc	Renorted	Receic	Reported	Recalculated
1,1-Dichloroethene	SD. 0	SB, U	625.0	50.9	110	CH	(02	101	8	8
Trichloroethene	_		53.6	8-67	601	[o]	S -	ا مر	٨	7
Benzene			23.52	49,9	601	107	00/	(B)	٨	1
Toluene			53.7	49.8	167	107	/ છ		7	7
Chlorobenzene	\searrow		52.55	8.94	(0)	(0)	94	b b .	80	×
				·						

Comments: Refer to Laboratory Control Sample findings worksheet for list of qualifications and associated samples when reported results do not agree within 10,0% of the recalculated results. LDC #: 24140 F1

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:	<u>lof l</u>
Reviewer:_	JVG
2nd reviewer:_	1

METHOD: GC/MS VOA (EPA SW 846 Method 8260B)

Y	N	N/A	
$\backslash \gamma /$	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,)(I,)(DF)

(A,)(RRF)(V,)(%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)

Relative response factor of the calibration standard. RRF

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

Df Dilution factor.

%S Percent solids, applicable to soils and solid matrices Example:

Sample I.D. # 6 . E

Conc. = $(\frac{21764}{302898})(0.252)(9.2978)(0.933)$ = 0.82 ug/kg

	only.	Γ '	T		1
			Reported Concentration	Calculated Concentration	
#	Sample ID	Compound		()	Qualification
		·			
		,			

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS Additional Sampling,

Henderson, Nevada

Collection Date:

August 30, 2010

LDC Report Date:

October 25, 2010

Matrix:

Soil/Water

Parameters:

Semivolatiles

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-6956-1

Sample Identification

BDT-1-S-10-8BPC BDT-1-S-5-10BPC BDT-1-S-5-12BPC

BDT-1-S-15-10BPC BDT-1-S-5-14BPC** BDT-1-S-15-12BPC BDT-1-S-5-8BPC BDT-1-S-15-14BPC** BDT-1-S-5-2BPC BDT-1-S-15-2BPC BDT-1-S-5-4BPC BDT-1-S-15-4BPC BDT-1-S-5-6BPC BDT-1-S-15-6BPC EB-08302010 BDT-1-S-15-8BPC SSAQ5-03-1BPCMS BDT-1-S-15-2BPC FD SSAQ5-03-1BPCMSD SSAQ5-03-10BPC** BDT-1-S-10-8BPCMS SSAQ5-03-1BPC BDT-1-S-10-8BPCMSD SSAQ5-03-5BPC BDT-1-S-5-14BPCMS BDT-1-S-10-10BPC BDT-1-S-5-14BPCMSD BDT-1-S-10-12BPC BDT-1-S-10-14BPC** BDT-1-S-10-2BPC BDT-1-S-10-4BPC BDT-1-S-10-6BPC

^{**}Indicates sample underwent Stage 4 review

Introduction

This data review covers 31 soil samples and one water sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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 (r²) were greater than or equal to 0.990.

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

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

V. Blanks

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

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
MB 280-31028/1-A	9/12/10	Dimethylphthalate	429 ug/Kg	BDT-1-S-15-10BPC BDT-1-S-15-12BPC BDT-1-S-15-14BPC** BDT-1-S-15-2BPC BDT-1-S-15-4BPC BDT-1-S-15-6BPC BDT-1-S-15-8BPC BDT-1-S-15-2BPC_FD SSAQ5-03-10BPC** SSAQ5-03-5BPC BDT-1-S-10-10BPC
MB 280-30961/1-A	9/10/10	Dimethylphthalate	47.2 ug/Kg	BDT-1-S-10-12BPC BDT-1-S-10-14BPC** BDT-1-S-10-2BPC BDT-1-S-10-4BPC BDT-1-S-10-6BPC BDT-1-S-5-10BPC BDT-1-S-5-12BPC BDT-1-S-5-14BPC** BDT-1-S-5-2BPC BDT-1-S-5-4BPC BDT-1-S-5-4BPC BDT-1-S-5-4BPC BDT-1-S-5-4BPC BDT-1-S-5-4BPC BDT-1-S-5-6BPC

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
BDT-1-S-15-14BPC**	Dimethylphthalate	57 ug/Kg	57U ug/Kg
BDT-1-S-15-2BPC	Dimethylphthalate	94 ug/Kg	94U ug/Kg
BDT-1-S-15-8BPC	Dimethylphthalate	89 ug/Kg	89U ug/Kg
BDT-1-S-15-2BPC_FD	Dimethylphthalate	120 ug/Kg	120U ug/Kg
SSAQ5-03-10BPC**	Dimethylphthalate	66 ug/Kg	66U ug/Kg
SSAQ5-03-1BPC	Dimethylphthalate	73 ug/Kg	73U ug/Kg
BDT-1-S-5-10BPC	Dimethylphthalate	91 ug/Kg	91U ug/Kg
BDT-1-S-5-14BPC**	Dimethylphthalate	110 ug/Kg	110U ug/Kg
BDT-1-S-5-8BPC	Dimethylphthalate	140 ug/Kg	140U ug/Kg
BDT-1-S-5-2BPC	Dimethylphthalate .	130 ug/Kg	130U ug/Kg
BDT-1-S-5-6BPC	Dimethylphthalate	230 ug/Kg	230U ug/Kg

Sample EB-08032010 was identified as an equipment blank. No semivolatile contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Compound	Concentration	Associated Samples
EB-08032010	8/30/10	Bis(2-ethyhexyl)phthalate	11 ug/L	SSAQ5-03-10BPC** SSAQ5-03-1BPC SSAQ5-03-5BPC

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

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

XII. Project Quantitation Limit

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

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-6956-1	All compounds reported below the PQL.	J (all detects)	А

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

XIII. 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 BDT-1-S-15-2BPC and BDT-1-S-15-2BPC_FD were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentrat	tion (ug/Kg)				
Compound	BDT-1-S-15-2BPC_FD	BDT-1-S-15-2BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Dimethylphthalate	94	120	-	26 (≤340)	-	-

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG 280-6956-1

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-6956-1	BDT-1-S-15-10BPC BDT-1-S-15-12BPC BDT-1-S-15-14BPC** BDT-1-S-15-15-2BPC BDT-1-S-15-6BPC BDT-1-S-15-6BPC BDT-1-S-15-6BPC BDT-1-S-15-8BPC BDT-1-S-10-10BPC SSAQ5-03-10BPC** SSAQ5-03-10BPC** SSAQ5-03-10BPC** SSAQ5-03-10BPC BDT-1-S-10-10BPC BDT-1-S-10-14BPC** BDT-1-S-10-14BPC** BDT-1-S-10-4BPC BDT-1-S-10-4BPC BDT-1-S-10-8BPC BDT-1-S-10-8BPC BDT-1-S-5-12BPC BDT-1-S-5-14BPC** BDT-1-S-5-14BPC** BDT-1-S-5-14BPC** BDT-1-S-5-4BPC BDT-1-S-5-4BPC BDT-1-S-5-4BPC BDT-1-S-5-8BPC BDT-1-S-5-6BPC	All compounds reported below the PQL.	J (all detects)	Α	Project Quantitation Limit (sp)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-6956-1

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
280-6956-1	BDT-1-S-15-14BPC**	Dimethylphthalate	57U ug/Kg	А	bl
280-6956-1	BDT-1-S-15-2BPC	Dimethylphthalate	94U ug/Kg	Α	bl
280-6956-1	BDT-1-S-15-8BPC	Dimethylphthalate	89U ug/Kg	Α	ы
280-6956-1	BDT-1-S-15-2BPC_FD	Dimethylphthalate	120U ug/Kg	Α	bl
280-6956-1	SSAQ5-03-10BPC**	Dimethylphthalate	66U ug/Kg	Α	bl
280-6956-1	SSAQ5-03-1BPC	Dimethylphthalate	73U ug/Kg	А	bl
280-6956-1	BDT-1-S-5-10BPC	Dimethylphthalate	91U ug/Kg	А	bl
280-6956-1	BDT-1-S-5-14BPC**	Dimethylphthalate	110U ug/Kg	Α	bl
280-6956-1	BDT-1-S-5-8BPC	Dimethylphthalate	140U ug/Kg	Α	bl
280-6956-1	BDT-1-S-5-2BPC	Dimethylphthalate	130U ug/Kg	А	ы
280-6956-1	BDT-1-S-5-6BPC	Dimethylphthalate	230U ug/Kg	А	bl

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Equipment Blank Data Qualification Summary - SDG 280-6956-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #:_	24140A2a	VALIDATION COMPLETENES
SDG #:_	280-6956-1	Stage 2B/4
Laborate	ory: Test America	•

Page: __bf_)
Reviewer: ______
2nd Reviewer: ______

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

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

	Validation Area		Comments
1.	Technical holding times	Ă	Sampling dates: 8/30 /10
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	shes in
IV.	Continuing calibration/ICV	A	5/2 CCV/10V = 25 }
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	A	ics /p
IX.	Regional Quality Assurance and Quality Control	N .	
X.	Internal standards	A	
XI.	Target compound identification	#	Not reviewed for Stage 2B validation.
XII.	Compound quantitation/CRQLs	A	Not reviewed for Stage 2B validation.
XIII.	Tentatively identified compounds (TICs)	N	Not reviewed for Stage 2B validation.
XIV.	System performance	Д	Not reviewed for Stage 2B validation.
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	b = 4.8
XVII.	Field blanks	SW	Eb = 26

Note:

A = Acceptable

ND = No compounds detected D = Duplicate

N = Not provided/applicable

R = Rinsate

TB = Trip blank

SW = See worksheet FB = Field blank

EB = Equipment blank

Validated Samples: ** Indicates sample underwent Stage 4 validation

r	Coil			Whter					
1	BDT-1-S-15-10BPC	S	11	SSAQ5-03-5BPC	21	BDT-1-S-5-14BPC**	٤	31	BDT-1-S-5-14BPCMS \$
2	BDT-1-S-15-12BPC	Ц	12	BDT-1-S-10-10BPC	22	BDT-1-S-5-8BPC		32	BDT-1-S-5-14BPCMSD
з 1	BDT-1-S-15-14BPC**	Ш	13	BDT-1-S-10-12BPC	23	BDT-1-S-5-2BPC		33 3	MB 280-30961/1-A
4	BDT-1-S-15-2BPC D		14	BDT-1-S-10-14BPC**	24	BDT-1-S-5-4BPC		34	MB 280 - 31028/1-A
5 1	BDT-1-S-15-4BPC		15	BDT-1-S-10-2BPC	25	BDT-1-S-5-6BPC	V	35	MB 280- 300 58/1-A
6	BDT-1-S-15-6BPC		16	BDT-1-S-10-4BPC	₂₆ 3	EB-08302010	W	36	
7 1	BDT-1-S-15-8BPC		17	BDT-1-S-10-6BPC	27	SSAQ5-03-1BPCMS	S	37	
8 ,	BDT-1-S-15-2BPC_FD /		18	BDT-1-S-10-8BPC	28	SSAQ5-03-1BPCMSD	T	38	
9)	SSAQ5-03-10BPC**		19	BDT-1-S-5-10BPC	29	BDT-1-S-10-8BPCMS	T	39	
10 (SSAQ5-03-1BPC		20	BDT-1-S-5-12BPC	30	BDT-1-S-10-8BPCMSD	1	40	

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: JW
2nd Reviewer: _____

Method: Semivolatiles (EPA SW 846 Method 8270C)

Validation Area 1 Technical holding times	Yes	No	NA	Findings/Comments
All technical holding times were met.				
Cooler temperature criteria was met.				
II GCMS hautmant peromanas sieżk w w 1865 w 1866 w				Becker St. Marie Carting Co.
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 sinital calibrations.				
Did the laboratory perform a 5 point calibration prior to sample analysis?	/	<u> </u>		
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?	1			
Were all percent relative standard deviations (%RSD) \leq 30% and relative response factors (RRF) \geq 0.05?	/			
IV Continuing calloration (1985)				The Late of the second
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?	/			·
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?	/			· ·
Were all percent differences (%D) ≤ 25% and relative response factors (RRF) ≥ 0.05?				
Va Hanks	2.00			CONSULT.
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.		_		
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?				
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?				
Village Beauty, Rend Centicles				
Was an LCS analyzed for this SDG?				

LDC#: 24/40 AZA

VALIDATION FINDINGS CHECKLIST

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		-		
DX Regional Cuality Assurance and Quality Consta				
Were performance evaluation (PE) samples performed?				
Were the performance evaluation (PE) samples within the acceptance limits?				
X incresoursans				CONTRACT
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 Taga compose bandication				think the recent the state of the
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?			~~~	
XIII someon equanidation/eng.				
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. Terratively identified composition (1856) % 200				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?				
Were relative intensities of the major ions within \pm 20% between the sample and the reference spectra?			1	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?				
System performance was found to be acceptable.		10.00		
Overall assessment of data was found to be acceptable.				
Field duplicate pairs were identified in this SDG.				
Target compounds were detected in the field duplicates.	1			
XVIII POR USINGE AND TO THE CONTROL OF THE CONTROL				
Field blanks were identified in this SDG.			Ti Stragen Vigo Vin	
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	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP, Banzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB, 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine⁴	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichiorophenol	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	חחח
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	
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.

241to A2a SDG #: LDC #:

VALIDATION FINDINGS WORKSHEET Blanks

Page: Reviewer: 2nd Reviewer:

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

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

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

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

Y/N N/A

Was the blank contaminated? If yes, please see qualification below. n date: 4/13/10 Blank analysis date: N/A

Blank extraction date: ⁹

7-1

(19)

73/W Sample Identification و 8 Associated Samples: Z ر م 4 3 27 424-4#7 A 1/85-015-084 BM Blank ID \mathcal{S} Compound Conc. units: 245/1296

Associated Samples Blank extraction date: 9 10 10 Blank analysis date: 9 10 Conc. units: Wa

13-

75

(19)

Sample Identification 7/062 2 23 136 SX MA 4 thers 7 = ∀) <u>a</u> 5 ¥-\$1828 MR 280-30941 Blank ID 429 3 Compound 7.

> to the SX.

5x Phthalates 2x all others

BLANKS2tronox.wpd

LDC# 24140 A24

VALIDATION FINDINGS WORKSHEET Field Blanks

Page: lof]

(be)

Were field blanks identified in this SDG?

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

Were target compounds detected in the field blanks? 130/10 Sampling date: Y N N/A N/A Blank units:

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

ሯ

ß

11 01 / Sample Identification Associated Samples:_ 中 × resents Ŧ Blank ID 在七千 Compound CRQL

Associated sample units: Blank units:

Sampling date:

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

Associated Samples:

Compound	Blank ID	Sample Identification	

5x Phthalates 2x All others

LDC#: 24140A2a

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page:_	<u> </u>
Reviewer:	\mathcal{M}
2nd Reviewer:	

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

YN NA

Were field duplicate pairs identified in this SDG?

N NA

Were target analytes detected in the field duplicate pairs?

Compound Name	Conc (ug/Kg)	RPD	Diff	Diff Limits	Quals
Compound Nume	4	8	(≤50%)			(Parent Only)
Dimethylphthalate	94	120		26	≤340	

V:\FIELD DUPLICATES\24140A2a.wpd

LDC# 24/40 A 22

VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

Page: 1 of Y Reviewer: JVG

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

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

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

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

 $A_x = Area of Compound$

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

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

X = Mean of the RRFs

			The second secon							
					Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration			RRF	RRF	Average RRF	Average RRF	%RSD	%RSD
#	Standard ID Date	Date	Compound (Internal Standard)	ard)	(50 std)	(50 std)	(Initial)	(Initial)		
-	ICAL	9/13/2010 Phenol		(181)	1.8397	1.8397	1.7733	1.7733	5.9	5.92
	MSS B	·	Naphthalene (I	(182)	1.0767	1.0767	1.0396	1.0396	10.0	96.6
			Fluorene (I	(183)	1.3777	1.3777	1.3051	1.3051	11.6	11.56
			Hexachlorobenzene (13	(184)	0.2406	0.2406	0.2343	0.2343	6.0	6.03
			nthalate	(185)	0.7243	0.7243	0.6681	0.6681	9.7	9:69
			Benzo(g,h,i)perylene (1S	(186)	1.1315	1.1315	1.0938	1.0938	3.8	3.80

Conc	Phenol	Naphthalene	Fluorene	Hexachlorob	bis(2-eh)phtha	Benzo(g,h,i)per
4.00	1.8394	1.1419	1.4534	0.2371	0.5406	1.0227
10.00	1.8341	1.1290	1.4363	0.2472	0.6101	1.1141
20.00	1.8662	1.1384	1.4299	0.2521	0.6785	1.1201
50.00	1.8397	1.0767	1.3777	0.2406	0.7243	1.1315
80.00	1.8227	1.0555	1.3340	0.2401	0.7348	1.1412
120.00	1.7552	0.9806	1.2121	0.2281	0.7081	1.0957
00.09	1.6515	0.9246	1.1457	0.2180	6989.0	1.0744
00.002	1.5775	0.8701	1.0514	0.2113	0.6617	1.0506
= ×	1.7733	1.0396	1.3051	0.2343	0.6681	1.0938
S	0.1049	0.1037	0.1509	0.0141	0.0647	0.0415

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# 24140 A22

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

JVG ਰ 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:

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

average RRF = sum of the RRFs/number of standards

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

A_{is} = Area of associated internal standard \hat{C}_{is} = Concentration of internal standard

%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)	dard)	(50 std)	(50 std)	(Initial)	(Initial)		
1	ICAL	8/27/2010	8/27/2010 1,4-Dioxane	(181)	0.5926	0.5926	0.5795	0.5795	3.7	3.74
	MSSK		Naphthalene	(182)	1.0571	1.0571	1.0015	1.0015	8.9	8.92
			Fluorene	(183)	1.3180	1.3180	1.2421	1.2421	7.9	7.87
			Hexachlorobenzene	(184)	0.2424	0.2424	0.2313	0.2313	6.1	6.04
			Bis(2-ethylhexyl)phthalate ((185)	0.6574	0.6574	0.6075	0.6075	7.1	7.14
			Benzo(g,h,i)perylene	(186)	1.1231	1.1231	1.0199	1.0199	7.5	7.53

Area IS	172314	669515	393544	662745	759660	781265
Area cpd	127636	884641	648342	200827	624253	1096793
onc IS/Cpd	40/20	40/20	40/20	40/20	40/20	40/20

Conc	1,4-Dioxane	Naphthalene	Fluorene	Hexachlorob	Bis(2-eh)phtha	Benzo(g,h,i)per
4.00	0.5778	1.1018	1.3240		0.5199	0.9595
10.00	0.6003	1.0722	1.3327	0.2454	0.5982	1.0450
20.00	0.6103	1.0714	1.3075	0.2448	0.6428	1.0900
50.00	0.5926	1.0571	1.3180	0.2424	0.6574	1.1231
80.00	0.5842	1.0008	1.2564	0.2335	0.6408	1.0769
120.00	0.5678	0.9489	1.1901	0.2252	0.6113	1.0108
160.00	0.5547	0.8964	1.1248	0.2168	0.6051	0.9476
200.00	0.5485	0.8636	1.0833	0.2109	0.5841	0.9066
×	0.5795	1.0015	1.2421	0.2313	0.6075	1.0199
S	0.0217	0.0893	0.0977	0.0140	0.0434	0.0768

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.

Continuing Calibration Results Verification VALIDATION FINDINGS WORSHEET

Page _ of_ Reviewer:_ 2nd Reviewer:

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

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

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)	rence IS)	(Initial RRF)	(CC RRF)	(CC RRF)	%D	%D
-	K6280	09/13/10	1,4-Dioxane	(IS1)	0.5795	0.6017	0.6017	3.8	3.8
			Naphthalene	(182)	1.0015	1.0791	1.0791	7.7	7.7
			Fluorene	(183)	1.2421	1.3344	1.3344	7.4	7.4
	-		Hexachlorobenzene	e (IS4)	0.2313	0.2388	0.2388	3.3	3.3
			Bis(2-ethylhexyl)phthalate	thalate (IS5)	0.6075	0.6965	0.6965	14.7	14.7
			Benzo(g,h,i)perylene	(IS6)	1.0199	1.1030	1.1030	8.1	8.1
	-		Samples 14, 21 analyzed right after ICAL	alyzed right after IC	.AL				

Compound (Reference IS)	(Concentration	Area Cpd	Area IS
		(IS/Cpd)		
1,4-Dioxane	(IS1)	40/80	245887	204325
Naphthalene	(182)	40/80	1708708	191701
Fluorene	(183)	40/80	1256497	470807
Hexachlorobenzene	(184)	40/80	374199	783406
Bis(2-ethylhexyl)phthalate	(185)	40/80	1138942	817609
Benzo(g,h,i)perylene	(186)	40/80	1820517	825293

LDC #: 24/40 A 29

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:_	101 1
Reviewer:	SVE
2nd reviewer:	1~

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	10	61.0	61	6)	0,
2-Fluorobiphenyl		68.5	69	6 9	
Terphenyl-d14		76.5	76	76	
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID:

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

Sample ID:

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

LDC #: 24140 A24 SDG #:

Matrix Spike/Matrix Spike Duplicates Results Verification VALIDATION FINDINGS WORKSHEET

Page: 2nd Reviewer:_ Reviewer:_

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

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

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

Where:

SC = Sample concentation

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

SSC = Spiked sample concentration SA = Spike added

MSD = Matrix spike duplicate percent recovery

MS/MSD samples:

%

MS = Matrix spike percent recovery

MS/MSD Matrix Spike Duplicate Matrix Spike Spiked Sample Concentration Sample Concentration Spike Added

٦	<u>.</u>	55 /2 	(M3/R1)	አ)	1/2 /kg)	Percent Recovery	Recovery	Percent Recovery	ecovery	RPD)
	MS	MSD	o l	MS	MSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
N-Nitroso-di-n-propylamine											
	2840 2830	2830	0	2270	23.50	₹ 8	12	80	80	E0'a	20.0
	38 4°	2830	}	2440	2440 2420	38	98	85	85	0.8	8 0
	-										
<u> </u>											
:									_		_

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.

110 #: 24140 # 24

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification VALIDALION FINDINGS WORKSHEEL

Page: Lof L Reviewer:_

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 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:

19606 182 2

	ldS	ike	Sp	Spike		CS	3	LCSD	 	CS/I CSD
Compound	Added (MS /kg	ded (F.)	Concei (יץ	Concentration	Percent Recovery	lecovery	Percent Recovery	Recovery	RF	RPD
	l CS) I CSD	1.08) I CSD	Reported	Racaic	Reported	Recalc	Reported	Recalculated
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene	2640	NA	1130	NA	73	73				
Pentachlorophenol										
Pyrene	2640	_	1190	•	X	SL				
			-							

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#: 24/40 xx

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

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	
Reviewer:_	M
2nd reviewer:	.,

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

Y	N	N/A
Y/	N	N/A
(– 7		

%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?

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

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

t_x = Amount of internal standard added in nanograms (ng)

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

V_t = Volume of extract injected in microliters (ul)

V_t = Volume of the concentrated extract in microliters (ul)

Df = Dilution Factor.

Percent solids, applicable to soil and solid matrices only.

Example:

Sample I.D. # 3, EEE

Conc. = (49997)(40)(600)(1000)(1

2.0	= Factor of 2 to accoun	t for GPC cleanup			
#	Sample ID	Compound	Reported Concentration ()	Calculated Concentration ()	Qualification
					· · · · · · · · · · · · · · · · · · ·
		•			
		: :			

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS Additional Sampling,

Henderson, Nevada

Collection Date:

August 31, 2010

LDC Report Date:

October 25, 2010

Matrix:

Soil/Water

Parameters:

Semivolatiles

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-6983-1

Sample Identification

RSAK2-1BPC RSAK2-3BPC RSAK2-5BPC RSAK2-8BPC RSAK2-10BPC** SSAI3-07-1BPC SSAI3-07-3BPC SSAI3-07-5BPC SSAI3-07-8BPC SSAI3-07-8BPC_FD SSAI3-07-10BPC SSAK4-02-0.00BPC SSAQ5-07-1BPC SSAQ5-07-5BPC SSAQ5-07-10BPC** EB-08312010 RSAK2-5BPCMS RSAK2-5BPCMSD SSAQ5-07-1BPCMS

SSAQ5-07-1BPCMSD

^{**}Indicates sample underwent Stage 4 review

Introduction

This data review covers 19 soil samples and one water sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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.

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

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

V. Blanks

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

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
MB 280-31029/1-A	9/12/10	Dimethylphthalate .	190 ug/Kg	RSAK2-1BPC RSAK2-3BPC RSAK2-5BPC RSAK2-8BPC RSAK2-10BPC** SSAI3-07-1BPC SSAI3-07-3BPC SSAI3-07-8BPC SSAI3-07-8BPC SSAI3-07-8BPC_FD SSAI3-07-10BPC

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
RSAK2-1BPC	Dimethylphthalate	180 ug/Kg	180U ug/Kg
RSAK2-3BPC	Dimethylphthalate	69 ug/Kg	69U ug/Kg
RSAK2-5BPC	Dimethylphthalate	140 ug/Kg	140U ug/Kg
RSAK2-8BPC	Dimethylphthalate	180 ug/Kg	180U ug/Kg
RSAK2-10BPC**	Dimethylphthalate	160 ug/Kg	160U ug/Kg
SSAI3-07-1BPC	Dimethylphthalate	290 ug/Kg	290U ug/Kg
SSAI3-07-3BPC	Dimethylphthalate	220 ug/Kg	220U ug/Kg
SSAI3-07-5BPC	Dimethylphthalate	98 ug/Kg	98U ug/Kg
SSAI3-07-8BPC	Dimethylphthalate	350 ug/Kg	350U ug/Kg
SSAI3-07-8BPC_FD	Dimethylphthalate	100 ug/Kg	100U ug/Kg
SSAI3-07-10BPC	Dimethylphthalate	160 ug/Kg	160U ug/Kg
SSAK4-02-0.00BPC	Dimethylphthalate	190 ug/Kg	190U ug/Kg
SSAQ5-07-1BPC	Dimethylphthalate	130 ug/Kg	130U ug/Kg
SSAQ5-07-5BPC	Dimethylphthalate	150 ug/Kg	150U ug/Kg
SSAQ5-07-10BPC**	Dimethylphthalate	150 ug/Kg	150U ug/Kg

Sample EB-08312010 was identified as an equipment blank. No semivolatile contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Compound	Concentration	Associated Samples
EB-08312010	8/31/10	Bis(2-ethylhexyl)phthalate	10 ug/L	All soil samples in SDG 280-6983-1

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

Sample	Compound	Reported Concentration	Modified Final Concentration	
RSAK2-3BPC	Bis(2-ethylhexyl)phthalate	47 ug/Kg	47U ug/Kg	

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) and relative percent differences (RPD)were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

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

XII. Project Quantitation Limit

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

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-6983-1	All compounds reported below the PQL.	J (all detects)	А

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

XIII. 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 SSAI3-07-8BPC and SSAI3-07-8BPC_FD were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentration (ug/Kg)					
Compound	SSAI3-07-8BPC	SSAI3-07-8BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Bis(2-ethylhexyl)phthalate	530	1000	61 (≤50)	•	J (all detects)	А
Dimethylphthalate	350	100	-	250 (≤350)	. -	
Fluoranthene	340U	38	-	302 (≤340)	-	-
Hexachlorobenzene	1300	10000	_	8700 (≤350)	J (all detects)	Α
Octachlorostyrene	320	2200	_	1880 (≤350)	J (all detects)	Α
Phenanthrene	17	110	_	93 (≤350)	-	-
Pyrene	340U	18	-	322 (≤340)	-	•

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG 280-6983-1

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-6983-1	RSAK2-1BPC RSAK2-3BPC RSAK2-5BPC RSAK2-8BPC RSAK2-10BPC** SSAI3-07-1BPC SSAI3-07-3BPC SSAI3-07-8BPC SSAI3-07-8BPC_FD SSAI3-07-10BPC SSAK4-02-0.00BPC SSAK4-02-0.00BPC SSAQ5-07-1BPC SSAQ5-07-10BPC** EB-08312010	All compounds reported below the PQL.	J (all detects)	Α	Project Quantitation Limit (sp)
280-6983-1	SSAI3-07-8BPC SSAI3-07-8BPC_FD	Bis(2-ethylhexyl)phthalate	J (all detects)	А	Field duplicates (RPD) (fd)
280-6983-1	SSAI3-07-8BPC SSAI3-07-8BPC_FD	Hexachlorobenzene Octachlorostyrene	J (all detects) J (all detects)	А	Field duplicates (Difference) (fd)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-6983-1

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
280-6983-1	RSAK2-1BPC	Dimethylphthalate	180U ug/Kg	А	Ы
280-6983-1	RSAK2-3BPC	Dimethylphthalate	69U ug/Kg	А	bl
280-6983-1	RSAK2-5BPC	Dimethylphthalate	140U ug/Kg	А	bl
280-6983-1	RSAK2-8BPC	Dimethylphthalate	180U ug/Kg	А	bl
280-6983-1	RSAK2-10BPC**	Dimethylphthalate	160U ug/Kg	А	bl
280-6983-1	SSAI3-07-1BPC	Dimethylphthalate	290U ug/Kg	Α	bl
280-6983-1	SSAI3-07-3BPC	Dimethylphthalate	220U ug/Kg	А	bl
280-6983-1	SSAI3-07-5BPC	Dimethylphthalate	98U ug/Kg	Α	bl
280-6983-1	SSAI3-07-8BPC	Dimethylphthalate	350U ug/Kg	А	bl
280-6983-1	SSAI3-07-8BPC_FD	Dimethylphthalate	100U ug/Kg	А	bl
280-6983-1	SSAI3-07-10BPC	Dimethylphthalate	160U ug/Kg	А	bl
280-6983-1	SSAK4-02-0.00BPC	Dimethylphthalate	190U ug/Kg	А	bl

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
280-6983-1	SSAQ5-07-1BPC	Dimethylphthalate	130U ug/Kg	. А	bl
280-6983-1	SSAQ5-07-5BPC	Dimethylphthalate	150U ug/Kg	А	bl
280-6983-1	SSAQ5-07-10BPC**	Dimethylphthalate	150U ug/Kg	Α	bl

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Equipment Blank Data Qualification Summary - SDG 280-6983-1

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
280-6983-1	RSAK2-3BPC	Bis(2-ethylhexyl)phthalate	47U ug/Kg	Α	be

Tronox Northgate Henderson

LDC #:	24140B2a	VALIDATION COMPLETENESS WORKSHEET	
SDG #:_	280-6983-1	Stage 2B/4	
Laborato	rv: Test America	-	

Date:	10/20 /r
Page:_	<u>\</u>
Reviewer:	
2nd Reviewer:	V

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
ı.	Technical holding times	Α	Sampling dates: 8/31 //o
11.	GC/MS Instrument performance check	A	,
III.	Initial calibration	Á	To RSD you
IV.	Continuing calibration/ICV	Á	COV/N = 25 }
V.	Blanks	SM	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	Α	
VIII.	Laboratory control samples	A	ics /D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	Α	Not reviewed for Stage 2B validation.
XII.	Compound quantitation/CRQLs	A	Not reviewed for Stage 2B validation.
XIII.	Tentatively identified compounds (TICs)	N	Not reviewed for Stage 2B validation.
XIV.	System performance	Á	Not reviewed for Stage 2B validation.
XV.	Overall assessment of data	A	
XVI.	Field duplicates	ZM,	D = 9,10
XVII.	Field blanks	Sh	FB = 16

Note:

A = Acceptable

N = Not provided/applicable SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate TB = Trip blank

EB = Equipment blank

** Indicates sample underwent Stage 4 validation Validated Samples:

	361	<u> </u>	NN	e/				
1	RSAK2-1BPC	<u>Ş</u>	11	SSAI3-07-10BPC S	† 1 21 1	MB 280-31029/-	3 1	
2	RSAK2-3BPC		12	SSAK4-02-0.00BPC	22 7	MB 280- 30058/1-A	32	
3	RSAK2-5BPC		13	SSAQ5-07-1BPC	23	,	33	
4	RSAK2-8BPC		14	SSAQ5-07-5BPC	24		34	
5	RSAK2-10BPC**		15	SSAQ5-07-10BPC**	25		35	
6	SSAI3-07-1BPC		16	EB-08312010 h)	26		36	
7	SSAI3-07-3BPC		17	RSAK2-5BPCMS \$	27		37	
8	SSAI3-07-5BPC		18	RSAK2-5BPCMSD	28		38	
9	SSAI3-07-8BPC <i>0</i>		19	SSAQ5-07-1BPCMS	29		39	
10	SSAI3-07-8BPC_FD b	1	20	SSAQ5-07-1BPCMSD	30		40	

VALIDATION FINDINGS CHECKLIST

Page: _\ of _2 Reviewer: _\ \forall V\/\ 2nd Reviewer: _\ _

Method: Semivolatiles (EPA SW 846 Method 8270C)

Validation Area	Yes	No	NA	Findings/Comments
i Technical holding times				
All technical holding times were met.				
Cooler temperature criteria was met.				
ii) GCMS instrument performance classk				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	/			
Were all samples analyzed within the 12 hour clock criteria?		2000 SAS		
III. Initial existeration				
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?	M	_		
Did the initial calibration meet the curve fit acceptance criteria of ≥ 0.990?	W			
Were all percent relative standard deviations (%RSD) \leq 30% and relative response factors (RRF) \geq 0.05?	/		·	
IV. Continuing calibration				
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?				
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?				
Were all percent differences (%D) ≤ 25% and relative response factors (RRF) ≥ 0.05?				
Verbanden betrette der State verbanden betrette der State verbanden betrette der State verbanden betrette der				
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.		/		
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?				
un variable market de la companya d				
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.	/	<u>,</u>		
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?				
vin kiranga sa sa kangga kangga sa				
Was an LCS analyzed for this SDG?				

LDC #: 24140 B29

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: 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?				
X Regional Cuality Assurance and Ocality Cosmi				
Were performance evaluation (PE) samples performed?				
Were the performance evaluation (PE) samples within the acceptance limits?		211 221 128277 1 1 1 1 1 1 1 1		
X memacancinos				GOOD OF THE STATE OF THE STATE
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, Targer to impound identification in the last of th				第 262条的制度的数据。254位
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. Composind quaritication/CRCLs: 18. 4.5. 38. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4.				
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 Tertalikely identified compainds (IKS).				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?			/	
Were relative intensities of the major ions within \pm 20% between the sample and the reference spectra?			1	
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?				
NVS clause temperatures				S ERVICE SERVICE SERVICES
System performance was found to be acceptable.		-	KONA METAL BI	
Overall assessment of data was found to be acceptable.				
Field duplicate pairs were identified in this SDG.	,			
Target compounds were detected in the field duplicates.			en en som de	
National Action of the Control of th		1		
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. Banzo(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-Nitropheno!*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachiorobutadiene™	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-dl-n-propylamine⁴	Y. 2,4,6-Trichlorophenoi**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR, Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	00. 4-Nitroanlline	DDD. Chrysene	SSS, Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TT.
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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VALIDATION FINDINGS WORKSHEET

2nd Reviewer:__ Reviewer:_

Blanks

Prease see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". METHOD: GC/MS BNA (EPA SW 846 Method 8270C) Y Y N/A N/A

Was a method blank analyzed for each matrix?

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

Y N/A

YN N/A Was the blank contaminated? If yes, please see qualification below. Blank extraction date: 9/12/p Blank analysis date:

4=

(P)

	Conc. units: VG /kc			Associa	Associated Samples:						
	Compound	Blank ID				Ø	Sample Identification	tion			
ž		NB 280-3 029/-A	029/-A	1	8	3	+	3	٩	7	8
3	25	190		180 /y	h/ 63	140/4	h/081	160/4	nobe	220 /4	98 /V
:											
	Blank extraction date:	Blank analysis date:	ysis date:		Same	Same as above	7				- : :
	Conc. units:			Associa	Associated Samples:						
	Compound	Blank ID				S	Sample Identification	ıtion			
		MB286- 3 1029/1-1	A-1/201	9	91	lı	17	13	14	15	
	3	196	•	450 /y	100 /4	h/ 091	190/4	130/4	hy osi	n/ as 1	
								-			

5x Phthalates 2x all others

LDC #: 24140 bx

VALIDATION FINDINGS WORKSHEET Field Blanks

Page: viewer: viewer:	5	36	2	
Pa Reviev 2nd Reviev	2000	Reviewer:	2nd Reviewer:	

Were field blanks identified in this SDG? METHOD: GC/MS BNA (EPA SW 846 Method 8270C) Y N N/A

Were target compounds detected in the field blanks?

Blank units: What Associated sample units:

Sampling date: 8

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

44 Sample Identification W Associated Samples: N_D hither others CAIL 47 Blank ID 0 ڡ Compound CRQL

Associated sample units: Blank units:

Sampling date:

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

Associated Samples:

isia ciamina per (cii de ciio) i isia ciamina i misare) ciio:		Carolina Carolina	השטטטמווושם השומים	.co.		
Compound	Blank ID		Sampl	Sample Identification		
				Add a control of the		
					1	
CRQL						

5x Phthalates 2x All others

FBLKASC2tronox.wpd

24140 DX LDC#:

VALIDATION FINDINGS WORKSHEET

Surrogate Recovery

× o o

Reviewer: Page:

2nd Reviewer.

Please see qualification below for all questions answered "N". Not applicable questions are identified as "N/A". Were percent recoveries (%R) for surrogates within QC limits? METHOD: GC/MS BNA (EPA SW 846 Method 8270C) Y (N/A/A

If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?

Y N N/A N N/A

If any %R was less than 10 percent, was a reanalysis performed to confirm %R?

-
<u>QC Limits (Water)</u> 35-114 35-114 33-116 S6 (TBP) = 2,4,6-Tribromophenol 33-141 S7 (2CP) = 2-Chlorophenol-d4 S8 (DCB) = 1,2-Dichlorobenzene-d4

LDC#: 24140B2a

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page	: <u>l</u> ofl
Reviewer:	NG
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M	ET	HOD:	GC/MS	S	V	ŊΑ	٠ (EPA	SW	846	3	Me	tho	t	82	270	OC
· 、	١.		1 4 /	~										_	_		_

<u>Y N NA</u> Y/N NA

C/MS SVOA (EPA SW 846 Method 8270C)
Were field duplicate pairs identified in this SDG?
Were target analytes detected in the field duplicate pairs?

Compound Name	Conc	(ug/Kg)	RPD	Dist	Diff Limits	
Compound Name	9	10	(≤50%)	Diff	DIIT LIMITS	Quals (Parent Only)
Bis(2-ethylhexyl)phthalate	530	1000	61			Jdet/A (fd)
Dimethyl phthalate	350	100		250	≤350	
Fluoranthene	340U	38		302	≤340	
Hexachlorobenzene	1300	10000		8700	≤350	Jdet/A (fd)
Octachlorostyrene	320	2200		1880	≤350	Jdet/A (fd)
Phenanthrene	17	110		93	≤350	
Pyrene	340U	18		322	≤340	

V:\FIELD DUPLICATES\24140B2a.wpd

LDC# 24140 Pra

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

1 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:

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

average RRF = sum of the RRFs/number of standards

 $C_x = Concentration of compound,$

A_{is} = Area of associated internal standard

S= Standard deviation of the RRFs, A_x = Area of Compound %RSD = 100 * (S/X)

 $C_{\rm is}$ = Concentration of internal standard X = Mean of the RRFs

Recalculated	%RSD		5.92	96.6	11.56	6.03	69.6	3.80	
Reported	%RSD		5.9	10.0	11.6	6.0	9.7	3.8	
Recalculated	Average RRF	(Initial)	1.7733	1.0396	1.3051	0.2343	0.6681	1.0938	
Reported	Average RRF	(Initial)	1.7733	1.0396	1.3051	0.2343	0.6681	1.0938	
Recalculated	RRF	(50 std)	1.8397	1.0767	1.3777	0.2406	0.7243	1.1315	
Reported	RRF	(50 std)	1.8397	1.0767	1.3777	0.2406	0.7243	1.1315	
		ndard)	(IS1)	(182)	(IS3)	(IS4)	(185)	(186)	
		Compound (Internal Standard)	Phenol	Naphthalene	Fluorene	Hexachlorobenzene	Bis(2-ethylhexyl)phthalate	Benzo(g,h,i)perylene	
	Calibration	Date	9/13/2010 Phenol						
,		Standard ID Date	ICAL	MSS B					
		#	-						

Area IS	252134	994488	570870	965177	1063669	1055901
Area cpd	579802	1338510	983140	290330	963068	1493397
nc IS/Cpd	40/20	40/20	40/20	40/20	40/20	40/20

Conc	Phenol	Naphthalene	Fluorene	Hexachlorob	bis(2-eh)phtha	Benzo(g,h,i)per
4.00	1.8394	1.1419	1.4534	0.2371	0.5406	1.0227
10.00	1.8341	1.1290	1.4363	0.2472	0.6101	1.1141
20.00	1.8662	1.1384	1.4299	0.2521	0.6785	1.1201
50.00	1.8397	1.0767	1.3777	0.2406	0.7243	1.1315
80.00	1.8227	1.0555	1.3340	0.2401	0.7348	1.1412
120.00	1.7552	0.9806	1.2121	0.2281	0.7081	1.0957
160.00	1.6515	0.9246	1.1457	0.2180	0.6863	1.0744
200.00	1.5775	0.8701	1.0514	0.2113	0.6617	1.0506
×	1.7733	1.0396	1.3051	0.2343	0.6681	1.0938
S	0.1049	0.1037	0.1509	0.0141	0.0647	0.0415
•						

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

VALIDATION FINDINGS WORSHEET Continuing Calibration Results Verification

Page 1 of 1 Reviewer: JVG 2nd Reviewer:

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

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

Where:

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

ave. RRF

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

Cx = Concentration of compound

ave. RRF = initial calibration average RRF Ax = Area of compound Ax = Area of associated internal s

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

							Î	<u> </u>	
Recalculated %D	3.7	5.2	4.4	3.5	14.1	6.1			
Reported %D	3.7	5.2	4.3	3.5	14.1	6.1			
Recalculated (CC RRF)	1.839	1.094	1.362	0.243	0.762	1.160			
Reported (CC RRF)	1.839	1.094	1.362	0.243	0.762	1.160			
Average RRF (Initial RRF)	1.773	1.040	1.305	0.234	0.668	1.094			
	(181)	(IS2)	(IS3)	(184)	(185)	(981)			
Compound (Reference IS)	Phenol	Naphthalene	Fluorene	Hexachlorobenzene	Bis(2-ethylhexyl)phthalate (IS5)	Benzo(g,h,i)perylene			
Calibration Date	09/17/10								
Standard ID	B0491								
#	1								

Compound (Reference IS)	(Concentration	Area Cpd	Area IS
		(IS/Cpd)		
1,4-Dioxane	(IS1)	40/80	815775	221784
Naphthalene	(182)	40/80	1926448	008088
Fluorene	(183)	40/80	1395413	512329
Hexachlorobenzene	(184)	40/80	415799	857059
Bis(2-ethylhexyl)phthalate	(185)	40/80	1380599	905803
Benzo(g,h,i)perylene	(186)	40/80	2086999	899230

LDC#: 24140 B29

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:	_lof_1_
Reviewer:_	1/4
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: # 5

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	101	G 7. 6	68	- ¢ 8	0
2-Fluorobiphenyl		69.)	69	6 9	
Terphenyl-d14	J	72.9	73	75	
Phenol-d5	150	104.9	70	70	
2-Fluorophenol		100.1	67	67	
2,4,6-Tribromophenol	V	96.2	64	64	
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					

4140 Bra SDG #: See Cover LDC #:

Matrix Spike/Matrix Spike Duplicates Results Verification VALIDATION FINDINGS WORKSHEET

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

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

The percent recoveries (%R) and Relative Percent Difference (RPD) of the matrix spike and matrix spike duplicate were recalculated for the compounds identified below

% 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:

Recalculated eQ. MS/MSD RPD Reported Y 7 Matrix Spike Duplicate Recalc Percent Recovery 77 7 Reported 77 9 Recalc Percent Recovery 16 Matrix Spike Reported 67 76 1990 5/10 MSD Spiked Sample Concentration 1840 8000 Sample Concentration 0 2750 2750 MSD Spike Added 2740 2740 N-Nitroso-di-n-propylamine 4-Chloro-3-methylphenol Compound Pentachlorophenol Acenaphthene Phenol Pyrene

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

12-20 DE LUC #:

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

7/6 Page: __lof__ Reviewer:_

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 duplicate were recalculated for the compounds identified below using the following calculation:

% Recovery = 100 * (SC/SA

SSC = Spike concentration SA = Spike added Where:

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

LCS/LCSD samples: LCS 080 - 310 24

	Ś	pike	zy.	Spike	7	CS	9	CSD	1/53/1	CS/I CSD
Compound	(m)	Added (17) (2)	Conce (45)	Concentration	Percent Recovery	Recovery	Percent Recovery	Recovery	RPD	Q
	108	l CSD	1.08	l CSD	Reported	Recalc	Reported	Receic	Panortad	Docalculator
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene	2600	ľλ	1980	N.A	76	75				
Pentachlorophenol										
Pyrene	22		786		83	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#: 74/40 8 m

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	lof1_
Reviewer:	14
2nd reviewer:	

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

Percent solids, applicable to soil and solid matrices only.

$\left(\mathbf{Y}\right)$	N	N/A
V	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	ntratio	$n = (A_{.})(I_{.})(V_{.})(DF)(2.0)$ $(A_{.})(RRF)(V_{.})(V_{.})(%S)$	Example:
A _x	=	Area of the characteristic ion (EICP) for the compound to be measured	Sample I.D. # 5 , EEE:
A_{is}	=	Area of the characteristic ion (EICP) for the specific internal standard	
i,	=	Amount of internal standard added in nanograms (ng)	Conc. = $(65347)(40)(1m)(100)($ $(94898)^{(1)}(0.668)^{(1)}(30.808)^{(1)}(0.919)^{(1)}$
V _o	=	Volume or weight of sample extract in milliliters (ml) or grams (g).	17 87 87 0.668 / 20.80 g 0.919
V,	=	Volume of extract injected in microliters (ul)	= 190 ug/Ez
V_{ι}	=	Volume of the concentrated extract in microliters (ul)	d
Df	=	Dilution Factor.	

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

		·			
	WALL				
					· · · · · · · · · · · · · · · · · · ·
				·	

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS Additional Sampling,

Henderson, Nevada

Collection Date:

September 2 through September 3, 2010

LDC Report Date:

October 25, 2010

Matrix:

Soil/Water

Parameters:

Semivolatiles

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-7103-1

Sample Identification

SSAK6-05-4BPC SSAK6-05-4BPC FD SSAK6-05-6BPC SSAK6-05-8BPC SSAK6-05-10BPC SSAM7-06-1BPC SSAM7-06-2BPC SSAM7-06-3BPC SSAN7-05-1BPC SSAN7-05-2BPC SSAN7-05-3BPC SSAN7-05-1BPC FD SSAM5-04-10BPC** SSAM5-04-1BPC SSAM5-04-5BPC SSAM5-04-5BPC FD SSAK8-08-1BPC SSAK8-8-3BPC** SSAK8-08-3BPC FD SSAN7-04-1BPC

SSAN7-04-2BPC SSAN7-04-3BPC SSAM7-07-1BPC SSAM7-07-2BPC SSAM7-07-3BPC** SSAM7-07-3BPC_FD EB-09022010 SSAK6-05-10BPCMS SSAK6-05-10BPCMSD SSAM7-06-3BPCMS

SSAM7-06-3BPCMSD

^{**}Indicates sample underwent Stage 4 review

Introduction

This data review covers 30 soil samples and one water sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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 with the following exceptions:

Sample	Compound	Total Days From Sample Collection Until Extraction	Required Holding Time (in Days) From Sample Collection Until Extraction	Flag	A or P
SSAK6-05-10BPC SSAK6-05-10BPCMS SSAK6-05-10BPCMSD	All TCL compounds	18	14	J- (all detects) UJ (all non-detects)	Р

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.

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

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

V. Blanks

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

Sample EB-09022010 was identified as an equipment blank. No semivolatile contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Compound	Concentration	Associated Samples
EB-09022010	9/2/10	Benzo(g,h,i)perylene	0.74 ug/L	SSAM7-06-1BPC SSAM7-06-2BPC SSAM7-06-3BPC SSAN7-05-1BPC SSAN7-05-1BPC SSAN7-05-1BPC SSAN7-05-1BPC SSAM5-04-10BPC** SSAM5-04-10BPC SSAM5-04-1BPC SSAM5-04-1BPC SSAM5-04-1BPC SSAN7-04-1BPC SSAN7-04-1BPC SSAN7-04-1BPC SSAN7-04-3BPC SSAM7-07-1BPC SSAM7-07-3BPC-FD

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

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

XII. Project Quantitation Limit

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

Sample	Compound	Finding	Flag	A or P
SSAN7-05-1BPC SSAN7-05-2BPC SSAN7-05-1BPC_FD SSAM7-07-1BPC SSAM7-07-3BPC_FD SSAM7-07-3BPC**	Benzo(b)fluoranthene Benzo(k)fluoranthene	Due to lack of resolution between these compounds in the samples, the laboratory performed the quantitation using the total peak area.	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-7103-1	All compounds reported below the PQL.	J (all detects)	A
	L	- (=:: =0.00.0)	,

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 SSAK6-05-4BPC and SSAK6-05-4BPC_FD, samples SSAN7-05-1BPC and SSAN7-05-1BPC_FD, samples SSAM5-04-5BPC and SSAM5-04-5BPC_FD, samples SSAK8-08-3BPC and SSAK8-08-3BPC_FD, and samples SSAM7-07-3BPC** and SSAM7-07-3BPC_FD were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

·	Concentration (ug/Kg)					
Compound	SSAK6-05-4BPC	SSAK6-05-4BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Dibenzo(a,h)anthracene	29	350U	-	321 (≤350)	-	-
Dimethylphthalate	360∪	29	-	331 (≤360)	•	-
Hexachlorobenzene	350	330	-	20 (≤360)	-	-
Octachlorostyrene	170	130	-	40 (≤360)	-	_

	Concentration (ug/Kg)					
Compound	SSAN7-05-1BPC	SSAN7-05-1BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Benzo(a)anthracene	160	170	-	10 (≤380)	-	-
Benzo(a)pyrene	140	190	-	50 (≤380)	-	-
Benzo(b)fluoranthene	. 460	400	-	60 (≤360)	-	-
Benzo(g,h,i)perylene	380U	140	_	240 (≤380)	-	-
Bis(2-ethylhexyl)phthalate	79	190	_	111 (≤380)	<u>-</u>	-
Chrysene	220	220	-	0 (≤380)	-	_
Di-n-butyl phthalate	1200	360∪	-	840 (≤360)	J (all detects) UJ (all non-detects)	А
Fluoranthene	160	150	-	10 (≤380)	-	-
Hexachlorobenzene	590	1200	-	610 (≤380)	J (all detects)	А
Indeno(1,2,3-cd)pyrene	110	100	-	10 (≤380)	-	-
Octachlorostyrene	250	390	-	140 (≤380)	-	-
Phenanthrene	30	360U	-	330 (≤360)	-	-
Pyrene	140	150	-	10 (≤380)	-	-

	Concentra	tion (ug/Kg)					
Compound	SSAM5-04-5BPC	SSAM5-04-5BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P	
Bis(2-ethylhexyl)phthalate	90	110	-	20 (≤350)	-	-	
Hexachlorobenzene	350U	50	-	300 (≤350)	-	-	

	Concentrat	ion (ug/Kg)				A or P	
Compound	SSAK8-08-3BPC	SSAK8-08-3BPC_FD	RPD (Limits)	Difference (Limits)	Flags		
Bis(2-ethylhexyl)phthalate	150	100	-	50 (≤350)	-	_	
Hexachlorobenzene	86	58	-	28 (≤350)	.	<u>-</u>	

	Concentra	tion (ug/Kg)				
Compound	SSAM7-07-3BPC**	SSAM7-07-3BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Benzo(a)anthracene	31	31	-	0 (≤360)	-	-
Benzo(a)pyrene	25	32	_	7 (≤360)	_	-
Benzo(b)fluoranthene	78	84	-	6 (≤360)		
Benzo(g,h,i)perylene	26	34	-	8 (≤360)	_	-
Bis(2-ethylhexyl)phthalate	59	84	-	25 (≤360)	-	-
Chrysene	47	48	-	1 (≤360)	-	-
Fluoranthene	47	49	-	2 (≤360)	_	-
Hexachlorobenzene	1000	670	-	330 (≤360)	_	-
Octachlorostyrene	120	160	-	40 (≤360)	-	-
Pyrene	37	40	-	3 (≤360)	-	-

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG 280-7103-1

SDG	Sample Compound		Flag	A or P	Reason (Code)
280-7103-1	SSAK6-05-10BPC	All TCL compounds	J- (all detects) UJ (all non-detects)	Р	Technical holding times (h)
280-7103-1	SSAN7-05-1BPC SSAN7-05-2BPC SSAN7-05-1BPC_FD SSAM7-07-1BPC SSAM7-07-3BPC_FD SSAM7-07-3BPC**	Benzo(b)fluoranthene Benzo(k)fluoranthene	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	Р.	Compound quantitation and CRQLs (q)
280-7103-1	SSAK6-05-4BPC SSAK6-05-4BPC_FD SSAK6-05-6BPC SSAK6-05-8BPC SSAK6-05-10BPC SSAM7-06-1BPC SSAM7-06-1BPC SSAM7-06-3BPC SSAN7-05-1BPC SSAN7-05-3BPC SSAN7-05-3BPC SSAN7-05-1BPC_FD SSAM5-04-1BPC SSAM5-04-1BPC SSAM5-04-5BPC_FD SSAM5-04-5BPC_FD SSAK8-08-3BPC** SSAK8-08-3BPC** SSAN7-07-1BPC SSAM7-07-1BPC SSAM7-07-1BPC SSAM7-07-1BPC SSAM7-07-3BPC_FD EB-09022010	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
280-7103-1	SSAN7-05-1BPC SSAN7-05-1BPC_FD	Di-n-butyl phthalate	J (all detects) UJ (all non-detects)	Α	Field duplicates (Difference) (fd)
280-7103-1	SSAN7-05-1BPC SSAN7-05-1BPC_FD	Hexachlorobenzene	J (all detects)	А	Field duplicates (Difference) (fd)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-7103-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Equipment Blank Data Qualification Summary - SDG 280-7103-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

SDG #: 280-7103-1 Stage 2B/4
Laboratory: Test America

Date: 10 /2.2 /rc
Page: 10f 1
Reviewer: >//
2nd Reviewer: ____

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

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

	Validation Area		Comments
<u>l.</u>	Technical holding times	SW	Sampling dates: 9 /02-03 /10
11.	GC/MS Instrument performance check	A	7-5-2710
III.	Initial calibration	A	% RSD
V.	Continuing calibration/ICV	A	CONTION = 25 %
V.	Blanks	A	1007.10
/I.	Surrogate spikes	A	
11.	Matrix spike/Matrix spike duplicates	A	
III.	Laboratory control samples	A	us/p
Χ.	Regional Quality Assurance and Quality Control	N	
(Internal standards	A	
1.	Target compound identification	A	Not reviewed for Stage 2B validation.
II.	Compound quantitation/CRQLs	SM	Not reviewed for Stage 2B validation.
11.	Tentatively identified compounds (TICs)	N	Not reviewed for Stage 2B validation.
V.	System performance	A	Not reviewed for Stage 2B validation.
/.	Overall assessment of data	A	
1.	Field duplicates	SM	D, = 1, 2 D2 = 9, 12 B3 = 15, 16 D4 = 18,19 D5 = 25
II.	Field blanks	(M2	FB = 27

Note:

A = Acceptable

ND = No compounds detected D = Duplicate

N = Not provided/applicable SW = See worksheet

R = Rinsate

TB = Trip blank

FB = Field blank

EB = Equipment blank

MSD

Validated Samples:

LDC #:

24140C2a

** Indicates sample underwent Stage 4 validation

	<u>il </u>	<u> </u>	Nater					
1 SSAK6-05-4BPC L	, 5	11	SSAN7-05-3BPC	<u> </u>	21	SSAN7-04-2BPC	31 /	Nan 284 2007-/
2 SSAK6-05-4BPC_FD L	<u>,]]</u>	12	SSAN7-05-1BPC_FD D	2	22 3	SSAN7-04-3BPC	32)	MB 286- 30977/-A
3 SSAK6-05-6BPC		13	SSAM5-04-10BPC**		23	SSAM7-07-1BPC	33 3	- 30983/1-A - 31002/1-A
4 SSAK6-05-8BPC	$- \bot \downarrow$	14	SSAM5-04-1BPC		24	SSAM7-07-2BPC	34 ¢	
5 7 SSAK6-05-10BPC	$\perp \downarrow \downarrow$	15	SSAM5-04-5BPC	03	25	SSAM7-07-3BPC** 05	35 9	32281/1-4
6 SSAM7-06-1BPC		16 3	SSAM5-04-5BPC_FD	D3	1	D-	/36	30599/1-A
7 SSAM7-06-2BPC		17	SSAK8-08-1BPC		5		37	
8 3 SSAM7-06-3BPC		18	SSAK8-8-3BPC**	04	28 4	SSAKL-05- 10BPC MS	38	
9 SSAN7-05-1BPC 02		19	SSAK8-08-3BPC_FD	04	₂₉ 4	1 msp	39	
10 SSAN7-05-2BPC	<u> </u>	20 3	SSAN7-04-1BPC	J	30 >	SSAM7-06-3BPC MS	40	
							<u> </u>	

Page: 1 of 2
Reviewer: JV

2nd Reviewer:

Method: Semivolatiles (EPA SW 846 Method 8270C)

	T	T	T	
Validation Area	Yes	No	NA	Findings/Comments
Technical holding times All technical holding times were met.			ř	And Charles and Ch
Cooler temperature criteria was met.	17	t	†	
II. Ge/AS (randiment de normanger) 220				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	1			
Were all samples analyzed within the 12 hour clock criteria?			_	
III. Initial colloration (C. A. J.				
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.				C. E. A. Cultina and Company of the
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?				
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?				
Were all percent differences (%D) ≤ 25% and relative response factors (RRF) ≥ 0.05?				
$M(\Omega_{0})$	2			
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.		. 1		
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?			7	
NE NESERO NE PROPERTORE				
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?			\Box	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?				
900 te Section 2000 militario places				
Was an LCS analyzed for this SDG?	1			

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: _______
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?	/			
D. Regional Quality Assurance and Quality Exercit				
Were performance evaluation (PE) samples performed?		_		
Were the performance evaluation (PE) samples within the acceptance limits?				
A SHEED REPORTED TO THE SHEET OF				PROPERTY AND ADDRESS OF THE PROPERTY A
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?				
Material conserve dentitioner and the second				A CONTRACT OF THE PARTY OF THE SAME
Were relative retention times (RRTs) within + 0.06 RRT units of the standard?	_			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?				
Were chromatogram peaks verified and accounted for?	1/	X 100° 100° 100° 100° 100° 100° 100° 100		
XII seomodification (CROS) Selfice Marie III (Comparison Marie III)				and the statement of the Park Berline
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. Jenaukay kienithed compounds (1906)				
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)?		/		
AN SASTERNAMENTAL				
System performance was found to be acceptable.			Wind a last	
Overall assessment of data was found to be acceptable.				
Overali assessment oi data was iddird to be acceptable.			15 17 87 87 88 Fr 82 8 7 8 1	
		200.00 200 200.00		
Field duplicate pairs were identified in this SDG.				
Target compounds were detected in the field duplicates.		ĺ		
Militaria in the control of the cont				
Field blanks were identified in this SDG.	7			
Target compounds were detected in the field blanks.	/			

VALIDATION FINDINGS WORKSHEET

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

A. Phenol™	P. Bls(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenoi™	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-Dichiorobenzene	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. Diethy/phthalate	AAA. Butylbenzylphthaiate	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. Hexachioroethane	Z. 2,4,5-Trichlorophenol	00. 4-Nitroanlline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexy!)phthalate	111.
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)™	FFF. Di-n-octylphthalate™	UUU
N. 2-Nitrophenoi™	CC. Dimethyiphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	WW.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	www.

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

LDC #:_	24 140 CZa	
SDG #:_	Su Con	-

VALIDATION FINDINGS WORKSHEET <u>Technical Holding Times</u>

	Page:_	l_of)	
	Reviewer:	016	
2nd	Reviewer:		_

All circled dates have exceeded the technical holding times.

Y N/A Were all cooler temperatures within validation criteria?

	METHOD :	GC/N		SW 846 Metho	od 8270)				
	Sample ID		Matrix	Preserved		Extraction date	Analysis date	Total #	Qualifier
\blacksquare	5, 28, 3	19	ع	N	9/00/10	9/21/10	9/22/10	18	J-/45/P
\parallel			······································			/			7.10 71
\Vdash									
H		+							
H		\dashv							
H		+							
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TECHNICAL HOLDING TIME CRITERIA

Water:

Extracted within 7 days, analyzed within 40 days.

Soil:

Extracted within 14 days, analyzed within 40 days.

LDC# 26 140 (20

VALIDATION FINDINGS WORKSHEET

_lof__)

Page: Reviewer: 2nd Reviewer:

Field Blanks

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

Were field blanks identified in this construction were field blanks?

Were target compounds detected in the field blanks?

Were target compounds detected in the field blanks?

Were target compounds detected in the field blanks?

Were field blanks?

Associated sample units: where the field blanks?

Sampling date: 4/6 2/10

20-26 6- 76 EB d Sample Identification ζ Associated Samples: 200 es the result = Blank ID 0.74 トトト Compound CROL x 1.48

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

LDC # 24140 C2a

VALIDATION FINDINGS WORKSHEET Compound Quantitation and Reported CRQLs

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

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

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? Y N/A N/A

Qualifications	J/45 10						The part of the second					
Associated Samples	Famp	ara		A de la desta de la dela del del del del del del d								
Finding	GGG HHH perlis unresolved	tab used total peak	for greantitution									
Sample ID	9 10 12 23 25 26											
Date												
#												

Comments: See sample calculation verification worksheet for recalculations

LDC#: 24140C2a

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page	: \ of \(\gamma\)
Reviewer:	W.
2nd Reviewer:	

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

Y N NA Y N NA

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

Compound Name	Conc	(ug/Kg)	RPD	Diff	Diff Limits	Quals
Compound Name	1	2	(≤50%)			(Parent Only)
Dibenzo(a,h)anthracene	29	350U		321	≤350	
Dimethylphthalate	360U	29		331	≤360	
Hexachlorobenzene	350	330		20	≤360	
Octachlorostyrene	170	130		40	≤360	

Commonwed Nome	Conc (ug/Kg)	RPD	Diff	Diff Limits	Quals
Compound Name	9	12	(≤50%)	Dill	Dill Elitiles	(Parent Only)
Benzo(a)anthracene	160	170		10	≤380	
Benzo(a)pyrene	140	190		50	≤380	
Benzo(b)fluoranthene	460	400		60	≤360	
Benzo(g,h,i)perylene	380U	140		240	≤380	
Bis(2-ethylhexyl)phthalate	79	190		111	≤380	
Chrysene	220	220		0	≤380	
Di-n-butyl phthalate	1200	360U		840	≤36,0	J/UJ/A (fd)
Fluoranthene	160	150		10	≤380	
Hexachlorobenzene	590	1200		610	≤380	Jdet/A (fd)
Indeno(1,2,3-cd)pyrene	110	100		10	≤380	
Octachlorostyrene	250	390		140	≤380	
Phenanthrene	30	360U		330	≤360	
Pyrene	140	150		10	≤380	

Compound Name	Conc (ug/Kg)	RPD	Diff	Diff Limits	Quals
Compound Name	15	16	(≤50%)	· -		(Parent Only)
Bis(2-ethylhexyl)phthalate	90	110		20	≤350	
Hexachlorobenzene	350U	50		300	≤350	

LDC#: 24140C2a

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	_ ~ _of_ ~
Reviewer:_	JV6
2nd Reviewer:	~

METHOD: GC/MS SVOA (EPA SW 846 Method 8270C)
YN NA
Were field duplicate pairs identified in this SDG? Y/ N_NA

Were target analytes detected in the field duplicate pairs?

Compound Name	Conc	(ug/Kg)	RPD	Diff	Diff Limits	Quals
•	18	19	(< = 0.01)		(Parent Only)	
Bis(2-ethylhexyl)phthalate	150	100		50	≤350	
Hexachlorobenzene	86	58		28	≤350	

Compound Name	Conc	(ug/Kg)	RPD	Diff	Diff Limits	Quals
	25	26	(≤50%)			(Parent Only)
Benzo(a)anthracene	31	31		0	≤360	
Benzo(a)pyrene	25	32		7	≤360	
Benzo(b)fluoranthene	78	84		6	≤360	
Benzo(g,h,i)perylene	26	34		8	≤360	
Bis(2-ethylhexyl)phthalate	59	84		25	≤360	
Chrysene	47	48	•	1	≤360	
Fluoranthene	47	49		2	≤360	
Hexachlorobenzene	1000	670		330	≤360	
Octachlorostyrene	120	160		40	≤360	
Pyrene	37	40		3	≤360	

V:\FIELD DUPLICATES\24140C2a.wpd

LDC#: 74.40 C22

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:

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

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 C_{is} = Concentration of internal standard X = Mean of the RRFs Recalculated %RSD

Reported %RSD

Average RRF Recalculated

(Initial)

11.56

6.03 9.69

6.0

0.2343

0.6681

3.80

3.8 9.7

1.0938

1.0938

1.1315

1.1315

(186)

Benzo(g,h,i)perylene

994488 252134

Area IS

Area cpd

nc IS/Cpd

197471

40/20 40/20 570870

983140 1338510

40/20

290330 963068 1493397

40/20 40/20 40/20

1063669 965177

1055901

6.18 9.98

> 10.0 11.6

1.0396

1.3051

0.6357

6.2

0000	(X/S) 001 - GSY8/			S= Standard c	S= Standard deviation of the RRFs,	RFs,
				Reported	Recalculated	Reported
		Calibration		RRF	RRF	Average RRF
#	Standard ID	Date	Compound (Internal Standard)	(50 std)	(50 std)	(Initial)
-	ICAL	9/13/2010	9/13/2010 1,4-Dioxane (IS1)	0.6266	0.6266	0.6356
	MSS B		Naphthalene (IS2)	1.0767	1 0767	1 0396
			Fluorene (IS3)	1.3777	1.3777	1.3051
			Hexachlorobenzene (IS4)	0.2406	0.2406	0.2343
			Bis(2-ethylhexyl)phthalate (IS5)	0.7243	0.7243	0.6681
	_					- 000

(1					
Cor	1,4-Dioxane	Naphthalene	Fluorene	Hexachlorob	bis(2-eh)phtha	Benzo(q.h.i)per
4.00	0.7296	1.1419	1.4534	0.2371	0.5408	1 0007
10.00	0.6351	1.1290	1.4363	0.2472	0.6101	1.0221
20.00	0.6284	1.1384	1.4299	0.2521	0.6785	1 1201
20.00	0.6266	1.0767	1.3777	0.2406	0.7243	1 1345
80.00	0.6289	1.0555	1.3340	0.2401	0.7348	1 1440
120.00	0.6226	0.9806	1.2121	0.2281	0.7081	1 0957
160.00	0.6087	0.9246	1.1457	0.2180	0 6863	1.000.1
200.00	0.6054	0.8701	1.0514	0.2113	0.0000	1.0744
# ×	0.6357	1.0396	1.3051	0.2343	0.5531	1.0000
= S	0.0393	0.1037	0.1509	0.0141	0.000	0.0930
j						0.0

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

VALIDATION FINDINGS WORSHEET Continuing Calibration Results Verification

Page of / Reviewer: JVG 2nd Reviewer:

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

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

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

ave. RRF = initial calibration average RRF Ax = Area of compound

Where:

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

RRF = continuing calibration RRF

Cx = Concentration of compound

		Calibration			Average RRF	Reported	Recalculated	Reported	Recalculated
#	Standard ID	Date	Compound (Reference IS)		(Initial RRF)	(CC RRF)	(CC RRF)	C/%	, codiated
-	B0548	09/18/10	1,4-Dioxane	(IS1)	0.636	0.612	0.612	800)) () ()
			Naphthalene	(IS2)	1.040	1.051	1 051	11	5 +
			Fluorene	(183)	1.305	1.283	1.283	1.7	1.1
			Hexachlorobenzene	(IS4)	0.234	0.233	0.233	0.7	2.0
			Bis(2-ethylhexyl)phthalate	(185)	0.668	0.752	0.752	12.5	12.5
			Benzo(g,h,i)perylene	(981)	1.094	1.077	1.077	1.5	7 7
2	B0598	09/20/10	1,4-Dioxane	(IS1)	0.636	0.611	0.641	3 8	0.0
			Naphthalene	(182)	1.040	1.050	1 050	5 5	0.0
			Fluorene	(IS3)	1.305	1.307	1307	0.0	5.0
			Hexachlorobenzene	(184)	0.234	0.233	0.233	0.4	0.2
			Bis(2-ethylhexyl)phthalate	(185)	0.668	0.761	0.761	13.0	73.0
			Benzo(g,h,i)perylene	(186)	1.094	1.042	1.042	4.7	4.7

Compound (Reference IS) Concentration (IS/Qpd) Area Cpd Area IS Area IS 1,4-Dioxane (IS1) 40/80 323105 264090 264090 Naphthalene (IS2) 40/80 2196496 1045249 21700 Fluorene (IS3) 40/80 1570034 611700 11700 Hexachlorobenzene (IS4) 40/80 156582 1041505 1041505 Benzo(g,h,i)perylene (IS6) 40/80 2262454 1049866 1							
(IS1) 40/80 323105 264090 (IS2) 40/80 2196496 1045249 (IS3) 40/80 1570034 611700 (IS4) 40/80 1565882 1041505 (IS5) 40/80 2262454 1049866			Concentration	Area Cpd	Area IS	Area Cpd	Area IS
(IS2) 40/80 323105 264090 (IS2) 40/80 2196496 1045249 (IS3) 40/80 1570034 611700 (IS4) 40/80 1565882 1041505 (IS5) 40/80 2262454 1049866			(IS/Cpd)			•	
(IS3) 40/80 2196496 1045249 (IS3) 40/80 1570034 611700 (IS4) 40/80 472647 1015623 (IS5) 40/80 1565882 1041505 (IS6) 40/80 2262454 1049866	1,4-Dioxane	(181)	40/80	323105	264090	304878	249345
(IS4) 40/80 1570034 611700 (IS4) 40/80 472647 1015623 (IS5) 40/80 1565882 1041505 (IS6) 40/80 2262454 1049866	Naphthalene	(182)	40/80	2196496	1045249	2065517	983381
(IS4) 40/80 472647 1015623 (IS5) 40/80 1565882 1041505 (IS6) 40/80 2262454 1049866	Fluorene	(183)	40/80	1570034	611700	1469517	562017
(ISG) 40/80 1565882 1041505 (ISG) 40/80 2262454 1049866	Hexachlorobenzene	(184)	40/80	472647	1015623	442141	947199
(1S6) 40/80 2262454 1049866	_	(185)	40/80	1565882	1041505	1435607	943374
		(186)	40/80	2262454	1049866	1842157	883736

LDC#: 24140 (26

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:_	<u>lof_1</u>
Reviewer:	No
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

Sample ID:

13

Where: SF = Surrogate Found SS = Surrogate Spiked

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	10	82.4	82	ev	9
2-Fluorobiphenyl		87.9	83	8 5	1
Terphenyl-d14	Į į	92.7	93	93	
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4			,		
1,2-Dichlorobenzene-d4					

Sample ID:

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

Sample ID:

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

LDC#: 24146C2 SDG #: See Cover

Matrix Spike/Matrix Spike Duplicates Results Verification VALIDATION FINDINGS WORKSHEET

Page: 1 of 1 Reviewer: 16 2nd Reviewer:

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

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

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

SC = Sample concentation

Where: SSC = Spiked sample concentration SA = Spike added

MSDC = Matrix spike duplicate concentration

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

MSC = Matrix spike concentration

MS/MSD samples:

2 200

	Ś	Spike	Sample	Spiked 5	ample	Matrix Spike	Spike	Matrix Spik	Matrix Spike Duplicate	USW/SW	QS QS
Compound	Added (WS /K	(X)	Concentration (仏 /氏)	Concentration (u_h /k.)	tration (L)	Percent Recovery	ecovery	Percent Recovery	ecovery	RPD	
	MS	MSD	0	MS	MSD	Reported	Rocale	Donoug			
Phenol								oan na	Kacair	Keported	Recalculated
N-Nitroso-di-n-propylamine											
4-Chloro-3-methylphenol											
Acenaphthene	2940	2950	0	2310	2230	24	78.	78	7.6	0	0
Pentachlorophenol						0			/	0,-))
Pyrene	3940	2950		2700	2740	44	7.6	4 %	7 6		,

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

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

Reviewer: 2nd Reviewer:

lof Page:

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

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

% Recovery = 100 * (SC/SA

Where: SSC = Spike concentration SA = Spike added

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

LCS/LCSD samples:

31002 4CS 280-

	Sr	oike	G.	Spike	83	Ų		Cen		000 100
Compound	Ad (VS	Added (Wg /kg)	Concer (%)	Concentration (MS //C)	Percent Recovery	ecovery	Percent Recovery	Secovery	8	RPD
	SJ I	1080	108) I GSD	Reported	Recalc	Reported	Recalc	Renorted	Boceloulated
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene	26 10	NA	2140	N.A	8	78				
Pentachlorophenol										
Pyrene	2410	→	2160		68	62				

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#: 74140 CZA

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:	_1_of1_
Reviewer:_	No
nd reviewer.	٦

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

P	N	N/A
(7/	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 = $(A_{\bullet})(L_{\bullet})(V_{\bullet})(DF)(2.0)$ $(A_{\bullet})(RRF)(V_{\circ})(V_{\bullet})(\%S)$

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

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

I_s = Amount of internal standard added in nanograms (ng)

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

V₁ = Volume of extract injected in microliters (ul)

V₁ = Volume of the concentrated extract in microliters (ul)

Df = Dilution Factor.

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

Example:

Sample I.D. # 35 S.S

Conc. = (143 591) (40) (1 m) (100) (100) (866027) (0, 23 44) (30.45) (0, 964) (0)

- 1030.0

v love ug leg

2.0	= Factor of 2 to accoun	nt for GPC cleanup				
#	Sample ID	Compound		Reported Concentration ()	Calculated Concentration ()	Qualification
					<u> </u>	
- 1						<u> </u>
		111111111111111111111111111111111111111				
	· · · · · · · · · · · · · · · · · · ·			T-107 - 107		
- 1						
						-

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS Additional Sampling,

Henderson, Nevada

Collection Date:

September 7, 2010

LDC Report Date:

October 25, 2010

Matrix:

Soil

Parameters:

Semivolatiles

Validation Level:

Stage 2B

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-7117-1

Sample Identification

SSAN8-06-0BPC

SSAN8-05-0BPC

SSAN7-06-0BPC

SSAN7-07-0BPC

SSAN8-03-0BPC

SSAN8-04-0BPC SSAN8-07-0BPC

SSAN8-07-0BPC_FD

SSAN7-06-0BPCMS

SSAN7-06-0BPCMSD

Introduction

This data review covers 10 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 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.

No field blanks were identified in this SDG.

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

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

Sample	Compound	Finding	Flag	A or P
SSAN8-06-0BPC SSAN8-05-0BPC SSAN8-07-0BPC	Benzo(b)fluoranthene Benzo(k)fluoranthene	Due to lack of resolution between these compounds in the samples, the laboratory performed the quantitation using the total peak area.	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-7117-1	All compounds reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

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

Samples SSAN8-07-0BPC and SSAN8-07-0BPC_FD were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentrat	ion (ug/Kg)				
Compound	SSAN8-07-0BPC_FD	SSAN8-07-0BPC_FD	RPD (Limits)	Difference (Limits)	Flags	AorP
Anthracene	27	330U	-	303 (≤330)	-	-
Benzo(a)anthracene	220	330U	-	110 (≤330)	-	-
Benzo(a)pyrene	160	330U	•	170 (≤330)	-	-
Benzo(b)fluoranthene	360	330U	-	30 (≤330)	-	-
Benzo(g,h,i)perylene	98	330U	-	232 (≤330)	-	-
Chrysene	260	330U	-	70 (≤330)	-	<u>-</u>
Di-n-octylphthalate	330U	56	-	274 (≤330)	-	-
Fluoranthene	550	330U	-	220 (≤330)	-	-
Hexachlorobenzene	39	330U	-	291 (≤330)	-	-
Indeno(1,2,3-cd)pyrene	77	330U	-	253 (≤330)	-	-
Phenanthrene	220	330U	· -	110 (≤330)	-	-
Pyrene	450	13	-	437 (≤330)	J (all detects)	А

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG 280-7117-1

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-7117-1	SSAN8-06-0BPC SSAN8-05-0BPC SSAN8-07-0BPC	Benzo(b)fluoranthene Benzo(k)fluoranthene	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	Р	Compound quantitation and CRQLs (q)
280-7117-1	SSAN8-06-0BPC SSAN8-05-0BPC SSAN7-06-0BPC SSAN7-07-0BPC SSAN8-03-0BPC SSAN8-04-0BPC SSAN8-07-0BPC SSAN8-07-0BPC_FD	All compounds reported below the PQL.	J (all detects)	А	Project Quantitation Limit (sp)
280-7117-1	SSAN8-07-0BPC SSAN8-07-0BPC_FD	Pyrene	J (all detects)	А	Field duplicates (Difference) (fd)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-7117-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Field Blank Data Qualification Summary - SDG 280-7117-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

		Honox Northgate Henderson	
_DC #:	24140D2a	VALIDATION COMPLETENESS WORKSHEET	
SDG #:	280-7117-1	Stage 2B	F
_aboratory	: Test America	-	Revi

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: 9/07/10
11.	GC/MS Instrument performance check	A	
Ш.	Initial calibration	A	2 RSD r
IV.	Continuing calibration/ICV	A	ca/101 ≤ 25].
V.	Blanks	À	
VI.	Surrogate spikes	JVGDY A	
VII.	Matrix spike/Matrix spike duplicates	(N2	
VIII.	Laboratory control samples	Ą	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	NS	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	À	
XVI.	Field duplicates	SW	D = 7.8
XVII.	Field blanks	N	

Note:

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

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank
EB = Equipment blank

Validated Samples:

spile Δu

r	<u> </u>	20113	>			
1	SSAN8-06-0BPC	11	MB 280 - 31791 N-A	21	31	
2	SSAN8-05-0BPC	12	/	22	32	
3	SSAN7-06-0BPC	13		23	33	
4	SSAN7-07-0BPC	14		24	34	
5	SSAN8-03-0BPC	15		25	35	
6	SSAN8-04-0BPC	16		26	36	
7	SSAN8-07-0BPC b	17		27	37	
8	SSAN8-07-0BPC_FD	18		28	38	
9	SSAN7-06-0BPCMS	19		29	39	
10	SSAN7-06-0BPCMSD	20		30	40	

VALIDATION FINDINGS WORKSHEET

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

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

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

LDC#: 24140 DRA

بْ

SDG #:

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Page: ⊥of⊥ Reviewer: 2nd Reviewer:

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

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

Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated

MS/MSD. Soil / Water. N/N N/A

Y N N/A	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?	ar. yzed every 20 ercent recove	0 samples ries (%R)	of each ma	atrix? ative percent diff	ference	s (RPD) within the	QC limits?	
	MS/MSD ID	Compound	n %R (i	MS %R (Limits)	MSD %R (Limits)		RPD (Limits)	Associated Samples	Qualifications
	9/6	335	4	(07)-65))	_	()		No gud
				())	^	()		(in asy)
				()	Ú	_ ^)		
				())	^	()		
				()		^)		
Ц				١ ،)	1	(
				())	<u> </u>	()		
				())) (()		
_				()))	()		
_				())	(()		
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				())	<u> </u>	()		
				())	<u> </u>	()		
_				())	<u> </u>	()		
\dashv				())	^	()		
_				<u> </u>)	•	(

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
ď	Phenol	76-90%	< 35%	12-110%	< 42%	99	Acenaphthene	31-137%	< 19%	46-118%	< 31%
ن	C. 2-Chlorophenol	25-102%	< 50%	27-123%	< 40%	=	4-Nitrophenol	11-114%	< 50%	10-80%	< 50%
نس	1,4-Dichlorobenzene	28-104%	< 27%	36-97%	< 28%	<u> </u>	2,4-Dinitrotoluene	28-89%	< 47%	24-96%	< 38%
	N-Nitroso-di-n-propylamine	41-126%	< 38%	41-116%	< 38%	ТТ.	Pentachlorophenol	17-109%	< 47%	9-103%	< 50%
œ	1,2,4-Trichlorobenzene	38-107%	< 23%	39-98%	< 28%	.72	Pyrene	35-142%	~36%	26-127%	< 31%
>	4-Chloro-3-methylphenol	26-103%	< 33%	23-97%	< 42%						

LDC# 24140 Dra

Compound Quantitation and Reported CRQLs VALIDATION FINDINGS WORKSHEET

l of) Page: Reviewer: 2nd Reviewer:

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

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

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

V N N ×

		T	T	T	Ī	Ī	I	T		T		Ī	
Qualifications	1/45/p												
Associated Samples	wwed	ara											
Finding	GGG HHH perlis unresponded	X	for greantitution	/									
Sample ID	1 2 7	*											
Date													
#													

See sample calculation verification worksheet for recalculations Comments: LDC#: 24140D2a

VALIDATION FINDINGS WORKSHEET Field Duplicates

	Page:		of <u>/</u>
	Reviewer:_	-	NG
2nd	Reviewer:		~

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

Y N NA /N NA

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

Compound Name	Conc	(ug/Kg)	RPD	Diff	Diff Limits	Quals
Compound Name	7	8	(≤50%)	Ditt	Dill Limits	(Parent Only)
Anthracene	27	330U		303	≤330	
Benzo(a)anthracene	220	330U		110	≤330	
Benzo(a)pyrene	160	330U		170	≤330	
Benzo(b)fluoranthene	360	330U		30	≤330	
Benzo(g,h,i)perylene	98	330U		232	≤330	
Chrysene	260	330U		70	≤330	
Di-n-octyl phthalate	330U	56		274	≤330	
Fluoranthene	550	330U		220	≤330	
Hexachlorobenzene	39	330U		291	≤330	
Indeno(1,2,3-cd)pyrene	77	330U		253	≤330	
Phenanthrene	220	330U		110	≤330	1,~
Pyrene	450	13		437	≤330	THA

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS Additional Sampling,

Henderson, Nevada

Collection Date:

September 7, 2010

LDC Report Date:

October 25, 2010

Matrix:

Soil

Parameters:

Semivolatiles

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-7183-1

Sample Identification

SSAP4-02-10BPC**

SSAP4-02-1BPC

SSAP4-02-5BPC

SSAP4-02-1BPC_FD

SSAP4-01-10BPC

SSAP4-01-1BPC

SSAP4-01-5BPC

SSAP5-02-1BPC

SSAP5-02-2BPC

SSAP5-02-3BPC

SSAP6-01-1BPC SSAP6-01-2BPC**

SSAP6-01-3BPC

SSAP6-01-3BPC FD

SSAP4-01-10BPC FD

^{**}Indicates sample underwent Stage 4 review

Introduction

This data review covers 15 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
MB 280-32100/1-A	9/19/10	Bis(2-ethylhexyl)phthalate	97.3 ug/Kg	SSAP4-02-1BPC_FD SSAP4-01-10BPC SSAP4-01-1BPC SSAP4-01-5BPC SSAP5-02-1BPC SSAP5-02-2BPC SSAP5-02-3BPC SSAP6-01-1BPC SSAP6-01-2BPC** SSAP6-01-3BPC SSAP6-01-3BPC_FD SSAP4-01-10BPC_FD

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
SSAP4-02-1BPC_FD	Bis(2-ethylhexyl)phthalate	120 ug/Kg	120U ug/Kg
SSAP4-01-10BPC	Bis(2-ethylhexyl)phthalate	110 ug/Kg	110U ug/Kg
SSAP5-02-2BPC	Bis(2-ethylhexyl)phthalate	110 ug/Kg	110U ug/Kg
SSAP5-02-3BPC	Bis(2-ethylhexyl)phthalate	110 ug/Kg	110U ug/Kg
SSAP6-01-1BPC	Bis(2-ethylhexyl)phthalate	100 ug/Kg	100U ug/Kg
SSAP6-01-3BPC	Bis(2-ethylhexyl)phthalate	120 ug/Kg	120U ug/Kg
SSAP6-01-3BPC_FD	Bis(2-ethylhexyl)phthalate	110 ug/Kg	110U ug/Kg
SSAP4-01-10BPC_FD	Bis(2-ethylhexyl)phthalate	100 ug/Kg	100U ug/Kg

No field blanks were identified in this SDG.

VI. Surrogate Spikes

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

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
SSAP4-01-1BPC	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 280-7183-1	All compounds reported below the PQL.	J (all detects)	А

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

XIII. 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.

XVI. Field Duplicates

Samples SSAP4-02-1BPC and SSAP4-02-1BPC_FD, samples SSAP6-01-3BPC and SSAP6-01-3BPC_FD, and samples SSAP4-01-10BPC and SSAP4-01-10BPC_FD were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentration (ug/Kg)					
Compound	SSAP4-02-1BPC	SSAP4-02-1BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Bis(2-ethylhexyl)phthalate	340U	120	. <u>.</u>	220 (≤340)	-	-

	Concentration (ug/Kg)					
Compound	SSAP4-01-10BPC	SSAP4-01-10BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Bis(2-ethylhexyl)phthalate	110	100	-	10 (≤350)	-	-
Hexachlorobenzene	62	32	<u>-</u>	30 (≤350)	-	-

	Concentration (ug/Kg)					
Compound	SSAP6-01-3BPC	SSAP6-01-3BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Bis(2-ethylhexyl)phthalate	120	110	-	10 (≤360)	-	-

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG 280-7183-1

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-7183-1	SSAP4-01-1BPC	Benzo(b)fluoranthene Benzo(k)fluoranthene	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	Р	Compound quantitation and CRQLs (q)
280-7183-1	SSAP4-02-10BPC** SSAP4-02-1BPC SSAP4-02-1BPC_FD SSAP4-01-1BPC SSAP4-01-1BPC SSAP4-01-1BPC SSAP4-01-5BPC SSAP5-02-1BPC SSAP5-02-3BPC SSAP6-01-1BPC SSAP6-01-1BPC SSAP6-01-3BPC SSAP6-01-3BPC SSAP6-01-3BPC SSAP6-01-1BPC_FD	All compounds reported below the PQL.	J (all detects)	Α	Project Quantitation Limit (sp.

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-7183-1

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
280-7183-1	SSAP4-02-1BPC_FD	Bis(2-ethylhexyl)phthalate	120U ug/Kg	A	bl
280-7183-1	SSAP4-01-10BPC	Bis(2-ethylhexyl)phthalate	110U ug/Kg	А	ы
280-7183-1	SSAP5-02-2BPC	Bis(2-ethylhexyl)phthalate	110U ug/Kg	А	bl
280-7183-1	SSAP5-02-3BPC	Bis(2-ethylhexyl)phthalate	110U ug/Kg	A	bl
280-7183-1	SSAP6-01-1BPC	Bis(2-ethylhexyl)phthalate	100U ug/Kg	А	bl
280-7183-1	SSAP6-01-3BPC	Bis(2-ethylhexyl)phthalate	120U ug/Kg	А	bl
280-7183-1	SSAP6-01-3BPC_FD	Bis(2-ethylhexyl)phthalate	110U ug/Kg	А	bl
280-7183-1	SSAP4-01-10BPC_FD	Bis(2-ethylhexyl)phthalate	100U ug/Kg	А	bl

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Field Blank Data Qualification Summary - SDG 280-7183-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson HEET

LDC #:	24140E2a	VALIDATION COMPLETENESS WORKS
SDG #:	280-7183-1	Stage 2B/4
Laborator	v. Test America	Jiago 25/7

Date:	10/20/
Page:_	of /
Reviewer:	3/6
2nd Reviewer:	\sim

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.

<u></u>	Validation Area		Comments
<u> </u>	Technical holding times	A	Sampling dates: 9 /67 /10
11.	GC/MS Instrument performance check	A	
111.	Initial calibration	A	7. RSD rx
IV.	Continuing calibration/ICV	À	7. RSD rr CW/W = 257.
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	client spec
VIII.	Laboratory control samples	Å	Chient spec
IX.	Regional Quality Assurance and Quality Control	N	
Х.	Internal standards	A	
XI.	Target compound identification	A	Not reviewed for Stage 2B validation.
XII.	Compound quantitation/CRQLs	SN)	Not reviewed for Stage 2B validation.
XIII.	Tentatively identified compounds (TICs)	N	Not reviewed for Stage 2B validation.
XIV.	System performance	А	Not reviewed for Stage 2B validation.
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SM)	$D_1 = 2.4$ $D_2 = 13.14$ $D_3 = 5.15$
XVII.	Field blanks	N	2 1 3 1

Note:

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

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

** Indicates sample underwent Stage 4 validation

	71)		20117			
1 1	SSAP4-02-10BPC**	↓ 3 11	SSAP6-01-1BPC	21	MB 280-31791/1-A 3	.1
2 1	SSAP4-02-1BPC	- 12	SSAP6-01-2BPC**	† 22 >	MB 260 - 32110/-A 3	
3 1	SSAP4-02-5BPC	† 2 13	SSAP6-01-3BPC 0 >	23	33	
4 7	SSAP4-02-1BPC_FD DI	۲ -⁄ 14	SSAP6-01-3BPC_FD D>	24	34	
ት ጉ 5	SSAP4-01-10BPC D3	⊁ ~ 15	SSAP4-01-10BPC_FD	25	38	
[†] γ	SSAP4-01-1BPC	16		26	36	,
7	SSAP4-01-5BPC	17		27	37	
17 71	SSAP5-02-1BPC	18		28	38	
9	SSAP5-02-2BPC	19		29	39	
10	SSAP5-02-3BPC	20		30	40	

VALIDATION FINDINGS CHECKLIST

Page: _\ of _2 Reviewer: _\mathcal{JW} 2nd Reviewer: _\mathcal{V}

Method: Semivolatiles (EPA SW 846 Method 8270C)

Walter and Maria	T	T	 	I
Validation Area Technical holding times 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Yes	No	NA	Findings/Comments
All technical holding times were met.				Reference and the second secon
Cooler temperature criteria was met.	1		\vdash	
II. GCMS institution performance creek				
Were the DFTPP performance results reviewed and found to be within the specified criteria?	/			
Were all samples analyzed within the 12 hour clock criteria?				
Ill falls 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?		70-030-27-0		
IV: Continuing calibration				Policy and entire and the second second
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?	1			
V. Banko I. a. (1994) and the second				CONTRACTOR
Was a method blank associated with every sample in this SDG?	1			
Was a method blank analyzed for each matrix and concentration?	4			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		`		
Were all surrogate %R within QC limits?	1			
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?				
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?	I			
MINERAL CONFERENCES				
Was an LCS analyzed for this SDG?	1		\bot	

VALIDATION FINDINGS CHECKLIST

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

		,		
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?	/			
DX. Regional Cuality Assurance and Chality Comes				
Were performance evaluation (PE) samples performed?		/		
Were the performance evaluation (PE) samples within the acceptance limits?				
X Internativativativs in the property of the Party of the				CONTRACTOR OF THE STATE OF THE
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?	V	Second Strategy	inistina - F	
ed a concentration de départe que la				A CALL OF THE CASE
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?	edit in the following			
XII Longografojanitation(GROLE) SEPERINDE				经验的 企业。
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). Tematively scentified compourks (Trus)				La Malaria
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?			7	
Were relative intensities of the major ions within \pm 20% between the sample and the reference spectra?				
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?			/	
(W.Systemasicinary)	X 77 # 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
System performance was found to be acceptable.			a Bakarangang a Baka	
Overall assessment of data was found to be acceptable.	j			
Overall assessment of data was round to be acceptable.				
Field duplicate pairs were identified in this SDG.	4			
Target compounds were detected in the field duplicates.	Λ			
Vilage Grange Co. St. Co. Co. Co. Co. Co. Co. Co. Co. Co. Co				
Field blanks were identified in this SDG.		7		
Farget compounds were detected in the field blanks.			7	

VALIDATION FINDINGS WORKSHEET

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

A, Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol™	III. Benzo(a)pyrene™
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene™	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene**	T. 4-Chloroaniline	II. 4-Nitrophenol*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F, 1,2-Dichlorobenzene	U. Hexachlorobutadiene∺	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	000. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. Butylbenzylphthalate	PPP, Benzoic Acid
I. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyl alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	00. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	111.
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate	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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DC #:	#

VALIDATION FINDINGS WORKSHEET Blanks

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?

Was the blank contaminated? If yes, please see qualification below.

0/00/ Blank extraction date: 9/19/10 Blank analysis date: 9

K

Z 20 1 ≘ 702 (7 g) 7 901 Sample Identification 9 <u>ه</u> = 0 2 Associated Samples: 61000 110 /U \mathcal{P} 4 <u>8</u> A 1/00/25-085 AM Blank ID 97.3 万四十 Conc. units: 🚧 /k< Compound

Blank extraction date:

Blank analysis date:

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

5x Phthalates 2x all others

LDC# 24 140 E 20

Compound Quantitation and Reported CRQLs VALIDATION FINDINGS WORKSHEET

Reviewer:

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Page: _

2nd Reviewer:

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

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

Y N N/A

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

Y N N/A

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

Qualifications	J/45/p									
Associated Samples	whed,	ara								
Finding	GGG, HHH pertis unresolved	tab need total peak	for great to time							
Sample ID	٠٩									
Date										
*										

Comments: See sample calculation verification worksheet for recalculations

LDC#: 24140E2a

VALIDATION FINDINGS WORKSHEET

Field Duplicates

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Reviewer:	3/2
2nd Reviewer:	1~
-	

METHOD: GC/MS SVOA (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? N NA

Compound Name	Conc (ug/Kg)	RPD	Diff	Diff Limits	01-
- Compound Numb	2	4	(≤50%)	D III	DIII LIMIKS	Quals (Parent Only)
Bis(2-ethylhexyl)phthalate	340U	120		220	≤340	

Compound Name	Conc (ug/Kg)	DDD	5::	D:#11	
Compound Name	5	15	RPD (≤50%)	Diff	Diff Limits	Quals (Parent Only)
Bis(2-ethylhexyl)phthalate	110	100		10	≤350	
Hexachlorobenzene	62	32		30	≤350	

Compound Name	Conc (ug/Kg)	RPD	Diff	Diff Limits	Quals
-	13	14	(≤50%)			(Parent Only)
Bis(2-ethylhexyl)phthalate	120	110		10	≤360	

V:\FIELD DUPLICATES\24140E2a.wpd

LDC# 24)40 E> ے رو روب SDG #:

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

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2nd Reviewer:

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

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

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

S= Standard deviation of the RRFs, 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

					Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration			RRF	RRF	Average RRF	Average RRF	%RSD	%RSD
#	Standard ID Date	Date	Compound (Internal S	ernal Standard)	(50 std)	(50 std)	(Initial)	(Initial)		
1	ICAL	8/27/2010	8/27/2010 1,4-Dioxane	(IS1)	0.5926	0.5926	0.5795	0.5795	3.7	3.74
	MSS K		Naphthalene	(IS2)	1.0571	1.0571	1.0015	1.0015	8.9	8.92
			Fluorene	(IS3)	1.3180	1.3180	1.2421	1.2421	7.9	78.7
			Hexachlorobenzene	(IS4)	0.2424	0.2424	0.2313	0.2313	6.1	6.04
			Chrysene	(185)	1.1257	1.1257	1.0679	1.0679	9.3	9.33
			Benzo(g,h,i)perylene	(186)	1.1231	1.1231	1.0199	1.0199	7.5	7.53

,,,,						
Area IS	172314	669515	393544	662745	759660	781265
Area cpd	127636	884641	648342	200827	1068947	1096793
Inc 1S/Cpd	40/20	40/20	40/20	40/50	40/20	40/20

Conc	1,4-Dioxane	Naphthalene	Fluorene	Hexachlorob	Chrysene	Benzo(g,h,i)per
4.00	0.5778	1.1018	1.3240		1.1929	0.9595
10.00	0.6003	1.0722	1.3327	0.2454	1.1472	1.0450
20.00	0.6103	1.0714	1.3075	0.2448	1.1400	1.0900
50.00	0.5926	1.0571	1.3180	0.2424	1.1257	1.1231
80.00	0.5842	1.0008	1.2564	0.2335	1.0651	1.0769
120.00	0.5678	0.9489	1.1901	0.2252	0.9953	1.0108
160.00	0.5547	0.8964	1.1248	0.2168	0.9529	0.9476
200.00	0.5485	0.8636	1.0833	0.2109	0.9244	9906.0
-						
×	0.5795	1.0015	1.2421	0.2313	1.0679	1.0199
S	0.0217	0.0893	0.0977	0.0140	0.0997	0.0768

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# 34140 # 24

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

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

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

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

 $C_x = Concentration of compound,$ 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 11.18 7.89 4.18 4.84 9.97 Reported %RSD 10.0 11.2 4.8 7.9 4.2 Average RRF Recalculated 1.0514 1.2948 0.2343 (Initial) 1.0117 1.0046 Average RRF Reported 0.2343 (Initial) 1.0514 1.2948 1.0046 1.0117 Recalculated (50 std) 1.0439 1.2658 1.0079 1.0014 0.2207 RRF see r2 calculations Reported (50 std) 1.0439 1.2658 1.0079 0.2207 1.0014 RRF (181) (183) (1S2)(IS4) (185) Compound (Internal Standard) (186) Benzo(g,h,i)perylene Hexachlorobenzene Naphthalene Chrysene Fluorene Phenol 9/15/2010 Calibration Date Standard ID MSS D ICAL #

Π	85	27	92	23	84	22
Area IS	244285	934927	603765	1043323	1161848	1028955
Area cpd	185677	1220003	955330	287832	1463728	1287934
nc IS/Cpd	40/50	40/50	40/50	40/50	40/50	40/50

Conc	1,4-Dioxane	Naphthalene	Fluorene	Hexachlorob	Chysene	Benzo(g,h,i)per
4.00	12	0.9661	1.1493		0.9354	0.8279
10.00		1.0094	1.1995	0.2011	0.9893	0.8797
20.00		1.0162	1.2174	0.2187	0.9758	0.9418
50.00		1.0439	1.2658	0.2207	1.0079	1.0014
80.00		1.0792	1.3399	0.2351	1.0501	1.0538
120.00		1.0903	1.3533	0.2393	1.0414	1.0832
160.00		1.0932	1.3954	0.2547	1.0532	1.1164
200.00		1.1130	1.4378	0.2704	1.0404	1.1329
×	#DIV/0i	1.0514	1.2948	0.2343	1.0117	1.0046
- S	#DIV/0i	0.0509	0.1022	0.0234	0.0423	0.1123

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 # 24140 F24

Initial Calibration Calculation Verification **VALIDATION FINDINGS WORKSHEET**

? of 2

Page:

Reviewer: $3\sqrt{\nu}$ 2nd Reviewer: L

GC EPA SW 846 Method 8270C METHOD:

Parameter:

1,4-Dioxane

			\	×	X^2
Date	Column	Compound	area ratio	conc ratio	
09/15/2010	Not specified	1,4-Dioxane	0.0984	0.100	
			0.1765	0.250	
			0.3444	0.500	
			0.7601	1.250	
	,		1.2284	2.000	
			1.8454	3.000	
			2.3578	4.000	
			3.0143	5.000	

Regression Output:		Reported	
Constant	0.03708	11 0	-0.065000
Std Err of Y Est	0.02621	and the state of t	The state of the s
R Squared	0.99950	12=	0.998700
No. of Observations	8.00000		
Degrees of Freedom	00000.9	And the second s	
			700000000000000000000000000000000000000
X Coefficient(s) 0.5	0.591839	=.W	0.590000
Std Err of Coef. 0.0	0.005410		

	0.9837	0.7058	0.6888	0.6081	0.6142	0.6151	0.5895	0.6029	0.6760	
--	--------	--------	--------	--------	--------	--------	--------	--------	--------	--

LDC # 74140 FX

VALIDATION FINDINGS WORSHEET Continuing Calibration Results Verification

Page of
Reviewer: JVG
2nd Reviewer:

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

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

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

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

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

Ax = Area of compound

Cx = Concentration of compound

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

	ated		T	T	T		Ī		Ī	-		Τ	1
-	Kecalculated	2 %	8 8	6.5	533	4 8	63	14.3	7. 10.	53	5.5	7 7	5.
	Keported %D	333	63	6.2	5.3	4.8	9.3	14.3	5.1	5.3	5.5	13	
1000	(CC RRF)	0.6104	1.0651	1.3197	0.2436	1.1189	1.1145	68625	1,105	1.363	0.247	1.025	
o trough	(CC RRF)	0.6104	1.0651	1.3197	0.2436	1.1189	1.1145	00989	1.105	1.363	0.247	1.025	
Average DDE	(Initial RRF)	0.5795	1.0015	1.2421	0.2313	1.0679	1.0199	80000	1.051	1.295	0.234	1.012	
	(S)	(181)	(182)	(IS3)	(IS4)	(185)	(186)	(IS1)	(182)	(183)	(184)	(185)	60;
	Compound (Reference IS)	1,4-Dioxane	Naphthalene	Fluorene	Hexachlorobenzene	Chrysene	Benzo(g,h,i)perylene	1,4-Dioxane	Naphthalene	Fluorene	Hexachlorobenzene	Chrysene	(; -q) (;
Calibration	Date	09/22/10						09/20/10					
	Standard ID	K6629						D8768					
	#							2					

Compound (Reference IS)	(S)	Concentration	Area Cpd	Area IS	Area Cpd	Area IS
		(IS/Cpd)				
1,4-Dioxane	(IS1)	40/80	325560	266683	236496	225113
Naphthalene	(182)	40/80	2174804	1020961	1906904	862593
Fluorene	(183)	40/80	1584055	600149	1446320	530492
Hexachlorobenzene	(1S4)	40/80	478292	981724	447244	904839
Chrysene	(185)	40/80	2326620	1039694	2178908	1062945
Benzo(g,h,i)perylene	(186)	40/80	2399208	1076340	1920793	873138

LDC#: 74/40 = 24

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:	_lof_1_
Reviewer:_	M
nd 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	70.4	70	70	Б
2-Fluorobiphenyl		72.8	73	73	
Terphenyl-d14		75.3	75	75	
Phenol-d5			1		
2-Fluorophenol					
2,4,6-Tribromophenol		***************************************			
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4	·				

Sample ID:

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

Sample ID:

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

110 # 71 F6 # 20

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

X Page: Lof 1 Reviewer:

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

Where: SSC = Spike concentration SA = Spike added

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

780 31791 Ξ LCS/LCSD samples:

	gS	ike	Sp	ike	LCS	S	ÖT	csn	USJ I/SJ I	CSD
Compound		Added	Concer (V	Concentration (\(\supersymbol{L} \supersymbol{L} \)	Percent Recovery	ecovery	Percent Recovery	\ecovery	RPD	٥
	1.08	O LCSD	SUI) I CSD	Reported	Recalc	Reported	Recelo	Renorted	Bocslenletad
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methyiphenoi										
Acenaphthene	0197	ΝΆ	orac	£.7	77	77				
Pentachlorophenol					,					
Pyrene	2660		75	>	79	79				
		→								
		-								

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#: 24140 F 29

YNMA

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Page:_	_lof_1_
Reviewer:	No
2nd reviewer:	~

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

`			
Conce	entratio	$n = (A_{s})(I_{s})(V_{t})(DF)(2.0)$ $(A_{s})(RRF)(V_{o})(V_{t})(%S)$	Example:
A _x	=	Area of the characteristic ion (EICP) for the compound to be measured	Sample I.D
A_{is}	æ	Area of the characteristic ion (EICP) for the specific internal standard	
l ²	=	Amount of internal standard added in nanograms (ng)	Conc. = ()()()()()
V _°	=	Volume or weight of sample extract in milliliters (ml) or grams (g).	
V_i	=	Volume of extract injected in microliters (ul)	=
V_i	=	Volume of the concentrated extract in microliters (ul)	
Ðf	=	Dilution Factor.	
%S	=	Percent solids, applicable to soil and solid matrices only.	

Were all reported results recalculated and verified for all level IV samples?

2.0	 Factor of 2 to accour 	nt for GPC cleanup				
#	Sample ID	Compound		Reported Concentration ()	Calculated Concentration ()	Qualification
 						
					e e	
 						
 		, , , , , , , , , , , , , , , , , , ,				
 						
<u> </u>						
			•			
 	•					
					7	.
			~			

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS Additional Sampling,

Henderson, Nevada

Collection Date:

September 8, 2010

LDC Report Date:

October 25, 2010

Matrix:

Soil

Parameters:

Semivolatiles

Validation Level:

Stage 2B

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-7229-1

Sample Identification

SSAO8-04-0BPC SSAO8-07-0BPC SSAO7-04-0BPC

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.

No field blanks were identified in this SDG.

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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 280-7229-1	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 idenitifed in this SDG.

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG 280-7229-1

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-7229-1	SSAO8-04-0BPC SSAO8-07-0BPC SSAO7-04-0BPC	All compounds reported below the PQL.	J (all detects)	Α	Project Quantitation Limit (sp)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-7229-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Field Blank Data Qualification Summary - SDG 280-7229-1

No Sample Data Qualified in this SDG

Tronox Northqate Henderson

LDC #:	24140F2a	VALIDATION COMPLETENESS WORKSHEET	Date: 10/20/
SDG #:_	280-7229-1	_ Stage 2B	Page: Vof V
Laborato	ry: Test America	-	Reviewer: 31/6
			2nd Reviewer:

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

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

	Validation Area		Comments
1.	Technical holding times	A	Sampling dates: 9 /6 8 /10
II.	GC/MS Instrument performance check	A	
111.	Initial calibration	Å	2 KSD ~
IV.	Continuing calibration/ICV	A	ca ha = 25 2
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	Client Spec
VIII.	Laboratory control samples	A	us
IX.	Regional Quality Assurance and Quality Control	N	
Χ.	Internal standards	A	· ·
XI.	Target compound identification	N	·
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	Α	
XVI.	Field duplicates	N	
XVII.	Field blanks	N	

Note:

A = Acceptable

N = Not provided/applicable SW = See worksheet

ND = No compounds detected

R = Rinsate FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

All soils

	HII 3075					
1	SSAO8-04-0BPC	11	21	31		
2	SSAO8-07-0BPC	12	22	32		
- 3	SSAO7-04-0BPC	13	23	33		
4	MB 280-31791 /-A	14	24	34		
5		15	25	35		
6		16	26	36		
7		17	27	37		
8		18	28	38		
9		19	29	39		
10		20	30	40		

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS Additional Sampling,

Henderson, Nevada

Collection Date:

September 10, 2010

LDC Report Date:

October 25, 2010

Matrix:

Soil

Parameters:

Semivolatiles

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-7342-1

Sample Identification

SSA07-08-0BPC

SSA07-07-0BPC**

SSAO8-12-0BPC

SSAO8-09-0BPC

SSAO8-06-0BPC

SSAO8-12-0BPC FD

SSAO7-07-0BPCMS

SSAO7-07-0BPCMSD

^{**}Indicates sample underwent Stage 4 review

Introduction

This data review covers 8 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.

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

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

V. Blanks

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

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
MB 280-32100/1-A	9/19/10	Bis(2-ethylhexyl)phthalate	97.3 ug/Kg	SSAO7-08-0BPC SSAO7-07-0BPC** SSAO8-12-0BPC

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
MB 280-32399/1-A	9/21/10	Bis(2-ethylhexyl)phthalate	92.8 ug/Kg	SSAO8-09-0BPC SSAO8-06-0BPC SSAO8-12-0BPC_FD

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
SSAO7-08-0BPC (4.0X)	Bis(2-ethylhexyl)phthalate	670 ug/Kg	670U ug/Kg
SSAO7-07-0BPC**	Bis(2-ethylhexyl)phthalate	110 ug/Kg	110U ug/Kg
SSAO8-12-0BPC	Bis(2-ethylhexyl)phthalate	98 ug/Kg	98U ug/Kg
SSAO8-09-0BPC	Bis(2-ethylhexyt)phthalate	220 ug/Kg	220U ug/Kg
SSAO8-06-0BPC	Bis(2-ethylhexyl)phthalate	350 ug/Kg	350U ug/Kg
SSAO8-12-0BPC_FD	Bis(2-ethylhexyl)phthalate	110 ug/Kg	110U ug/Kg

No field blanks were identified in this SDG.

VI. Surrogate Spikes

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

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
SSAO7-08-0BPC SSAO8-09-0BPC SSAO8-06-0BPC	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	-1	
Sample	Finding	Flag	A or P
All samples in SDG 280-7342-1	All compounds reported below the PQL.	J (all detects)	А

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

XIII. 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 SSAO8-12-0BPC and SSAO8-12-0BPC_FD were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentrat	tion (ug/Kg)				
Compound	SSAO8-12-0BPC	SSAO8-12-0BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
2-Methylnaphthalene	24	100	-	76 (≤330)	•	-
Acenaphthene	30	57	-	27 (≤330)	<u>.</u>	-
Bis(2-ethylhexyl)phthalate	98	110	-	12 (≤330)	-	_
Dimethylphthalate	330U	27	-	303 (≤330)	-	-
Naphthalene	330U	250	_	80 (≤330)	-	-
Phenanthrene	17	330U	-	313 (≤330)	-	

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG 280-7342-1

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-7342-1	SSAO7-08-0BPC SSAO8-09-0BPC SSAO8-06-0BPC	Benzo(b)fluoranthene Benzo(k)fluoranthene	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	Р	Compound quantitation and CRQLs (q)
280-7342-1	SSAO7-08-0BPC SSAO7-07-0BPC** SSAO8-12-0BPC SSAO8-09-0BPC SSAO8-06-0BPC SSAO8-12-0BPC_FD	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-7342-1

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
280-7342-1	SSAO7-08-0BPC (4.0X)	Bis(2-ethylhexyl)phthalate	670U ug/Kg	А	bl
280-7342-1	SSAO7-07-0BPC**	Bis(2-ethylhexyl)phthalate	110U ug/Kg	А	bl
280-7342-1	SSAO8-12-0BPC	Bis(2-ethylhexyl)phthalate	98U ug/Kg	. А	bl
280-7342-1	SSAO8-09-0BPC	Bis(2-ethylhexyl)phthalate	220U ug/Kg	А	bl
280-7342-1	SSAO8-06-0BPC	Bis(2-ethylhexyl)phthalate	350U ug/Kg	А	bl
280-7342-1	SSAO8-12-0BPC_FD	Bis(2-ethylhexyl)phthalate	110U ug/Kg	А	bl

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Field Blank Data Qualification Summary - SDG 280-7342-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson T

LDC #:_	24140G2a	VALIDATION COMPLETENESS WORKSHEE
SDG #:_	280-7342-1	Stage 2B/4
Laborate	ory: Test America	

Reviewer: 2nd Reviewer:

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

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

	Validation Area		Comments
1.	Technical holding times	A	Sampling dates: 9 ho ho
II.	GC/MS Instrument performance check	A	
111.	Initial calibration	A	2 RSD
IV.	Continuing calibration/ICV	A	ca/10 = 252
V.	Blanks	SM	
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	
X.	Internal standards	A	
XI.	Target compound identification	Α	Not reviewed for Stage 2B validation.
XII.	Compound quantitation/CRQLs	Sh)	Not reviewed for Stage 2B validation.
XIII.	Tentatively identified compounds (TICs)	N	Not reviewed for Stage 2B validation.
XIV.	System performance	A	Not reviewed for Stage 2B validation.
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D = 3,6
XVII.	Field blanks	NX	Eb = EB 09+02010 (from 280-7344-+)

Note:

A = Acceptable

SW = See worksheet

N = Not provided/applicable

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank EB = Equipment blank

Validated Samples: ** Indicates sample underwent Stage 4 validation

	All So	115					
1	SSAO7-08-0BPC	11 /	MB 280 - 32100 /-A	21		31	
2 1	SSA07-07-0BPC**	12	MB 280- 32399/1-A	22		32	
3 1	SSAO8-12-0BPC D	13		23		33	
4 7	SSAO8-09-0BPC	14		24	_	34	
5 7	SSAO8-06-0BPC	15		25		35	
6)	SSAO8-12-0BPC_FD b	16		26		36	
7	SSAO7-07-0BPCMS	17		27		37	
8	SSAO7-07-0BPCMSD	18		28		38	
9		19		29		39	
10		20		30		40	

Page: _\ of _2 Reviewer: _\ \mathcal{JVL} 2nd Reviewer: _\ _

Method: Semivolatiles (EPA SW 846 Method 8270C)

Validation Area	Yes	No	NA	Findings/Comments
L Tachnical holding times	les	140		Timonga Commenta
All technical holding times were met.				
Cooler temperature criteria was met.				
ii GCMS Instrument performance creck				
Were the DFTPP performance results reviewed and found to be within the specified criteria?				
Were all samples analyzed within the 12 hour clock criteria?		Note and a sing of the	Sec. 10.00 (19.3	
III Initial Calibration	7	ı		
Did the laboratory perform a 5 point calibration prior to sample analysis?	/	<u> </u>		
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 Barks (Spinish and Spinish S	2			Contract Con
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.				
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?			•	
ras cantes sobre recreative contests				
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?				
Vine Constant vine definition and the constant of the constant				
Was an LCS analyzed for this SDG?				

VALIDATION FINDINGS CHECKLIST

	V	N 1 -	AL A	Findings/Commonts
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?			09/1 No. 1980 Co. 10 10 10	
D. Regional Quality Assurance and Guality Control				
Were performance evaluation (PE) samples performed?				
Were the performance evaluation (PE) samples within the acceptance limits?	PE 00000	property of	0.00 (2.00)	
Xemienas saiscans				
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?		AND COMPANY		
XI. Since compared benulcation with the state of the stat	2.2			
Were relative retention times (RRT's) within + 0.06 RRT units of the standard?	/			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	/			
Were chromatogram peaks verified and accounted for?				36/E X. * *
XII Company quantitation/CRUEs		l e		
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?		/		
XIIIs Tenatively identified compatrics (TIPS)				
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)?			/	
System performance was found to be acceptable.				
Overall assessment of data was found to be acceptable.				
			25.0	
Field duplicate pairs were identified in this SDG.				
Target compounds were detected in the field duplicates.				
cyleges reges received to the control of the contro				
Field blanks were identified in this SDG.	X	J	//	
Target compounds were detected in the field blanks.	Ì	//	1	

VALIDATION FINDINGS WORKSHEET

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

A. Phenol™	P. Bis(2-chioroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachiorophenoi™	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-Dinitrophenol⁴	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene**	T. 4-Chloroaniline	II. 4-Nitropheno!*	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. Banzoic Acid
l. 4-Methylphenol	X. Hexachlorocyclopentadiene*	MM. 4-Chlorophenyl-phenyl ether	BBB. 3,3'-Dichlorobenzidine	QQQ. Benzyi alcohol
J. N-Nitroso-di-n-propylamine*	Y. 2,4,6-Trichlorophenol**	NN. Fluorene	CCC, Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	00. 4-Nitroaniline	DDD. Chrysene	SSS, Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TTT.
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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414	760
LDC #:	SDG #:

VALIDATION FINDINGS WORKSHEET

101	3	2
Page:	Reviewer:	2nd Reviewer:

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

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

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

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

Was the blank contaminated? If yes, please see gualification below. Y/N N/A N/N N/A

Associated Samples: 26 Blank extraction date: 9 /19 /20 Blank analysis date: 9

3

(6 R) Sample Identification 80 2 4.0× 670 4-14 280-321 00/K-A 97.3 Blank ID FEE Compound Z Conc. units:

Associated Samples: 124/10 Blank extraction date: Conc. units:

> D ÷

4-6

29

Sample Identification 2 252 S 220 280-323966-4 Blank ID 928 でです Compound

5x Phthalates 2x all others

LDC# 34 190 Gra

Compound Quantitation and Reported CRQLs VALIDATION FINDINGS WORKSHEET

l of] Page: Reviewer:

2nd Reviewer:

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

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

	1	T	Ī	T	T	T	1	T	T	T	7	T	T-	1	1		-	1
Qualifications	7 / h																	
Associated Samples	phred	ana																
Finding	GGG, HHH perlis unresolved	tab need total peak	for quantitution															
Sample ID	4 5																	
Date																		
#																		

Comments: See sample calculation verification worksheet for recalculations

LDC#: 24140G2a

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	of/
Reviewer:	W6
2nd Reviewer:	~

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

N NA Were field duplicate pairs identified in this SDG?

N_NA Were target analytes detected in the field duplicate pairs?

Compound Name	Conc	(ug/Kg)	RPD	Diff	Diff Limits	Quals
Compound Name	3	6	KFD (≤50%)	DIII	Diricinats	(Parent Only)
2-Methylnaphthalene	24	100		76	≤330	
Acenaphthene	30	57		27	≤330	
Bis(2-ethylhexyl)phthalate	98	110		12	≤330	
Dimethyl phthalate	330U	27		303	≤330	
Naphthalene	330U	250		80	≤330	
Phenanthrene	17	330U		313	≤330	

V:\FIELD DUPLICATES\24140G2a.wpd

LDC #:

VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

Page: 1 of Y Reviewer: JVG

2nd Reviewer:

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

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

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

%RSD = 100 * (S/X)

 $\mathsf{KKF} = (A_{\mathsf{x}})(\mathsf{Cl}_{\mathsf{s}})(\mathsf{Cx})$ average RRF = sum of the RRFs/number of standards C_{x}

 $A_{x} = Area \ of \ Compound$ $C_{x} = Concentration \ of \ compound,$ $S= Standard \ deviation \ of \ the \ RRFs,$

 $A_{ls} = Area \ of \ associated \ internal \ standard$ $C_{ls} = Concentration \ of \ internal \ standard$ $X = Mean \ of \ the \ RRFs$

					Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration			RRF	RRF	Average RRF	Average RRF	%RSD	%RSD
#	Standard ID Date	Date	Compound (Internal Standard)	dard)	(50 std)	(50 std)	(Initial)	(Initial)		
-	ICAL	9/15/2010	9/15/2010 1,4-Dioxane	(181)	see r2 calculations	ns				
	MSS D		Naphthalene	(182)	1.0439	1.0439	1.0514	1.0514	4.8	4.84
			Fluorene	(183)	1.2658	1.2658	1.2948	1.2948	7.9	7.89
			Hexachlorobenzene	(1S4)	0.2207	0.2207	0.2343	0.2343	10.0	9.97
			Chrysene	(185)	1.0079	1.0079	1.0117	1.0117	4.2	4.18
			Benzo(g,h,i)perylene	(186)	1.0014	1.0014	1.0046	1.0046	11.2	11.18

Area IS		244285	934927	603765	1043323	1161848	1028955
Area cod	200	185677	1220003	955330	287832	1463728	1287934
IS/Cod	200	40/20	40/20	40/20	40/20	40/20	40/20

Cond 1,4-Dioxane Naphthalene Fluorene Hexachlorob Chysene Benzal 4.00 r2 0.9661 1.1493 0.2011 0.9354 10.00 1.0094 1.1995 0.2011 0.9893 20.00 1.0162 1.2174 0.2187 0.9758 80.00 1.0439 1.2658 0.2207 1.0079 120.00 1.0903 1.3539 0.2351 1.0501 160.00 1.0903 1.3954 0.2547 1.0414 X #DIV/0! 1.0514 1.2948 0.2704 1.0404 X #DIV/0! 0.0509 0.01022 0.0234 0.0423 0.0423	•						
r2 0.9661 1.1493 1.0094 1.1995 0.2011 1.0162 1.2174 0.2187 1.0439 1.2658 0.2207 1.0792 1.3539 0.2351 1.0903 1.3533 0.2393 #DIV/0! 1.0514 1.2948 0.2704 #DIV/0! 0.0509 0.1022 0.02343	Conc	1 1	Naphthalene	Fluorene	Hexachlorob	Chysene	Benzo(g,h,i)per
1.0094 1.1995 0.2011 1.0162 1.2174 0.2187 1.0439 1.2658 0.2207 1.0792 1.3399 0.2351 1.0903 1.3653 0.2393 #DIV/0! 1.0514 0.2704 #DIV/0! 0.0509 0.1022	4.00	1.2	0.9661	1.1493		0.9354	0.8279
#DIV/OI #DIV/OI 1.0162 1.2174 0.2187 0.2207 #DIV/OI 1.0439 1.2658 0.2351 0.2351 1.0903 1.3533 0.2393 0.2393 #DIV/OI 1.0913 1.3954 0.2704 #DIV/OI 0.0509 0.1022 0.02343	10.00		1.0094	1.1995		0.9893	0.8797
1.0439 1.2658 0.2207 1.0792 1.3399 0.2351 1.0903 1.3533 0.2393 1.0932 1.3954 0.2547 #DIV/0! 1.0514 1.2948 0.2704 #DIV/0! 0.0509 0.1022 0.02343	20.00		1.0162	1.2174		0.9758	0.9418
1.0792 1.3399 0.2351 1.0903 1.3533 0.2393 1.0932 1.3954 0.2547 1.1130 1.4378 0.2704 #DIV/0! 1.0514 1.2948 0.2343 #DIV/0! 0.0509 0.1022 0.0234	50.00		1.0439	1.2658		1.0079	1.0014
#DIV/O! 1.0903 1.3533 0.2393 1.0932 1.3954 0.2547 1.1130 1.4378 0.2704 #DIV/O! 1.0514 1.2948 0.2343 #DIV/O! 0.0509 0.1022 0.0234	80.00		1.0792	1.3399		1.0501	1.0538
#DIV/0! 1.0932 1.3954 0.2547 #DIV/0! 1.0514 1.2948 0.2343 #DIV/0! 0.0509 0.1022 0.0234	120.00		1.0903	1.3533		1.0414	1.0832
#DIV/0! 1.0514 1.2948 0.2343 (0.0234) #DIV/0! 0.0509 0.1022 0.0234	160.00		1.0932	1.3954	0.2547	1.0532	1.1164
#DIV/0! 1.0514 1.2948 0.2343 (#DIV/0! 0.0509 0.1022 0.0234	200.00	-	1.1130	1.4378		1.0404	1.1329
#DIV/0! 0.0509 0.1022 0.0234	×		1.0514	1.2948		1.0117	1.0046
	S		0.0509	0.1022	0.0234	0.0423	0.1123

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 # 24 140 621

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

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Page: 7 of Reviewer: 4

METHOD:

GC EPA SW 846 Method 8270C

1,4-Dioxane Parameter:

Date	Column	Compound	Y area ratio	× conc ratio	ZvX X
	Not specified	1,4-Dioxane	0.0984	0.100	
			0.1765	0.250	
			0.3444	0.500	
			0.7601	1.250	
			1.2284	2.000	
			1.8454	3.000	
			2.3578	4.000	
			3.0143	5.000	

0.7058 0.6888 0.6081 0.6142 0.6151

0.9837

0.5895 0.6029 0.6760

Regression Output:		Reported	
Constant	0.03708	= 0	-0.065000
Std Err of Y Est	0.02621		
R Squared	0.99950	12 =	0.998700
No. of Observations	8.00000		
Degrees of Freedom	00000.9		
X Coefficient(s) 0.59	0.591839	m ==	0.590000
Std Err of Coef. 0.00	0.005410		

VALIDATION FINDINGS WORSHEET Continuing Calibration Results Verification

Page 1 of 1
Reviewer: JVG
2nd Reviewer:

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

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

Where

ave. RRF = initial calibration average RRF

Ax = Area of compound

RRF = continuing calibration RRF
Ais = Area of associated internal standard
Cis = Concentration of internal standard

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

Cx = Concentration of compound

Recalculated %D	14.3	5.1	5.3	5.5	1.3	9.5				
Rec										
Reported %D	14.2	5.1	5.3	5.5	1.3	9.5				
Recalculated (CC RRF)	68624.800	1.105	1.363	0.247	1.025	1.100				
Reported (CC RRF)	68600.000	1.105	1.363	0.247	1.025	1.100				
Average RRF (Initial RRF)	80000.000	1.051	1.295	0.234	1.012	1.005				
	(181)	(182)	(183)	(184)	(185)	(186)				
Compound (Reference IS)	1,4-Dioxane	Naphthalene	Fluorene	Hexachlorobenzene	Chrysene	Benzo(g,h,i)perylene				
Calibration Date	09/20/10									
Standard ID	D8768		MSS D							
#	1									

Compound (Reference IS)	IS)	Concentration	Area Cpd	Area IS
		(IS/Cpd)		
1,4-Dioxane	(IS1)	40/80	236496	225113
Naphthalene	(182)	40/80	1906904	862593
Fluorene	(183)	40/80	1446320	530492
Hexachlorobenzene	(184)	40/80	447244	904839
Chrysene	(185)	40/80	2178908	1062945
Benzo(g,h,i)perylene	(186)	40/80	1920793	873138

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:	lof 1
Reviewer:	JVY
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

Sample ID:

SS = Surrogate Spiked

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	100	84. C	85	28	0
2-Fluorobiphenyl		82.3	82	8 ~	
Terphenyl-d14	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	102,0	102	10~	8
Phenol-d5	·				
2-Fluorophenol					
2,4,6-Tribromophenol			·		
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID:

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

Sample ID.

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

SDG #: See Carer

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: 1/2

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

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

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

Where: SSC = Spiked sample concentration SA = Spike added

SC = Sample concentation

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

MSC = Matrix spike concentration

MSDC = Matrix spike duplicate concentration

MS/MSD samples: 7

			ted			Ī							T	=			=
OS			Recalculated					+		-	-						
MS/MSD	aga	KPL	Reported					7		,	/						
Duplicate	View		Recalc					λy		-	75	_					
Matrix Spike Duplicate	Percent Recovery		Reported					<u>ک</u>		. 3	22						
Matrix Spike	Recovery		Recalc				- ×	2	-	-					•		
Matrix	Percent Recovery		Keported	,			13	0		0 1	,,						
Sample	Concentration	0	N S				7/2	2		7210							
Spiked	Concer (と)	W	Cin				2630			0366							
Sample	$(\mu_{\zeta}/\ell_{\zeta})$	0					0			4							
ike	ke,)	O MSD					2490			2490							
Spike	(US	MS					2490			2490							
	Compound			Phenol	N-Nitroso-di-n-propylamine	 4-Cnloro-3-methylphenol	Acenaphthene		Pentachiorophenol	Pyrene							

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

LUC#: 24140 G2

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Reviewer: 10f 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 = 1 LCSC - LCSDC 1 * 2/(LCSC + LCSDC)

LCS/LCSD samples: 1

10 256- 32100 /2-A

	Sp	ike	Sp	Spike	SOI	Ş	: -	I CSD	I CS/I CSD	CSD
Compound	Added (MS AS	ded /e_)	Concentration (M. Acc.)	Concentration	Percent Recovery	ecovery	Percent Recovery	Secovery	RPD	Q
	SOI	l csn	SOI	J CSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenoi										
N-Nitroso-di-n-propytamine										
4-Chloro-3-methylphenol										
Acenaphthene	2610	NA	01k	114	83	63				
Pentachlorophenoi				2						
Pyrene	2610		0152		36	75				
						, ,				

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 #:_	24	140	G2K
SDG #	\	(10	~~

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:	<u>lof_l</u>
Reviewer:	706
2nd reviewer:	1~

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

Y	N	N/A
(Y)	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?

Cond	centratio	$n = (A_*)(I_*)(V_*)(DF)(2.0)$
		$(A_{ls})(RRF)(V_{ls})(V_{ls})(%S)$
Α	=	Area of the characteristi

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

A_{is} = Area of the characteristic ion (EICP) for the specific internal standard

i_s = Amount of internal standard added in nanograms (ng)

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

V₁ = Volume of extract injected in microliters (ui)

V, = Volume of the concentrated extract in microliters (ul)

Df = Dilution Factor.

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

Example:

22

Sample I.D. # γ ,

Conc. = $\frac{(11144)(40)(40)(1ml)(10m)(1)}{(1065068)(0,234)(31.38)(0,481)(1)}$

= 57.18

~ 57 ng /leg

2.0	= Factor of 2 to accoun	t for GPC cleanup			
#	Sample ID	Compound	Reported Concentration ()	Calculated Concentration ()	Qualification
ļ					
		490,000,000			
		-			
<u> </u>				<u> </u>	^

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS Additional Sampling,

Henderson, Nevada

Collection Date:

September 10, 2010

LDC Report Date:

October 25, 2010

Matrix:

Soil/Water

Parameters:

Semivolatiles

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-7344-1

Sample Identification

SSAJ8-03-1BPC SSAJ8-03-3BPC_FD SSAJ8-03-5BPC SSAJ8-03-8BPC SSAJ8-03-10BPC** EB-09102010 SSAJ8-03-10BPCMS SSAJ8-03-10BPCMSD

^{**}Indicates sample underwent Stage 4 review

Introduction

This data review covers 8 soil samples and one water sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

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

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

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

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

V. Blanks

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

Method Blank ID	Extraction Date	Compound TIC (RT in minutes)	Concentration	Associated Samples
MB 280-32399/1-A	9/21/10	Bis(2-ethylhexyl)phthalate	92.8 ug/Kg	All soil samples in SDG 280-7344-1

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
SSAJ8-03-1BPC	Bis(2-ethylhexyl)phthalate	97 ug/Kg	97U ug/Kg
SSAJ8-03-3BPC	Bis(2-ethylhexyl)phthalate	96 ug/Kg	96U ug/Kg
SSAJ8-03-3BPC_FD	Bis(2-ethylhexyl)phthalate	96 ug/Kg	96U ug/Kg
SSAJ8-03-5BPC	Bis(2-ethylhexyl)phthalate	94 ug/Kg	94U ug/Kg
SSAJ8-03-8BPC	Bis(2-ethylhexyl)phthalate	87 ug/Kg	87U ug/Kg
SSAJ8-03-10BPC**	Bis(2-ethylhexyl)phthalate	95 ug/Kg	95U ug/Kg

Sample EB-09102010 was identified as an equipment blank. No semivolatile contaminants were found in this blank.

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

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

XII. Project Quantitation Limit

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

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-7344-1	All compounds reported below the PQL.	J (all detects)	А

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

XIII. 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 SSAJ8-03-3BPC and SSAJ8-03-3BPC_FD were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentra	ation (ug/Kg)				
Compound	SSAJ8-03-3BPC	SSAJ8-03-3BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Bis(2-ethylhexyl)phthalate	96	96	-	0 (≤350)	-	-

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG 280-7344-1

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-7344-1	SSAJ8-03-1BPC SSAJ8-03-3BPC SSAJ8-03-3BPC_FD SSAJ8-03-5BPC SSAJ8-03-8BPC SSAJ8-03-10BPC** EB-09102010	All compounds reported below the PQL.	J (all detects)	А	Project Quantitation Limit (sp)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-7344-1

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
280-7344-1	SSAJ8-03-1BPC	Bis(2-ethylhexyl)phthalate	97U ug/Kg	А	bl
280-7344-1	SSAJ8-03-3BPC	Bis(2-ethylhexyl)phthalate	96U ug/Kg	А	bl
280-7344-1	SSAJ8-03-3BPC_FD	Bis(2-ethylhexyl)phthalate	96U ug/Kg	А	bl
280-7344-1	SSAJ8-03-5BPC	Bis(2-ethylhexyl)phthalate	94U ug/Kg	Α .	bl
280-7344-1	SSAJ8-03-8BPC	Bis(2-ethylhexyl)phthalate	87U ug/Kg	А	bl
280-7344-1	SSAJ8-03-10BPC**	Bis(2-ethylhexyl)phthalate	95U ug/Kg	А	bl

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Equipment Blank Data Qualification Summary - SDG 280-7344-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

_DC #: 24140H2a	VALIDATION COMPLETENESS WORKSHEET
SDG #: 280-7344-1	Stage 2B/4
Laboratory: Test America	

Reviewer: 2nd Reviewer:

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

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

	Validation Area		Comments
l.	Technical holding times	Α	Sampling dates: 9 /10 /10
II.	GC/MS Instrument performance check	A	·
III.	Initial calibration	A	% RSD r CW/101 = 25 }
IV.	Continuing calibration/ICV	Α	ca/10 € 25 }
V.	Blanks	5W	
VI.	Surrogate spikes	Ą	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	Α	LCS
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	Α	
XI.	Target compound identification	A	Not reviewed for Stage 2B validation.
XII.	Compound quantitation/CRQLs	A	Not reviewed for Stage 2B validation.
XIII.	Tentatively identified compounds (TICs)	N	Not reviewed for Stage 2B validation.
XIV.	System performance	A	Not reviewed for Stage 2B validation.
XV.	Overall assessment of data	A	
XVI.	Field duplicates	W2	$\dot{D} = 2,3$
XVII.	Field blanks	ND	E8 = 7

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

** Indicates sample underwent Stage 4 validation Validated Samples:

	Soil +		water		
1	SSAJ8-03-1BPC	† 11	MB 280- 32399 /1-A	21	31
2	SSAJ8-03-3BPC	12	MB 280-32399/1-A MB 280-7344-18	22	32
3	SSAJ8-03-3BPC_FD b	13		23	33
4	SSAJ8-03-5BPC	14		24	34
5	SSAJ8-03-8BPC	15		25	35
6	SSAJ8-03-10BPC**	16		26	36
₇ >	EB-09102010 W	17		27	37
8	SSAJ8-03-10BPCMS	18		28	38
9	SSAJ8-03-10BPCMSD	19		29	39
10		20		30	40

Page: \(\frac{1}{2}\) of \(\frac{2}{2}\)
Reviewer: \(\frac{1}{2}\)
2nd Reviewer: \(\frac{1}{2}\)

Method: Semivolatiles (EPA SW 846 Method 8270C)

			T	
Validation Area	Yes	No	NA	Findings/Comments
I Tachnical holding times				
All technical holding times were met.				
Cooler temperature criteria was met.				
II. GCANS instrument performance creax				
Were the DFTPP performance results reviewed and found to be within the specified				
criteria?			 	
Were all samples analyzed within the 12 hour clock criteria?		V 24		
ill Initial calibration				
Did the laboratory perform a 5 point calibration prior to sample analysis?			1	
Were all percent relative standard deviations (%RSD) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?			<u> </u>	
Was a curve fit used for evaluation?	/			
Did the initial calibration meet the curve fit acceptance criteria of > 0.990?	/			
Were all percent relative standard deviations (%RSD) ≤ 30% and relative response				·
factors (RRF) > 0.05?				10 m
IV Continuing calibration	T T	I	T T	
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?				
Were all percent differences (%D) and relative response factors (RRF) within	/			
method criteria for all CCCs and SPCCs?			 	
Were all percent differences (%D) ≤ 25% and relative response factors (RRF) ≥ 0.05?	/		1	
	_			
Was a method blank associated with every sample in this SDG?	-	-	┼	
Was a method blank analyzed for each matrix and concentration?	/	<u> </u>	 	
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.				
Was all aurocate V.B. within OC limits?				
Were all surrogate %R within QC limits?	 		1	
If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?	ļ		/_	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?		a was in the cone		
The Company of American Company				
State Section Control of the Association of the Ass				
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	1/	1		
(RPD) within the QC limits?			100 m	
vijo kalendavy vasinskedni č eske				
Was an LCS analyzed for this SDG?	/	1		

VALIDATION FINDINGS CHECKLIST

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?	/			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?				
DX Regional Quality Assurance and Chality Sound				
Were performance evaluation (PE) samples performed?		/		
Were the performance evaluation (PE) samples within the acceptance limits?	******************************		/	
Xanera sense:				AND THE PARTY OF T
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 carge compound benefication				
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?			A200	
XII. Composino quantitatio VGFXCLS 6 da 18 18 46 48 18 18 18 18 18 18 18 18 18 18 18 18 18				
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. Tentalityely identified compounds (170s) 1				
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)?				
NVS Standard mension				10 A
System performance was found to be acceptable.		de anteriorista		The state of Confederation Science and Confe
Overall assessment of data was found to be acceptable.		,		
Field duplicate pairs were identified in this SDG.				
Target compounds were detected in the field duplicates.				
XVI Pěli vanis				
Field blanks were identified in this SDG.				
Target compounds were detected in the field blanks.				

VALIDATION FINDINGS WORKSHEET

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

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

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Fage:_ Reviewer:_ 2nd Reviewer:	

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

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

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

Was a method blank analyzed for each concentration preparation level?

Was the blank contaminated? If yes, please, see qualification below. Was a method blank associated with every sample? Y N/A

Blank extraction date: 4/21/10 Blank analysis date: 4 N/A

₩

1/56 Sample Identification 42 Associated Samples: 9 280-3239 Blank 1D 7 力力 Conc. units:

Blank extraction date:

Blank analysis date:

5x Phthalates 2x all others

LDC#: 24140H2a

VALIDATION FINDINGS WORKSHEET

Field Duplicates

	Page:	<u> </u>	of <u>) </u>
	Reviewer:_	D	4
2nd	Reviewer:		/~

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

YN NA

Were field duplicate pairs identified in this SDG?

N NA

Were target analytes detected in the field duplicate pairs?

Compound Name	Conc (ug/Kg)	RPD	Diff	Diff Limits	Quals
Compound Name	2	3	(≤50%)	DIII	Diff Cilling	(Parent Only)
Bis(2-ethylhexyl)phthalate	96	96		0	≤350	

V:\FIELD DUPLICATES\24140H2a.wpd

LDC# 24/40 +22

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

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:

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

average RRF = sum of the RRFs/number of standards

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

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

%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	Compound (Internal Standard)	dard)	(50 std)	(50 std)	(Initial)	(Initial)		
1	ICAL	9/23/2010	9/23/2010 1,4-Dioxane	(181)	0.5414	0.5414	0.5467	0.5467	10.9	10.91
	MSS Y		Naphthalene	(182)	1.0285	1.0285	1.0303	1.0303	1.4	1.37
			Fluorene	(183)	1.2605	1.2605	1.2584	1.2584	4.8	4.81
			Hexachlorobenzene	(184)	0.2358	0.2358	0.2435	0.2435	4.3	4.29
			Bis(2-ethylhexyl)phthalate	(185)	see r2 calculations	SL				
			Benzo(g,h,i)perylene	(186)	0.9682	0.9682	0.9416	0.9416	12.7	12.68

Area IS	214563	872181	548947	911902	973988	876472
Area cpd	145195	1121337	864951	268731	1223088	1060714
nc IS/Cpd	40/20	40/20	40/20	40/20	40/20	40/20

Conc	1,4-Dioxane	Naphthalene	Fluorene	Hexachlorob	bis(2eh)phth	Benzo(g,h,i)per
4.00	0.6894	1.0108	1.1578		1.2	0.7223
10.00	0.5449	1.0504	1.1888	0.2352		0.8117
20.00	0.5423	1.0213	1.2358	0.2306		0.9185
50.00	0.5414	1.0285	1.2605	0.2358		0.9682
80.00	0.5180	1.0495	1.3064	0.2403		0.9819
120.00	0.5035	1.0338	1.2801	0.2533		1.0222
160.00	0.5222	1.0184	1.3121	0.2558		1.0472
200.00	0.5122	1.0298	1.3256	0.2536		1.0611
×	0.5467	1.0303	1.2584	0.2435	0.000	0.9416
S	0.0596	0.0141	0.0605	0.0104	#DIV/0i	0.1194

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 # 24/40 H 29

VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

2 of 2

Page:

METHOD: G(

GC EPA SW 846 Method 8270C

Parameter:

Bis(2-eh)phthalate

×	conc ratio	0.100	0.250	0.500	1.250	2.000	3.000	4.000	5.000	-
\	area ratio	0.0332	0.1086	0.2795	0.8169	1.4119	2.1210	2.8427	3.6032	
	Compound	Bis(2-eh)phthalate		,		•				
	Column	Not specified								
	Dafe	09/23/2010								

0.3316 0.4343 0.5590 0.6535 0.7059

X^2

0.7206

0.7107

þe	0.059700		0.993000			0.700600	
Reported	11 0		r2 =			= W	
	-0.07110	0.02132	0.99978	8.00000	6.00000		
			-			0.732027	0.004399
Regression Output:							
, R	Constant	Std Err of Y Est	R Squared	No. of Observations	Degrees of Freedom	X Coefficient(s)	Std Err of Coef

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3
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#
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Continuing Calibration Results Verification **VALIDATION FINDINGS WORSHEET**

Page 1 of 1 Reviewer._ 2nd Reviewer:

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

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

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

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

ave. RRF = initial calibration average RRF

RRF = continuing calibration RRF

Ax = Area of compound

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

		Calibration			Average RRF	Reported	Recalculated	Reported	Recalculated
Standard ID	₽	Date	Compound (Reference IS)		(Initial RRF)	(CC RRF)	(CC RRF)	Q%	Q%
Y5105	5	09/24/10	1,4-Dioxane	(IS1)	0.5467	0.5259	0.5259	3.8	3.8
MSS Y	→		Naphthalene	(182)	1.0303	1.0673	1.0673	3.6	3.6
			Fluorene	(183)	1.2584	1.2852	1.2852	2.1	2.1
			Hexachlorobenzene	(184)	0.2435	0.2502	0.2502	2.8	2.8
		i i i	Bis(2-ethylhexyl)phthalate	(185)	80000	81800	81793	2.2	2.2
			Benzo(g,h,i)perylene	(186)	0.9416	1.0304	1.0304	9.4	9.4
									_

Compound (Reference IS)		Concentration	Area Cpd	Area IS	Area Cpd	Area IS
		(IS/Cpd)				
1,4-Dioxane	(IS1)	40/80	211295	200892		
Naphthalene	(IS2)	40/80	1685942	789799		
Fluorene	(IS3)	40/80	1315231	511699		
Hexachlorobenzene	(IS4)	40/80	427264	853812		- Children and a second
Bis(2-ethylhexyl)phthalate	(185)	40/80	1299611	934443		
Benzo(g,h,i)perylene	(186)	40/80	1701263	825567		

LDC#: 24140 Hza

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:_	lof_1_
Reviewer:	Mt_
2nd reviewer:_	1/

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	79.9	80	80	0
2-Fluorobiphenyl		78.0	78	78	
Terphenyl-d14		101.4	101	101	
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID:

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

Sample ID:

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

24:45 HZ SDG #: See Cover LDC#:

Matrix Spike/Matrix Spike Duplicates Results Verification VALIDATION FINDINGS WORKSHEET

Mc Page: lof 1 Reviewer. 2nd Reviewer:

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

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

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

Where: SSC = Spiked sample concentration SA = Spike added

SC = Sample concentation

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

MSC = Matrix spike concentration

MSDC = Matrix spike duplicate concentration

MS/MSD samples:

⊗

	ďS		Sample	Spiked	Sample	Matrix Spike	Spike	Matrix Spike Duplicate	- Duplicate	MS/MSD	C:
Compound	, SAG	Added VS /kx)	Concentration (45/5)	Concer (Mg	Concentration (tx/E)	Percent Recovery	ecovery	Percent Recovery	ecovery	RPD	
	MS	MSD	0	MS	MSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol											
N-Nitroso-di-n-propylamine											
4-Chloro-3-methylphenol											
Acenaphthene	26.70	058c	a	0960	2310	48	× ×	- &	8	y	7
Pentachlorophenol											
Pyrene	28.70	2650		2882	280	104	40)	98	86	ب	9
					-						

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.

LUC#: 34/40 #29

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

Reviewer:_

Page: Lof 1 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:

RPD = 1 LCSC - LCSDC 1 * 2/(LCSC + LCSDC)

LCS/LCSD samples: _

322991/2-4 - 03e ž

	Sp	ike	Sp	Spike	31	CS	ິ -	CSD	103/1	CS/I CSD
Compound	Added (MS /FE	ded /E)	Concer (7K)	Concentration	Percent Recovery	Recovery	Percent F	Percent Recovery	Ŗ	RPD
	1.05	l csn	SUL	Usol /	Reported	Recalc	Reported	Recalc	Reported	Receiculated
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methyiphenol										
Acenaphthene	2640	L.A.	2240	KA	8 5	Şx				
Pentachlorophenol						3		\		
Pyrene	2640		0982	_>	801	801				
							\			
	•									

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 #: 24 140 Hza

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:	tott
Reviewer:_	JV4
reviewer.	M

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

$\langle Y \rangle$	N	N/A
y	Ν	N/A

Were all reported results recalculated and verified for all level IV samples?

Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Conce	entratio	$n = \frac{(A_{.})(I_{.})(V_{.})(DF)(2.0)}{(A_{})(RRF)(V_{})(V_{.})(%S)}$	Example:
A _x	=	Area of the characteristic ion (EICP) for the compound to be measured	Sample I.D. # 6 FEE:
A _{is}	=	Area of the characteristic ion (EICP) for the specific internal standard	
l _s	=	Amount of internal standard added in nanograms (ng)	Conc. $\left\{ = \frac{(4281)}{(865634)} \right\} \left(\right) \right) \left(\left(\right) \left(\right) \left(\right) \left(\right) \left(\right) \left(\right) \left(\left(\right) \left(\right) \left(\right) \left(\right) \left(\right) \left(\left(\right) \left(\right) \left(\right) \left(\left(\right) \left(\right) \left(\right) \left(\left(\right) \left(\right) \left(\left(\right) \left(\right) \left(\left(\left(\right) \left(\left(\left(\right) \left($
V_{\circ}	=	Volume or weight of sample extract in milliliters (ml) or grams (g).	0.7066 + 0.0597
V,	=	Volume of extract injected in microliters (ul)	=
V,	=	Volume of the concentrated extract in microliters (ul)	
Df	=	Dilution Factor.	X = 0.0668
% S	=	Percent solids, applicable to soil and solid matrices only.	final conc. = 6.0668) (40) (1ml) (1000)

2.0	= Factor of 2 to accour	nt for GPC cleanup	,			
#	Sample ID	Compound		Reported 30, Concentration	Concentration	Qualification
·				= 95.2	us ler	
					δ	
		·				
				7		
						· · · · · · · · · · · · · · · · · · ·
		1				

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS Additional Sampling,

Henderson, Nevada

Collection Date:

September 1, 2010

LDC Report Date:

October 25, 2010

Matrix:

Soil/Water

Parameters:

Semivolatiles

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-7047-1

Sample Identification

SSAJ2-04-10BPC

SSAJ2-04-1BPC

SSAJ2-04-5BPC

SSAI2-03-10BPC

SSAI2-03-1BPC

SSAI2-03-5BPC

SSAI2-04-10BPC**

SSAI2-04-1BPC

SSAI2-04-5BPC

SSAI2-03-1BPC_FD

EB-09012010

SSAI2-04-5BPCMS

SSAI2-04-5BPCMSD

^{**}Indicates sample underwent Stage 4 review

Introduction

This data review covers 12 soil samples and one water sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8270C for Semivolatiles.

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

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

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.

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

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

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

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

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

V. Blanks

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

Sample EB-09012010 was identified as an equipment blank. No semivolatile contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Compound	Concentration	Associated Samples
EB-09012010	9/1/10	Bis(2-ethyhexyt)phthalate	2.2 ug/L	All soil samples in SDG 280-7047-1

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

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for samples SSAI2-03-5BPC and SSAJ2-04-10BPC. Since the samples were diluted out, no data were qualified.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Although the MS/MSD percent recoveries (%R) were not within QC limits for several compounds, the 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) and relative percent differences (RPD) were within QC limits.

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

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

XII. Project Quantitation Limit

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

Sample	Compound	Finding	Flag	A or P
SSAI2-04-5BPC	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 280-7047-1 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 SSAI2-03-1BPC and SSAI2-03-1BPC_FD were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentra	tion (ug/Kg)				
Compound	SSAI2-03-1BPC_FD		RPD (Limits)	Difference (Limits)	Flags	A or P
Bis(2-ethylhexyl)phthalate	300	290	-	10 (≤340)	-	-
Hexachlorobenzene	260	320	-	60 (≤340)	-	-

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG 280-7047-1

SDG	Sample	Compound	Flag	A or P	Reason (Code)			
280-7047-1	SSAI2-04-5BPC	Benzo(b)fluoranthene Benzo(k)fluoranthene	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	Р	Compound quantitation and CRQLs (q)			
280-7047-1	SSAJ2-04-10BPC SSAJ2-04-1BPC SSAJ2-04-5BPC SSAI2-03-10BPC SSAI2-03-1BPC SSAI2-03-5BPC SSAI2-04-10BPC** SSAI2-04-1BPC SSAI2-04-5BPC SSAI2-04-5BPC SSAI2-03-1BPC_FD EB-09012010	All compounds reported below the PQL.	J (all detects)	А	Project Quantitation Limit (sp)			

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 280-7047-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Semivolatiles - Equipment Blank Data Qualification Summary - SDG 280-7047-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

LDC #:	24140l2a	VALIDATION COMPLETENESS WORKSHEE
SDG #:_	280-7047-1	Stage 2B/4
Laborato	ry: Test America	·

Page: 1 of Reviewer: 2nd Reviewer:

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

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

	Validation Area		Comments
l.	Technical holding times	A	Sampling dates: 9/01/10
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	Α	on RSD
IV.	Continuing calibration/ICV	A	CW/W =25 3
V.	Blanks	A	
VI.	Surrogate spikes	ŚW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	Á	us/b
IX.	Regional Quality Assurance and Quality Control	N	
Χ.	Internal standards	A	
Xì.	Target compound identification	Ą	Not reviewed for Stage 2B validation.
XII.	Compound quantitation/CRQLs	SW	Not reviewed for Stage 2B validation.
XIII.	Tentatively identified compounds (TICs)	N	Not reviewed for Stage 2B validation.
XIV.	System performance	A	Not reviewed for Stage 2B validation.
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SM	D = 5,10
XVII.	Field blanks	W2	EB = 11

Note:

A = Acceptable

N = Not provided/applicable SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

** Indicates sample underwent Stage 4 validation

		<u></u>	8) T WATEY			
1	SSAJ2-04-10BPC	11	EB-09012010 W	21	MB 280- 30 977/1-A	31
2	SSAJ2-04-1BPC	12	SSAI2-04-5BPCMS	22	MB 280- 300 58/1-A	32
3	SSAJ2-04-5BPC	13	SSAI2-04-5BPCMSD	23	/	33
4	SSAI2-03-10BPC	14		24		34
5	SSAI2-03-1BPC b	15		25		35
6	SSAI2-03-5BPC	16		26		36
7	SSAI2-04-10BPC**	17		27		37
8	SSAI2-04-1BPC	18		28		38
9	SSAI2-04-5BPC	19		29		39
10	SSAI2-03-1BPC_FD b	20		30		40

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.				
III GCMS Instrument performative energy				
Were the DFTPP performance results reviewed and found to be within the specified criteria?		_		
Were all samples analyzed within the 12 hour clock criteria?			a programme	
III. Initial californium.				
Did the laboratory perform a 5 point calibration prior to sample analysis?			ļ	
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 callocation	I			
Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?				,
Were all percent differences (%D) and relative response factors (RRF) within method criteria for all CCCs and SPCCs?				
Were all percent differences (%D) ≤ 25% and relative response factors (RRF) ≥ 0.05?				
Vallanks				
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.				
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?				
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?	\angle			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?				
Ville De Balla (Say) Agrico Leathighea				Aller Mittals of State (19 , 1997)
Was an LCS analyzed for this SDG?				

LDC#: 24/40 I 29

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer:
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?				
D. Regional Cuality Assurance and Quality Course				
Were performance evaluation (PE) samples performed?	<u> </u>			
Were the performance evaluation (PE) samples within the acceptance limits?			1	
Karlitemal staholarish				ACMINING TO SECURE
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?				
Kurt in term corres conditions and				
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?				
All scape of equality along RQL				
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?				
XUL Lensitively dentitied comparing (1)(2)				
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)?			-	
System performance was found to be acceptable.			204, April 141	
Overall assessment of data was found to be acceptable.		I		
Field duplicate pairs were identified in this SDG.				
Target compounds were detected in the field duplicates.				
Xyla Politican and the Street				
Field blanks were identified in this SDG.				
Target compounds were detected in the field blanks.	7			

VALIDATION FINDINGS WORKSHEET

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

yrene**	JJJ. Indeno(1,2,3-cd)pyrene	KKK. Dibenz(a,h)anthracene	LLL. Benzo(g,h,i)perylene	MMM. Bis(2-Chloroisopropyl)ether		000. N-Nitrosodimethylamine	s Acid	alcohol	91	ne				
III. Benzo(a)pyrene**	JJJ. Indeno(KKK. Dibenz	LLL. Benzo((MMM. Bis(2-	NNN. Aniline	OOO. N-Nitro	PPP. Benzoic Acid	QQQ. Benzyl alcohol	RRR. Pyridine	SSS, Benzidine	TT.	กกก	w.	www.
TT. Pentachlorophenol™	UU. Phenanthrene	W. Anthracene	WW. Carbazole	XX. Di-n-butylphthalate	YY. Fluoranthene**	ZZ. Pyrene	AAA. Butylbenzylphthaiate	BBB. 3,3'-Dichlorobenzidine	CCC. Benzo(a)anthracene	DDD. Chrysene	EEE. Bis(2-ethylhexyl)phthalate	FFF. Di-n-octylphthalate**	GGG. Benzo(b)fluoranthene	HHH. Benzo(k)fluoranthene
EE. 2,6-Dinitrotoluene	FF. 3-Nitroaniline	GG. Acenaphthene™	HH. 2,4-Dinitrophenol*	II. 4-Nitrophenol*	JJ. Dibenzofuran	KK. 2,4-Dinitrotoluene	LL. Diethylphthalate	MM. 4-Chlorophenyl-phenyl ether	NN. Fluorene	00. 4-Nitroaniline	PP. 4,6-Dinitro-2-methylphenol	QQ. N-Nitrosodiphenylamine (1)**	RR. 4-Bromophenyl-phenylether	SS. Hexachlorobenzene
P. Bis(2-chloroethoxy)methane	Q. 2,4-Dichlorophenol**	R. 1,2,4-Trichlorobenzene	S. Naphthalene	T. 4-Chloroaniline	U. Hexachlorobutadiene™	V. 4-Chloro-3-methylphenol™	W. 2-Methylnaphthalene	X. Hexachlorocyclopentadiene*	Y. 2,4,6-Trichlorophenol**	Z. 2,4,5-Trichlorophenol	AA. 2-Chloronaphthalene	BB. 2-Nitroaniline	CC. Dimethylphthalate	DD. Acenaphthylene
A. Phenol**	B. Bis (2-chloroethyl) ether	C. 2-Chlorophenol	D. 1,3-Dichlorobenzene	E. 1,4-Dichlorobenzene**	F. 1,2-Dichlorobenzene	G. 2-Methylphenol	H. 2,2'-Oxybis(1-chloropropane)	I. 4-Methylphenol	J. N-Nitroso-di-n-propylamine⁴	K. Hexachloroethane	L. Nitrobenzene	M. Isophorone	N. 2-Nitrophenol**	O. 2,4-Dimethylphenol

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

LDC#: 24140 IN SDG #:

VALIDATION FINDINGS WORKSHEET Field Blanks

2nd Reviewer: Page: Reviewer:_

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

V N N/A Were field blanks identified in the field blanks?

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

Slank units:

Sample units:

Sample

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

Sample Identification Associated Samples: 罚 <u>火</u>り RSWIS 2.2 Blank ID Compound

Associated sample units: Blank units:

5x Phthalates 2x All others

LDC# 29140 I 29

VALIDATION FINDINGS WORKSHEET Surrogate Recovery

Page: of

2nd Reviewer: Reviewer:

METHOD: GC/MS BNA (EPA SW 846 Method 8270C)
Please see qualification below for all questions answered "N". Not applicable questions are identified as "N/A".

Were percent recoveries (%R) for surrogates within QC limits?

YN N/A

If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?

YN N/A

If any %R was less than 10 percent, was a reanalysis performed to confirm %R?

Qualifications 58-120 (varied %R (Limits) 20 Surrogate FBP (x0x) (x) Sample ID Date #

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

LDC# 24140 I 29

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

3/5 Page: 1 of 1 2nd Reviewer: Reviewer:_

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

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

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 X NA

MS/MSD. Soil / Water.

N N X

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
		12/13	Several	Con	nds my side	()	6	No grad
		_		4.4.4	2 R)	()		(i sy)
				(,)	()	(
				()	()	()		
				()	(')	()		
					,	()		
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				()	()	()		
						(

	•	QC Limits	RPD	QC Limits	RPD			QC Limits	RPD	QC Limits	RPD
	Compound	(Soil)	(Soil)	(Water)	(Water)		Compound	(Soil)	(Soll)	(Water)	(Water)
Ą.	Phenol	26-90%	< 35%	12-110%	< 42%	99	Acenaphthene	31-137%	< 19%	46-118%	< 31%
ن	2-Chlorophenol	25-102%	< 50%	27-123%	< 40%	==	4-Nitrophenol	11-114%	< 50%	10-80%	< 50%
ய	1,4-Dichlorobenzene	28-104%	< 27%	36-97%	< 28%	<u> </u>	KK. 2,4-Dinitrotoluene	28-89%	< 47%	24-96%	≥ 38%
	N-Nitroso-di-n-propylamine	41-126%	< 38%	41-116%	< 38%	Ë	Pentachlorophenol	17-109%	< 47%	9-103%	× 20%
œ	1,2,4-Trichlorobenzene	38-107%	< 23%	39-98%	< 28%	77.	Pyrene	35-142%	< 36%	26-127%	< 31%
>	4-Chloro-3-methylphenol	26-103%	< 33%	23-97%	< 42%					-	

24/40122 LDC #:

Compound Quantitation and Reported CRQLs VALIDATION FINDINGS WORKSHEET

l of) Page:

Reviewer: 2nd Reviewer:

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

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

YN N/A

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

XNN N/A

Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight

Finding Associated Samples 6666 HHH perlis ann solved Lab used toth peak and for grantition
Sample ID
Date

Comments: See sample calculation verification worksheet for recalculations

LDC#: 24140I2a

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page:_	
Reviewer:	384
2nd Reviewer:	

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

Y N NA Y/N NA

Were field duplicate pairs identified in this SDG?

Were target analytes detected in the field duplicate pairs?

Compound Name	Conc (ug/Kg)	RPD	Diff	Diff Limits	Quals
Compound Name	5	10	(≤50%)	Dill	Dill Limits	(Parent Only)
Bis(2-ethylhexyl)phthalate	300	290		10	≤340	
Hexachlorobenzene	260	320		60	≤340	

V:\FIELD DUPLICATES\24140I2a.wpd

LDC# MADO I'va

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

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

S= Standard deviation of the RRFs,

X = Mean of the RRFs

			The state of the s		Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
		Calibration			RRF	RRF	Average RRF	Average RRF	%RSD	%RSD
#	Standard ID	Date	Compound (Internal Standard)	dard)	(50 std)	(50 std)	(Initial)	(Initial)		
1	ICAL	9/13/2010	9/13/2010 1,4-Dioxane	(181)	0.6266	0.6266	0.6356	0.6357	6.2	6.18
	MSS B		Naphthalene	(182)	1.0767	1.0767	1.0396	1.0396	10.0	96.6
			Fluorene	(183)	1.3777	1.3777	1.3051	1.3051	11.6	11.56
			Hexachlorobenzene	(184)	0.2406	0.2406	0.2343	0.2343	6.0	6.03
			Bis(2-ethylhexyl)phthalate	(185)	0.7243	0.7243	0.6681	0.6681	9.7	69.6
			Benzo(g,h,i)perylene	(186)	1.1315	1.1315	1.0938	1.0938	3.8	3.80

	34	88	20	77	69	9
Area IS	252134	994488	570870	965177	1063669	1055901
Area cpd	197471	1338510	983140	290330	963068	1493397
anc IS/Cpd	40/20	40/20	40/50	40/20	40/20	40/20

_						
Conc	1,4-Dioxane	Naphthalene	Fluorene	Hexachlorob	bis(2-eh)phtha	Benzo(g,h,i)per
4.00	0.7296	1.1419	1.4534	0.2371	0.5406	1.0227
10.00	0.6351	1.1290	1.4363	0.2472	0.6101	1.1141
20.00	0.6284	1.1384	1.4299	0.2521	0.6785	1.1201
50.00	0.6266	1.0767	1.3777	0.2406	0.7243	1.1315
80.00	0.6289	1.0555	1.3340	0.2401	0.7348	1.1412
120.00	0.6226	9086.0	1.2121	0.2281	0.7081	1.0957
160.00	0.6087	0.9246	1.1457	0.2180	0.6863	1.0744
200.00	0.6054	0.8701	1.0514	0.2113	0.6617	1.0506
×	0.6357	1.0396	1.3051	0.2343	0.6681	1.0938
S	0.0393	0.1037	0.1509	0.0141	0.0647	0.0415
J						

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.

Continuing Calibration Results Verification VALIDATION FINDINGS WORSHEET

Page 1 of_ Reviewer: 2nd Reviewer:

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

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

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

ave. RRF = initial calibration average RRF

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

RRF = continuing calibration RRF

Cx = Concentration of compound Ax = Area of compound RRF = (Ax)(Cis)/(Ais)(Cx)

		Calibration		Average RRF	Reported	Recalculated	Reported	Recalculated	
	Standard ID	Date	Compound (Reference IS)	(Initial RRF)	(CC RRF)	(CC RRF)	%D	%D	
. 7	B0548	09/18/10	Phenol (IS1)	0.636	0.612	0.612	3.8	3.8	
			Naphthalene (IS2)	1.040	1.051	1.051	1.1	1.1	
			Fluorene (IS3)	1.305	1.283	1.283	1.7	1.7	
			Hexachlorobenzene (IS4)	0.234	0.233	0.233	0.7	0.7	
			Bis(2-ethylhexyl)phthalate (IS5)	0.668	0.752	0.752	12.5	12.5	
			Benzo(g,h,i)perylene (IS6)	1.094	1.077	1.077	1.5	1.5	
1									
1									
1									
ı									

Compound (Reference IS)	(Concentration	Area Cpd	Area IS
		(IS/Cpd)		
1,4-Dioxane	(181)	40/80	323105	264090
Naphthalene	(182)	40/80	2196496	1045249
Fluorene	(183)	40/80	1570034	611700
Hexachlorobenzene	(184)	40/80	472647	1015623
Bis(2-ethylhexyl)phthalate	(185)	40/80	1565882	1041505
Benzo(g,h,i)perylene	(186)	40/80	2262454	1049866

LDC#: 14/40 [29

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:_	lof_t_
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	160	75. <i>1</i>	76	76	9
2-Fluorobiphenyl		73.7	74	74	
Terphenyl-d14		73.4	73	75	1
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-Fluorophenoi					
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 #: 14140 I'M SDG#:

Matrix Spike/Matrix Spike Duplicates Results Verification VALIDATION FINDINGS WORKSHEET

Page: 1 of 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:

Where:

SC = Sample concentation

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

SSC = Spiked sample concentration SA = Spike added

MSD = Matrix spike duplicate percent recovery

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

MS = Matrix spike percent recovery

4

MS/MSD samples:

Compound	5	9	Sample	Spiked 5	Sample	Matrix Spike	Spike	Matrix Spike Duplicate	Duplicate	MS/MSD	, D
	Added (WS / FE	() ()	Concentration (VS /氏)	Concentration (VS /LC)	tration ()	Percent Recovery	ecovery	Percent Recovery	ecovery	RPD	
	MS	O MSD	0	MS	MSD	Renorted	Recalc	Reported	Recalc	Reported	Recalculated
Phenol											
N-Nitroso-di-n-propylamine											
4-Chloro-3-methylphenol											
Acenaphthene 3	2780	2780	a	2440 2240	2740	68	89	/8	~ &	10	(8)
Pentachlorophenol	_	_			-						
Pyrene			20)	78.20	2476	94	44	××	82	7)	4)
	>										

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.

LUC #: 24/40 1 29

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

Reviewer: 1/2 2nd Reviewer: 1/2

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

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

% Recovery = 100 * (SC/SA

Where: SSC = Spike concentration SA = Spike added

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

LCS/LCSD samples: \mathcal{U}^{S}

US 280-20977/2-A

	dS	ike	Š	ike	รบา	V	21	l CSD	1.CS/I	CS/LCSD
Compound	PV (VV)	Added ()	Conce (44	Concentration (Mc/kz,)	Percent Recovery	ecovery	Percent Recovery	Recovery	RF	RPD
	I CS	O I CSD	108	U I CSD	Reported	Recalc	Reported	Racalc	Reported	Recalculated
Phenoi										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene	2630	kΑ	35 of of	λA	79	79				
Pentachlorophenol										
Pyrene	SG 70		2140	>	18	<u>~</u>				
						-	V			
				-						

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 #:	M	140	Iza
LUU m.			-

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:	<u>lof_1</u>
Reviewer:	SIL
2nd reviewer:	

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

	Y	Ν	N/A
ĺ,	y	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 = $(A_{\cdot})(I_{\cdot})(V_{\cdot})(DF)(2.0)$ $(A_{is})(RRF)(V_{o})(V_{\cdot})(\%S)$

= Area of the characteristic ion (EICP) for the compound

to be measured

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

I_s = Amount of internal standard added in nanograms (ng)

V_o = Volume or weight of sample extract in milliliters (ml) or

V_i = Volume of extract injected in microliters (ul)

V_t = Volume of the concentrated extract in microliters (ul)

Df = Dilution Factor.

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

Example:

Conc. = (1) 450) (40)(1ml)(100)()
(95/521) (0,234) (30.7g) (0.919)()

729.1

2 730 mg/leg

2.0	= Factor of 2 to account	t for GPC cleanup				
#	Sample ID	Compound		Reported Concentration ()	Calculated Concentration ()	Qualification
			· · · · · · · · · · · · · · · · · · ·			
	·					
			·			
		,				
				:		
				- All Market		
						· · · · · · · · · · · · · · · · · · ·

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS Additional Sampling,

Henderson, Nevada

Collection Date:

August 27, 2010

LDC Report Date:

October 22, 2010

Matrix:

Soil/Water

Parameters:

Chlorinated Pesticides

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-6956-1

Sample Identification

BDT-1-S-15-10BPC BDT-1-S-15-12BPC BDT-1-S-15-14BPC** BDT-1-S-15-2BPC BDT-1-S-15-4BPC BDT-1-S-15-6BPC BDT-1-S-15-8BPC BDT-1-S-15-2BPC FD BDT-1-S-10-10BPC BDT-1-S-10-12BPC BDT-1-S-10-14BPC** BDT-1-S-10-2BPC BDT-1-S-10-4BPC BDT-1-S-10-6BPC BDT-1-S-10-8BPC BDT-1-S-5-10BPC BDT-1-S-5-12BPC BDT-1-S-5-14BPC** BDT-1-S-5-8BPC BDT-1-S-5-2BPC

BDT-1-S-5-4BPC BDT-1-S-5-6BPC BDT-1-S-10-8BPCMS BDT-1-S-10-8BPCMSD

BDT-1-S-5-14BPCMS BDT-1-S-5-14BPCMSD

^{**}Indicates sample underwent Stage 4 review

Introduction

This data review covers 26 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.

No field blanks were identified in this SDG.

VI. Surrogate Spikes

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

Sample	Column	Surrogate	%R (Limits)	Compound	Flag	A or P
BDT-1-S-5-10BPC	CLP1	Tetrachloro-m-xylene	124 (59-115)	All TCL compounds	J+ (all detects)	Р
BDT-1-S-5-12BPC	CLP1	Tetrachloro-m-xylene	116 (59-115)	All TCL compounds except 4,4'-DDE	J+ (all detects)	А
BDT-1-S-5-12BPC (2X)	CLP1	Tetrachloro-m-xylene	116 (59-115)	4,4'-DDE	J+ (all detects)	A

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Although the MS/MSD percent recoveries (%R) and relative percent difference (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 a Stage 4 review was performed.

The sample results for detected compounds from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Compound	RPD	Flag	A or P
BDT-1-S-10-14BPC**	Endrin ketone	153.3	J (all detects)	А
BDT-1-S-5-14BPC**	Endrin ketone 4,4'-DDT	174.3 42.8	J (all detects) J (all detects)	А

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-6956-1	All compounds reported below the PQL.	J (all detects)	Α

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

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

Samples BDT-1-S-15-2BPC and BDT-1-S-15-2BPC_FD were identified as field duplicates. No chlorinated pesticides were detected in any of the samples with the following exceptions:

	Concentra	tion (ug/Kg)				
Compound	BDT-1-S-15-2BPC	BDT-1-S-15-2BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
beta-BHC	4.3	27	-	22.7 (≤1.8)	J (all detects)	А
4,4'-DDE	1.8U	0.42	-	1.38 (≤1.8)	-	

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Chlorinated Pesticides - Data Qualification Summary - SDG 280-6956-1

SDG	Sample	Compound	· Flag	A or P	Reason (Code)
280-6956-1	BDT-1-S-5-10BPC	All TCL compounds	J+ (all detects)	Р	Surrogate recovery (%R) (s)
280-6956-1	BDT-1-S-5-12BPC	All TCL compounds except 4,4'-DDE	J+ (all detects)	А	Surrogate recovery (%R) (s)
280-6956-1	BDT-1-S-5-12BPC (2X)	4,4'-DDE	J+ (all detects)	Α	Surrogate recovery (%R) (s)
280-6956-1	BDT-1-S-10-14BPC**	Endrin ketone	J (all detects)	Α	Project Quantitation Limit (RPD) (dc)
280-6956-1	BDT-1-S-5-14BPC**	Endrin ketone 4,4'-DDT	J (all detects) J (all detects)	А	Project Quantitation Limit (RPD) (dc)
280-6956-1	BDT-1-S-15-10BPC BDT-1-S-15-12BPC BDT-1-S-15-14BPC** BDT-1-S-15-2BPC BDT-1-S-15-2BPC BDT-1-S-15-3BPC BDT-1-S-15-3BPC BDT-1-S-10-10BPC BDT-1-S-10-10BPC BDT-1-S-10-14BPC** BDT-1-S-10-4BPC BDT-1-S-10-4BPC BDT-1-S-10-4BPC BDT-1-S-10-4BPC BDT-1-S-10-4BPC BDT-1-S-10-4BPC BDT-1-S-10-4BPC BDT-1-S-10-8BPC BDT-1-S-5-10-8BPC BDT-1-S-5-14BPC** BDT-1-S-5-4BPC BDT-1-S-5-4BPC BDT-1-S-5-4BPC BDT-1-S-5-4BPC BDT-1-S-5-4BPC BDT-1-S-5-4BPC BDT-1-S-5-6BPC	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
280-6956-1	BDT-1-S-15-2BPC BDT-1-S-15-2BPC_FD	beta-BHC	J (all detects)	А	Field duplicates (Difference) (fd)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Chlorinated Pesticides - Laboratory Blank Data Qualification Summary - SDG 280-6956-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Chlorinated Pesticides - Field Blank Data Qualification Summary - SDG 280-6956-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

Stage 2B/4

Date:	10 po /c
Page:_	1 of 1
Reviewer:	5/4
2nd Reviewer:	h/

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: 8 /30 to
11.	GC/ECD Instrument Performance Check	A	
111.	Initial calibration	À	1/2 850 = 20 g r2
IV.	Continuing calibration/ICV	A	"/6 RSD = 20 B r 2 Cav /1 W € 20 }
V.	Blanks	A	
VI.	Surrogate spikes	SW)	
VII.	Matrix spike/Matrix spike duplicates	ZW	
VIII.	Laboratory control samples	A	las
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	A	Not reviewed for Stage 2B validation.
XII.	Compound quantitation and reported CRQLs	SW	Not reviewed for Stage 2B validation.
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	ZW.	p = 4, 8
XV.	Field blanks	N	

Note:

A = Acceptable

LDC #: 24140A3a SDG #: 280-6956-1

Laboratory: Test America

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples: ** Indicates sample underwent Stage 4 validation

		31) S	oi	15				
1 1	BDT-1-S-15-10BPC	81	1	BDT-1-S-10-14BPC**	21 >	BDT-1-S-5-4BPC	31 1	MB 280- 30887/1-A
2 1	BDT-1-S-15-12BPC	1	2 -	BDT-1-S-10-2BPC	22	BDT-1-S-5-6BPC	32	Mb 280- 30895 /1-A
3 1	BDT-1-S-15-14BPC**	1	3 7	BDT-1-S-10-4BPC	23	BDT-1-S-10-8BPCMS	33	
4 !	BDT-1-S-15-2BPC	D 1	4	BDT-1-S-10-6BPC	24 1	BDT-1-S-10-8BPCMSD	34	
5 1	BDT-1-S-15-4BPC	1	5	BDT-1-S-10-8BPC	25 ~	BDT-1-S-5-14BPCMS	35	
<u>å</u> 1	BDT-1-S-15-6BPC	1	₆ 7	BDT-1-S-5-10BPC	26	BDT-1-S-5-14BPCMSD	36	
7 1	BDT-1-S-15-8BPC	1	7	BDT-1-S-5-12BPC	27		37	
8 /	BDT-1-S-15-2BPC_FD	1 מ	81	BDT-1-S-5-14BPC**	28		38	
9 1	BDT-1-S-10-10BPC	19	9 7	BDT-1-S-5-8BPC	29		39	
10	BDT-1-S-10-12BPC	20	<u>، ۲</u>	BDT-1-S-5-2BPC	30		40	

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2
Reviewer: 1/6
2nd Reviewer: ______

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

		T	7	
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 $(\%RSD) \leq 20\%$?	/			
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	<u>/</u>			
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 \leq 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.		1		
VI. Surrogate spikes				
Were all surrogate %R within the QC limits?		1		
If the percent recovery (%R) of one or more surrogates was outside QC limits, was a reanalysis performed to confirm %R?			-	
If any %R was less than 10 percent, was a reanalysis performed to confirm %R?				
yll: Matrix spike/Matrix spike duplicates				

LDC #: 24 140 A 31

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: 11/1/
2nd Reviewer: 1

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 Quality Control				
Were performance evaluation (PE) samples performed?		/	<u> </u>	
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.				·
KIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	7			
CIV. Field duplicates				
ield duplicate pairs were identified in this SDG.	/			
arget compounds were detected in the field duplicates.	/			
○ Field blanks				
ield blanks were identified in this SDG.		7		
arget compounds were detected in the field blanks.			7	

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	l. Dieldrin	Q. Endrin ketone	Y. Aroclor-1242	GG. Chlordane
B. beta-BHC	J. 4,4-DDE	R. Endrin aldehyde	Z. Aroclor-1248	HH. Chlordane (Technical)
C. della-BHC	K. Endrin	S. alpha-Chlordane	AA. Aroclar-1254	H.
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	JJ.
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	cc. 2,4'-DDD	KK.
F. Aldrin	N. Endosulfan sulfate	V, Aroclor-1016	DD. 2,4'-DDE	LL.
G. Heptachlor epoxide	O.4,4'-DDT	W. Aroclor-1221	EE. 2,4'-DDT	MM.
H. Endosulfan I	P. Methoxychlor	X. Arodor-1232	FF. Hexachlorobenzene	NN.

Notes:_

24140 x34 LDC #:

VALIDATION FINDINGS WORKSHEET Surrogate Spikes

Page: lof \ Reviewer: 2nd 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".

V N N/A

Were surrogates spiked into all samples, standards and blanks?

Y N N/A

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

 Date	Ol clume?	-	Surrogate			
,	Or aldings	Column	Compound	(Limits	cation	
	9	3	#	(24 (59-115)	3+ dets/p (all Ta) (s)	
	(7			116 ()	It dots (A law +xeunt)	
				()		
	17 (2×)		→	1(1) 611	(J. C. J. J. C. J. C. J. C. J. C. J. C. J. J. C.	
		•		()		
				()		
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				()		
				()		

Letter Designation	Surrogate Compound	Recovery QC Limits (Soil)	Recovery QC Limits (Water)	Commonte
			()	Sillingo
A	Tetrachoro-m-xylene			
മ	Decachlorobiphenyl		•	

LDC#: 24140 134 SDG #: See Con-

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Page: of) 2nd Reviewer:__ Reviewer:

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

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

Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG?

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?

SDG #: Lee Com LDC # 24140 A34

Compound Quantitation and Reported CRQLs VALIDATION FINDINGS WORKSHEET

Page: \ of Reviewer: 2nd Reviewer:

METHOD: __GC__ HPLC

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

Y N NA V N NA

Were CRQLs adjusted for sample dilutions, dry weight factors, etc.?

Did the reported results for detected target compounds agree within 10.0% of the recalculated results?

Did the percent difference of detected compounds between two columns./detectors <40%?

		(dc)		→			9			
	Qualifications	J dets /A		-						
	ARPDI%D Between Two Columns/Detectors Limit (≤ 40%)	153,3	174.3	42,8						
s bellow.	Sample ID	_	18							
If no, please see findings bellow.	Compound Name	Ø	Ø	0						
)	*									

Comments: See sample calculation verification worksheet for recalculations

LDC #:	2416	-0 A3 C	-
SDG #:			

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	<u></u>
Reviewer:_	M
2nd reviewer:	\sim

METHOD: GC Pesticides/PCBs (EPA SW846 Method 8081/8082)

P	N	N/A
Y	N	N/A

	Concentration	in (us /ey	Phre
Compound	4		Pare RPD PA
В	4. 3	27	22.7 (= 1.8D) JAct
	1.84	0.42	1.38 6 1
	1301	0. 2	1
	Concentratio	<u>n (</u>	
Compound			RPD
	<u> </u>		
	Concentratio	<u> </u>	_
Compound			RPD

Company of the Compan			
	Concentration	<u> </u>	
Compound			RPD

LDC# 24 140 Ana

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

1 of 4

Page:

Reviewer: 376 2nd Reviewer:

GC EPA SW 846 Method 8081A METHOD:

b-BHC Parameter:

Date	Column	Compound	X Area	Conc	X^2
08/11/2010	CLP1	p-BHC	23110.00	4.00	
			52056.00	10.00	
	GCS_P1		124514.00	25.00	
			245293.00	50.00	
			366609.00	75.00	
			479885.00	100.00	

Regression Output:		Reported	
Constant	0.0000	= 0	0.0000
Std Err of Y Est	3979.11102		
R Squared	0.99952	r2 =	1.000000
No. of Observations	00000'9		
Degrees of Freedom	5.0000		
X Coefficient(s) 484	4848.652338 -1.270906	= q	4813.000000
Std Err of Coef.	28.969843 0.79		

5205.60 4980.56 4905.86 4888.12 4798.85 5092.75

5777.50

Ave RF

LDC# 24140 A36

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Reviewer: W

y of d

Page:

METHOD:

GC EPA SW 846 Method 8081A

b-BHC Parameter:

Conc	4.00	10.00	25.00	50.00	75.00	100.00	
Y Area	46113.00	103650.00	239958.00	450061.00	648617.00	826471.00	
 Compound	OH8-q						
Column	CLP2		GCS_P2				
Date	08/11/2010						

Regression Output:			Reported	
Constant		9066.02542	= 3	NR
Std Err of Y Est		1421.92497		
R Squared		0.99999	12=	1.000000
No. of Observations		6.00000		
Degrees of Freedom		3.00000		
			m II	A.
X Coefficient(s)	9529.795818	-13.537170	= q	N.
Std Err of Coef.	67.958350	0.65		

10365 9298 8648 9001 8265

> 2500.00 5625.00 10000.00

100.00 625.00

16.00

X₄2

11528

Ave RF

9568

LDC# 24 1 40 And

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

> of 4

Page:

Reviewer: 31/6 2nd Reviewer:

GC EPA SW 846 Method 8081A METHOD:

Hexachlorobenzene Parameter:

Compound

Regression Output:	put:	,	Reported	
Constant		0.00000	= O	0.00000
Std Err of Y Est		8773.78312		
R Squared		0.99941	r2 =	0066660
No. of Observations		6.00000	The state of the s	
Degrees of Freedom		5.00000		
	The state of the s	The state of the s	THE REAL PROPERTY AND ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY AND ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY AND ADDRESS OF THE PROPERTY AND ADDRESS OF THE PROPERTY AND ADDRESS OF THE PROPERTY ADDRESS OF T	FRANCISCO
X Coefficient(s)	9653.526874	-1.270906	= q	9638.000000
Std Err of Coef.	63.877363	0.79		

10358.80 9962.88 9804.16 9537.05 9742.32

11206.75

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10101.99

LDC # 24140 A 3 A

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

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

Reviewer: 26 2nd Reviewer:

GC EPA SW 846 Method 8081A METHOD:

Hexachlorobenzene Parameter:

Date	Column	Compound	Y Area	Conc	X^2
08/11/2010	CLP2	Hexachlorobenzene	93334.00	4.00	16.00
			210505.00	10.00	100.00
	GCS_P2		481272.00	25.00	625.00
			894649.00	50.00	2500.00
			1284080.00	75.00	5625.00
			1628971.00	100.00	10000.00

Regression Output:	tput:		Reported	
Constant	-	20708.90229	= 0	NR
Std Err of Y Est		3835.69679		A CONTRACTOR OF THE CONTRACTOR
R Squared		0.99998	12=	0.999990
No. of Observations		000000		
Degrees of Freedom		3,00000		
			a II	NR
X Coefficient(s)	19034.788783	-29.504222	II Q	NR.
Std Err of Coef.	183.320239	1.76		

21051 19251 17893 17121 16290

23334

19156 Ave RF

LDC # 24140 A34

Continuing Calibration Calculation Verification **VALIDATION FINDINGS WORKSHEET**

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:

Initial Calibration Factor or Nominal Amount

Calibration Factor from Continuing Calibration Standard or Calculated Amount " " Z O

		CCV1	CCV2	CCV3	CCV4	CCV5
	Stope	Area	Area	Area		
HCB CLP1	9638	499664	508165			
b-BHC CLP1	4813	260440	264411	and the state of t		

		(-b-())/2a	596.945638	653.700137	595.968591	652.049091
	(-b+ ())/2a				49.1910142	
		()^1/2	16189,7792	8168.70394	16132.1256	8124.00297 51.9234393
Calculation		(b^2 - 4aT)			260245477.5 16132.1256 49.1910142	65999424.25
		T = Y-c	-849158.098	444872.9746	-864948,098	458322.9746
		final conc				
	Conc.	×	48.214	50.272	49.191	51.923
		υ	20708.902	9066.025	20708.902	9066.025
U +		Ω	19034.789	9529.796	19034.789	9529.796
$Y = a(X^2) + bX + c$		Ø	-29.504	-13.537	-29.504	-13.537
	Агеа		869867	453939	885657	467389
	Ar	>	CCV1 HCB CLP2	CCV1 b-BHC 2	CCV1 HCB CLP2	CCV1 b-BHC 2

LDC #: 24/40 A 36 SDG #: Su Com

VALIDATION FINDINGS WORKSHEET **Surrogate Results Verification**

Page:_	of
Reviewer:	NR
2nd reviewer:	1~

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

The percen	t recoveries (%	(R) of surro	ates were rec	alculated for	the compound	ls identified bel	ow usina ti	he 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
		100000		Reported	Recalculated	
Tetrachloro-m-xylene	CEP 1	20	17.0	85	85	9
Tetrachloro-m-xylene	7		15.0	78	78	
Decachlorobiphenyl	1,		19-4	97	57	
Decachlorobiphenyl	7 7	8	19,3	96	96	1

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						

Notes:_					
_	 	 	 	 	
		 	 	 	

LDC# 2414 A3A

Matrix Spike/Matrix Spike Duplicates Results Verification VALIDATION FINDINGS WORKSHEET

Page: | of | Reviewer: 37/2 2nd 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

Where: SSC = Spiked sample concentration SA = Spike added

SC = Concentration

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

MSD = Matrix spike duplicate percent recovery

2 2 MS/MSD samples:

MS = Matrix spike percent recovery

	Sp	Spike	Sample	Spiked	Sample	Matrix	Matrix Spike	Matrix Spil	Matrix Spike Duplicate	×	MS/MSD
Compound	(Mg)	<u>/</u> E1)	('5/ kg	Souce (4)	Concentration (½ /k)	Percent	Percent Recovery	Percent	Percent Recovery		RPD
	MS	√ MSD	· 0	MS	Ø MSD	Reported	Recalc.	Reported	Recalc.	Reported	Receicilated
gamma-BHC	17, 1	17.5	٥	(۲, ۲	15.7	•	9	9	9.	-	
4,4'-DDT				14.0	Ī	, 1	0.5		120	- ,	
0007			*		7,7	/0	0	17	٦ ٦	7	_
Arocior 1260											

Comments: Refer ot Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within

LDC#: 24140 A32

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

Reviewer: 37/2 Page: lof

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 duplicate were recalculated for the compounds identified below using the following calculation:

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

Where: SSC = Spiked sample concentration SA = Spike added

SC = Concentration

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

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

LCS/LCSD samples:

7805 - 38K7 Ş

	ds	Spike	Spiked	Sample	01	TCS		190		
Compound	P V	ped	Conce	Concentration					LCS/	LCS/LCSD
200) (LM)	※	3	(F)	Percent Recovery	Recovery	Percent	Percent Recovery	ž	RPD
	rcs	CCSD	rcs	CCSD	Reported	Recalc	Ponortod			
gamma-BHC	16.7	A A	15.0	LA	98	0.0	parioday	Recalc.	Keported	Recalc.
4,4'-DDT	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		1 7)		20					
			3	9	00	ンプ		1		
Aroclor 1260							1			

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 #: 24140 A 39

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:	of	
Reviewer:_	:JVG	
2nd reviewer:	V~	

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

$/_{Y}$	N	N/A
(🔀	Ŋ	N/A

Were all reported results recalculated and verified for all level IV samples?

Were all recalculated results for detected target compounds agree within 10.0% of the reported results?

Example:

Sample I.D. $\frac{1}{4}$ $\frac{1}{3}$:

Conc. = $\frac{(18337)}{(4813.0)}$ $\frac{(10 m)}{(30.19)}$ $\frac{(0.964)}{(0.964)}$ = $\frac{(4.0 \text{ ug}/\text{bg})}{(4813.0)}$

#	Sample ID	Compound	Reported Concentration ()	Calculated Concentration ()	Qualification
		_	ŕ		·

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS Additional Sampling,

Henderson, Nevada

Collection Date:

September 2, 2010

LDC Report Date:

October 25, 2010

Matrix:

Soil

Parameters:

Chlorinated Pesticides

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-7103-1

Sample Identification

SSAM5-04-10BPC** SSAM5-04-1BPC SSAM5-04-5BPC

SSAM5-04-5BPC_FD

SSAM5-04-1BPCMS

SSAM5-04-1BPCMSD

^{**}Indicates sample underwent Stage 4 review

Introduction

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

Extraction Date	Compound	Concentration	Associated Samples
9/10/10	Hexachlorobenzene	0.332 ug/Kg	All samples in SDG 280-7103-1
;	Date	Date Compound	Date Compound Concentration

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

No field blanks were identified in this SDG.

VI. Surrogate Spikes

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

Sample	Column	Surrogate	%R (Limits)	Compound	Flag	Acre
SSAM5-04-1BPC	CLP1 CLP2	Decachlorobiphenyl Decachlorobiphenyl	466 (63-124) 442 (63-124)	All TCL compounds except Hexachlorobenzene	J+ (all detects)	A or P
SSAM5-04-5BPC_FD	CLP1 CLP2	Decachlorobiphenyl Decachlorobiphenyl	165 (63-124) 161 (63-124)	All TCL compounds except Hexachlorobenzene	J+ (all detects)	A

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Although the MS/MSD percent recoveries (%R) were not within QC limits for several compounds, the 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	AorP
All samples in SDG 280-7103-1	All compounds reported below the PQL.	J (all detects)	Α

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

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

Samples SSAM5-04-5BPC and SSAM5-04-5BPC_FD were identified as field duplicates. No chlorinated pesticides were detected in any of the samples with the following exceptions:

	Concentra	ition (ug/Kg)				T
Compound	SSAM5-04-5BPC	SSAM5-04-5BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
4,4'-DDT	1.9U	1.1	-	0.8 (≤1.9)	-	-
Hexachlorobenzene	51	150	99 (≤50)	-	J (all detects)	A

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Chlorinated Pesticides - Data Qualification Summary - SDG 280-7103-1

,				1	
SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-7103-1	SSAM5-04-1BPC SSAM5-04-5BPC_FD	All TCL compounds except Hexachlorobenzene	J+ (all detects)	А	Surrogate recovery (%R) (s)
280-7103-1	SSAM5-04-10BPC** SSAM5-04-1BPC SSAM5-04-5BPC SSAM5-04-5BPC_FD	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp.
280-7103-1	SSAM5-04-5BPC SSAM5-04-5BPC_FD	Hexachlorobenzene	J (all detects)	А	Field duplicates (RPD) (fd)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Chlorinated Pesticides - Laboratory Blank Data Qualification Summary - SDG 280-7103-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Chlorinated Pesticides - Field Blank Data Qualification Summary - SDG 280-7103-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #: 24140C3a	VALIDATION COMPLETENES
SDG #: 280-7103-1	Stage 2B/4
Laboratory: Test America	

Date:	10/25/
Page:_	of
Reviewer:	
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	Ä	Sampling dates: 1/02/10
II.	GC/ECD Instrument Performance Check	A	
111.	Initial calibration	A	2 RSD = 20 } r~ CW/W = 20 }
IV.	Continuing calibration/ICV	A	CW/W = 20 }
V.	Blanks	SW)	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	vas
IX.	Regional quality assurance and quality control	N	
Xa.	Florisil cartridge check	N	
Xb.	GPC Calibration	N	
XI.	Target compound identification	A	Not reviewed for Stage 2B validation.
XII.	Compound quantitation and reported CRQLs	Α	Not reviewed for Stage 2B validation.
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	SW	b = 3,4
XV.	Field blanks	* 1)).

Note:

A = Acceptable

N = Not provided/applicable SW = See worksheet

R = Rinsate FB = Field blank

ND = No compounds detected

D = Duplicate

TB = Trip blank EB = Equipment blank

Validated Samples: ** Indicates sample underwent Stage 4 validation

	S.	i				
1_	SSAM5-04-10BPC**	11	MB 280-30951 / A	21	31	
2	SSAM5-04-1BPC	12	<u>'</u>	22	32	
3	SSAM5-04-5BPC 0	13		23	33	
4	SSAM5-04-5BPC_FD p	14		24	34	
5	SSAM5-04- IBPC MS	15		25	35	
6	V MSD	16		26	36	
7		17		27	37	
8		18		28	38	
8 9		19		29	39	
10		20		30	40	

VALIDATION FINDINGS CHECKLIST

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?	_	ļ		
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) \leq 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?				MINUS MARKET TO THE PARTY OF TH
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?	1			
V. Blanks				
Was a method blank associated with every sample in this SDG?	4			
Was a method blank analyzed for each matrix and concentration?				
Were extract cleanup blanks analyzed with every batch requiring clean-up?	4			
Was there contamination in the method blanks or clean-up blanks? If yes, please see he Blanks validation completeness worksheet.				·
A. Surrogate spikes				
Were all surrogate %R within the QC limits?		1		
f the percent recovery (%R) of one or more surrogates was outside QC limits, was a eanalysis performed to confirm %R?				
f any %R was less than 10 percent, was a reanalysis performed to confirm %R?				
/II. Matrix spike/Matrix spike duplicates				

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: TV/
2nd Reviewer:

Validation Area	T.	T	7	
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 /	Yes	No	NA	Findings/Comments
Was a MS/MSD analyzed every 20 samples of each matrix?	1			
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?	7			
Was an LCS analyzed per extraction batch?	1	$\neg +$	$\neg +$	
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	1		\dashv	
X Regional Quality Assurance and Quality Control	-Z.L			
Vere performance evaluation (PE) samples performed?		7	Т	
Vere the performance evaluation (PE) samples within the acceptance limits?		+	+	
Target compound identification				
/ere the retention times of reported detects within the RT windows?	\mathcal{T}			
Compound guantifation/CRQLs				
ere compound quantitation and CRQLs adjusted to reflect all sample dilutions, dry eight factors, and clean-up activities applicable to level IV validation?	1			
System performance				
stern performance was found to be acceptable.	1	1	т	
Overall assessment of data	<u> </u>			•
erall assessment of data was found to be acceptable.	F	1	T	
Field duplicates				
d duplicate pairs were identified in this SDG.	J	1	T	
get compounds were detected in the field duplicates.	ļ-		<u> </u>	
Field blanks	1			
blanks were identified in this SDG.				
et compounds were detected in the field blanks.	-	-		

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	I. Dieldrin	Q. Endrin ketone	Y. Aroclor-1242	GG. Chlordane
B. beta-BHC	J. 4,4'-DDE	R. Endrin aldehyde	Z. Aroclor-1248	HH. Chlordane (Technical)
C. delta-BHC	K. Endrin	S. alpha-Chlordane	AA. Aroclor-1254	Н.
D. gamma-BHC	L. Endosulfan li	T. gamma-Chlordane	BB. Aroclor-1260	.برر
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	cc.2,4'-DDD	KK.
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. 2,4'-DDE	tt.
G. Heptachlor epoxide	O.4,4'-DDT	W. Aroclor-1221	EE. 2,4'-DDT	MM.
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF. Hexachlorobenzene	NN.

Notes:

LDC #: 74140 C 24 SDG #: 8c Com

VALIDATION FINDINGS WORKSHEET

in Findings wo

Page: lof l Reviewer: $0 \sqrt{c}$ 2nd Reviewer: [

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

Vere all samples associated with a method blank? Note all samples associated with a method blanks? Note all samples associated with a method blanks? If yes, please see the qualifications below. Note an ethod blanks? If yes, please see the qualifications below. Associated samples: Note all of pallank analysis date: Note all samples and pallank analysis date: Note all samples and whenever a sample extraction was performed? Note all samples and were extract clean-up was performed, were extract clean-up was performed. Note and were all samples and were actived analyzed at the proper frequencies? Note and were actived analyzed at the proper frequencies? Note analyzed are contamination in the method blanks? If yes, please see the qualifications below. Associated analyzed are analyzed at the proper frequencies?	Sample Identification		A11 recourts > 2x MB			
ns answered "N with a method bed for each mat med, were extra ne method blank						
ifications below for all questions answered "N". Not Were all samples associated with a method blank? Was a method blank performed for each matrix and flextract clean-up was performed, were extract cles Was there contamination in the method blanks? If yes 4 / 16 / 10 / 10 / 10 / 10 / 10 / 10 / 10	Blank ID	#\$ 280- 30951 /- A	6,332			
Y N N/A Were all samples associate Were all samples associate Were all samples associate Was a method blank performance of N N/A Was there contamination is safeth extraction date: 4 / 16 /p8lank analysis date: Conc. units: 1/9 / 1/6 /p8lank analysis date:	Compound	H	##			

0.664

X

ation				
Sample Identification				
Sa				
Blank ID				
Compound				
Сотр				

Associated samples:

Blank analysis date:

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT: All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC # 20140 C34

VALIDATION FINDINGS WORKSHEET Surrogate Spikes

Page: of Reviewer: 2nd Reviewer.

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

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•	ecoveries
1	percent r
- 11	ogate
=	=
Č	ב ב ב

*	Date	Sample ID	Column	Surrogate Compound	%R (Limits)	Qualifications
		2	CLP!	\$	466 (63-1,24)	J+ dets 14 (5) fruct all til
			2		447 (\ \)	- 11
					()	-
		20L (50x)	CLPI	Ą	10 (54-115)	No small
			7	\	(1)	
				4	(25-124) 854	
			7	/		Å
				•	()	
					()	
		4	CUP 1	Š	165 (62124)	J+ dets 14 (S) (qual all TCL)
			λ		() ()	exapt FF)
				>		
		4h(5,0 x)	1 000	Ъ	187 ()	No pre
)	-ત		177 ()	
					()	
					()	
					()	
					()	

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

Page: ___of __ Reviewer: ____ 2nd Reviewer: _____

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

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

LDC # 34 140 C 34

SDG#:

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? 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?

Qualifications	No grad																									
Associated Samples	7																									
RPD (Limits)	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()
MSD %R (Limits)	mtside)	Ĭ,		()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()
MS %R (Limits)		Г)	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	(.)
Compound	Several	limits																								
DI OSWISD ID	9/5																									
# Date																										

LDC#: 24140C3a

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page:	
Reviewer:_	1/6
2nd Reviewer:_	

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

Y/N NA Y N NA Were field duplicate pairs identified in this SDG? N NA

Were target analytes detected in the field duplicate pairs?

Compound Name	Conc (ug/Kg)	RPD	Diff	Diff Limits	Quals
•	3	4	(≤50%)			(Parent Only)
4,4'-DDT	1.9U	1.1		0.8	≤1.9	
Hexachlorobenzene	51	150	99			Jdet/A (fd)

V:\FIELD DUPLICATES\24140C3a.wpd

LDC # 34 190 (22

VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

Reviewer: 3VL2nd Reviewer: $L\Delta$

Page: | of

METHOD: GC EPA S

GC EPA SW 846 Method 8081A

Parameter:

r: Hexachlorobenzene

			>	×	X^2
Date	Column	Compound	Area	Conc	
08/11/2010	CLP1	Hexachlorobenzene	35416.00	4.00	16.00
			79982.00	10.00	100.00
	GCS_P1		186328.00	25.00	625.00
			366503.00	50.00	2500.00
			532247.00	75.00	5625.00
			700881.00	100.00	10000.00

Regression Output: Constant Std Err of Y Est R Squared No. of Observations Degrees of Freedom	6214.81624 c 2282.53420 0.99996 r2	Reported c= NR
Constant Std Err of Y Est R Squared No. of Observations Degrees of Freedom		
Std Err of Y Est R Squared No. of Observations Degrees of Freedom		
R Squared No. of Observations Degrees of Freedom		
No. of Observations Degrees of Freedom	6 00000	r2 = 1.000000
Degrees of Freedom	0.0000	
	3.00000	
	a.	= NA
X Coefficient(s) 7365.983258	-4.269664 b	b == NR
Std Err of Coef. 109.089622	1.05	

7998 7453 7330 7097 7009

Ave RF 7

8854

7623

LDC# 24140 C22

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

METHOD:

GC EPA SW 846 Method 8081A

Hexachlorobenzene Parameter:

			×	>	X^2
Date	Column	Compound	Area	Conc	
08/11/2010	2 6√30	Hexachlorobenzene	38101.00	4.00	
			87056.00	10.00	
	GCS_P1	-	206854.00	25.00	
			408434.00	50.00	
			593608.00	75.00	
			783179.00	100.00	

Regression Output:			Reported	-
Constant		0.00000	# 3	0.0000
Std Err of Y Est		9097.68589		A BARTALISM BARTAN BARTAN A SAN A A A A A A A A A A A A A A A A
R Squared		0.99905	12 =	0.999700
No. of Observations		6.00000		MANAGEMENT AND ALCOHOLOGY OF THE PROPERTY OF T
Degrees of Freedom		5.00000		
X Coefficient(s)	7921.897276	-1.270906	= q	7928.000000
Std Err of Coef.	66.235531	0.79		

Page: 2 of ¢ Reviewer: $\sqrt{\mathcal{U}}$ 2nd Reviewer: $\sqrt{\zeta}$

9525.25

8705.60 8274.16

8168.68

7914.77

7831.79

8403.38

Ave RF

LDC # 24/40 C32

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

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Page:

Reviewer: 34/2 2nd Reviewer:

METHOD:

GC EPA SW 846 Method 8081A

Parameter:

4,4'-DDT

X^2							
Y Conc	4.00	10.00	25.00	50.00	75.00	100.00	
X Area	23760.00	54935.00	129507.00	260822.00	384225.00	508746.00	
Compound	4,4'-DDT						
Column	CLP1		GCS_P1				
Date	08/11/2010						

Recression Output:		Reported	
Constant	0.00000	٥	0.00000
Std Err of Y Est	3488,48800		
R Squared	79666.0	12=	0.999900
No. of Observations	6.00000		
Degrees of Freedom	5.00000		
X Coefficient(s) 5121.0	5121.098272 -1.270906	= q	5090.000000
Std Err of Coef. 25.3	25.397871 0.79		

5493.50 5180.28 5216.44 5123.00 5087.46

5940.00

Ave RF

5340.11

LDC#: 24140 (3h SDG#:

VALIDATION FINDINGS WORKSHEET

Initial Calibration Calculation Verification

of of Page:

Reviewer: 2nd Reviewer:

METHOD: GC Pesticides (EPA SW 846 Method 8081)

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

Where

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

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

	Reported Rec	Recalculated	Reported	Recalculated	Reported	Recalculated
			Average CF	Average CF	%RSD	%RSD
Compound	(100 std) (1	(100 std)	(Initial)	(Initial)		
(CLP2)	5271	5271	5475	5475	4.8	4.779
					The state of the s	

					.
Response cpd	527096				
Conc	100				
Compound	ddt				

ddt	5948	5611	5336	5386	5298	5271	5475	262	
Conc	4	10	25	50	75	100	S	×	•

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# 74140C3A

Continuing Calibration Calculation Verification **VALIDATION FINDINGS WORKSHEET**

of) Page:

METHOD: GC_

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:

Initial Calibration Factor or Nominal Amount

Calibration Factor from Continuing Calibration Standard or Calculated Amount || || || ||

-		·	_				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	_		,	_	,	 	 	·	,	
Recalculated %D		2.6	4.6	0.1	3.1												
Reported % D		2.6	3.2	1.5	3.1												
Recalculated Conc		48.7	52.3	50.1	48.5												
Reported		48.7	51.6	49.2	48.5												
CCV Conc		50	50	50	90	,			THE PERSON NAMED AND THE PERSO								
	punc	. CLP1	CLP1	CLP2	CLP2									 			
	Compound	HCB	DOT	HCB	DDT												
Calibration	Date		18:41														
	Standard ID	005F0501														•	
	#	-					2					3	 		4		

CCV5					
CCV4					
CCV3					
CCV2	Area				
CCV1	Area	396891	266199	265266	TOTAL CONTRACTOR OF THE PARTY O
	Slope/CF	7928	2090	5475	
		HCB CLP2	DDT CLP1	DDT CLP2	

		(-b-())/2a	1676.50777	1651.66126
	(-b+ ())/2a		6950.2665 48.6826075 1676.50777	6738.094 73.5291185 1651.66126
		()^ 1/2	6950.2665	6738.094
Calculation		(b^2 - 4aT)	348476.1838 48306204.49 6950.266	45401910.72
		۲ ≒ Y-د ۲ = ۲	-348476.1838	-518530,1838
		final conc		
	Conc.	×	48.683	73.529
		U	6214.816	6214.816
o + >		٩	7365.983	7365,983
$Y = a(X^{n}2) + bX + c$		Ø	4.270	4.270
	Area		354691	524745
	₹	>	CCV1 HCB CLP1	SSAM5-04-10BPC

LDC#: 4140 C34

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:	of_/
Reviewer:	JV6
2nd reviewer:	V-

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

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

% Recovery: SF/SS * 100

Where: SF = Surrogate Found

Sample ID:_

SS = Surrogate Spiked

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
Tetrachloro-m-xylene	(le)	20	15.7	79	79	2)
Tetrachloro-m-xylene	\		15.9	79	79	
Decachlorobiphenyl	1/2		21.9	109	109	
Decachlorobiphenyl		T T	2396		120	

Sample ID:

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
	<u> </u>			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	
Tetrachioro-m-xylene						
Tetrachloro-m-xylene		-				
Decachlorobiphenyl						
Decachlorobiphenyl					<u>, </u>	

Notes:	

LDC#: 24140 (36

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates Results Verification

Page: Lof L Reviewer: NC 2nd Reviewer: L

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

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

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

Where: SSC = Spiked sample concentration SA = Spike added

SC = Concentration

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

MS = Matrix spike percent recovery

MSD = Matrix spike duplicate percent recovery

MS/MSD samples:

2/6

	Sp	Spike Added	Sample	Spiked	Sample	Matri	Matrix Spike	Matrix Spik	Matrix Spike Duplicate	W	MS/MSD
Compound	(k)	/ <u>k</u>)	(n/k)) (M	(MG/E)	Percent	Percent Recovery	Percent	Percent Recovery		RPD
	MS	/ MSD	0.	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Pocelciated
gamma-BHC	(8, >	18 ×	Ō	7.51	6 71	٧,	κ »	91,	23	4	nata in a second
4,4'-DDT	ì	_	7 7	1 41		7 %	0 :	<i>c)</i>	12	5	
	*	+	3/2	,0,	٦), و	(2)	74	92	26	7	7
Aroclor 1260											<u> </u>
					-						
		,									

Comments: Refer ot Matrix Spike/Matrix Spike Duplicates findings worksheet for list of qualifications and associated samples when reported results do not agree within

LDC#: 24140 C32

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

Page: of Reviewer: J1/2

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 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

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

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

LCS/LCSD samples:__

3015

	30	Spike	Spikec	Spiked Sample	רנ	rcs		I CSD		400
Compound	3	(Y	Sono:	antration					/co/	FC3/FC3D
		0			rercent	Percent Recovery	Percent	Percent Recovery	~	RPD
	CCS	LCSD	rcs	LCSD	Reported	Recelc.	Reported	-10	,	
gamma-BHC	12,	*	14		84	17.9	periodes	Necalc.	Keported	Recalc.
4 4:-DDT	-	# 7	- 2	VŽΛ	7.1	40				
		~	13.0		8	~				
Aroclor 1260										

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicate findings worksheet for list of qualifications and associated samples when reported

LDC #: 24,40 C 39

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:	l_of
Reviewer:_	JVG
nd reviewer:	

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

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?

Example:

Sample I.D.
$$\frac{\# /}{y} = \frac{\# /}{4x^2 + 6x + c}$$

Conc. = $\frac{(524745)}{(} = -4.27x^2 + 7365.96X + 6214.9$

$$X = 73.5 \text{ M}$$

Find one. = $(73.529)(10 \text{ M})$
 $(31.09)(0.899)$
= 26.4
 26.4

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

Note:	

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS Additional Sampling,

Henderson, Nevada

Collection Date:

September 1, 2010

LDC Report Date:

October 25, 2010

Matrix:

Soil/Water

Parameters:

Chlorinated Pesticides

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-7047-1

Sample Identification

SSAI2-03-1BPC

SSAI2-03-5BPC

SSAI2-04-1BPC

SSAI2-04-5BPC**

SSAI2-03-1BPC FD

EB-09012010

SSAI2-04-5BPCMS

SSAI2-04-5BPCMSD

^{**}Indicates sample underwent Stage 4 review

Introduction

This data review covers 7 soil samples and one water sample 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 with the following exceptions:

Date	Standard	Column	Compound	%D	Associated Samples	Flag	A or P
9/14/10	053F5301	CLP1	4,4'-DDD	24.9	All water samples in SDG 280-7047-1	J+ (all detects)	А
9/14/10	053F5301	CLP2	4,4'-DDD	26.2	All water samples in SDG 280-7047-1	J+ (all detects)	А

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 with the following exceptions:

Method Blank ID	Extraction Date	Compound	Concentration	Associated Samples
MB 280-31016/1-A	9/15/10	Hexachlorobenzene Methoxychlor	0.602 ug/Kg 0.528 ug/Kg	All soil samples in SDG 280-7047-1

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

Sample EB-09012010 was identified as an equipment blank. No chlorinated pesticide contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Compound	Concentration	Associated Samples
EB-09012010	9/1/10	Hexachlorobenzene	0.13 ug/L	All soil samples in SDG 280-7047-1

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

VI. Surrogate Spikes

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

Sample	Column	Surrogate	%R (Limits)	Compound	Flag	A or P
SSAI2-03-1BPC	CLP1 CLP2 CLP1 CLP2	Tetrachloro-m-xylene Tetrachloro-m-xylene Decachlorobiphenyl Decachlorobiphenyl	48 (59-115) 58 (59-115) 395 (63-124) 624 (63-124)	Aldrin alpha-Chlordane Chlordane (Technical) delta-BHC Endosulfan I Endosulfan sulfate Endrin Endrin aldehyde Endrin ketone gamma-Chlordane Heptachlor Heptachlor epoxide Methoxychlor Toxaphene	J (all detects) UJ (all non-detects)	A
SSAI2-03-1BPC	CLP1 CLP1 CLP2	Tetrachloro-m-xylene Decachlorobiphenyl Decachlorobiphenyl	57 (59-115) 573 (63-124) 1021 (63-124)	4,4'-DDD	J (all detects) UJ (all non-detects)	А

Sample	Column	Surrogate	%R (Limits)	Compound	Flag	A or P
SSAI2-03-5BPC	CLP1 CLP2 CLP1 CLP2	Tetrachloro-m-xylene Tetrachloro-m-xylene Decachlorobiphenyl Decachlorobiphenyl	0 (59-115) 0 (59-115) 0 (63-124) 625 (63-124)	4,4'-DDD Aldrin alpha-Chlordane delta-BHC Dieldrin Endosulfan I Endosulfan II Endosulfan sulfate Endrin Endrin aldehyde Endrin ketone gamma-BHC gamma-Chlordane Heptachlor Methoxychlor Toxaphene	J (all detects) UJ (all non-detects)	А
SSAI2-04-1BPC	CLP1 CLP2	Decachlorobiphenyl Decachlorobiphenyl	582 (63-124) 617 (63-124)	Aldrin alpha-BHC alpha-Chlordane Chlordane (Technical) delta-BHC Dieldrin Endosulfan II Endosulfan III Endosulfan sulfate Endrin aldehyde gamma-BHC gamma-Chlordane Heptachlor Heptachlor epoxide Methoxychlor Toxaphene	J+ (all detects)	A
SSAI2-04-1BPC	CLP1 CLP2	Decachlorobiphenyl Decachlorobiphenyl	598 (63-124) 582 (63-124)	4,4'-DDD Endrin ketone	J+ (all detects) J+ (all detects)	А
SSAI2-04-5BPC**	CLP1 CLP2 CLP1 CLP2	Tetrachloro-m-xylene Tetrachloro-m-xylene Decachlorobiphenyl Decachlorobiphenyl	0 (59-115) 4878 (59-115) 50440 (63-124) 304961 (63-124)	4,4'-DDD Aldrin alpha-Chlordane beta-BHC Chlordane (Technical) delta-BHC Dieldrin Endosulfan I Endosulfan sulfate Endrin aldehyde Endrin ketone gamma-Chlordane Heptachlor Heptachlor Toxaphene	J (all detects) UJ (all non-detects)	Α

Sample	Column	Surrogate	%R (Limits)	Compound	Flag	A or P
SSAI2-03-1BPC_FD	CLP1 CLP2	Decachlorobiphenyl Decachlorobiphenyl	805 (63-124) 2454 (63-124)	Aldrin alpha-BHC alpha-Chlordane Chlordane (Technical) delta-BHC Dieldrin Endosulfan I Endosulfan II Endosulfan sulfate Endrin Endrin aldehyde Endrin ketone gamma-BHC gamma-Chlordane Heptachlor Heptachlor epoxide Methoxychlor Toxaphene	J+ (all detects)	A
SSAI2-03-1BPC_FD	CLP1 CLP2	Decachlorobiphenyl Decachlorobiphenyl	493 (63-124) 613 (63-124)	4,4-DDD	J+ (all detects)	Α
MB 280-31016/1-A	CLP1	Decachlorobiphenyl	156 (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) were not within QC limits for several compounds, the 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) and relative percent differences (RPD) 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.

The sample results for detected compounds from the two columns were within 40% relative percent difference (RPD) with the following exceptions:

Sample	Compound	RPD	Flag	A or P
SSAI2-04-5BPC**	Hexachlorobenzene gamma-BHC 4,4'-DDE Endosulfan II 4,4'-DDT	177.3 47.3 84.7 198.3 105.8	J (all detects)	A

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-7047-1	All compounds reported below the PQL.	J (all detects)	Α .

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

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

Samples SSAI2-03-1BPC and SSAI2-03-1BPC_FD were identified as field duplicates. No chlorinated pesticides were detected in any of the samples with the following exceptions:

	Concentra	tion (ug/Kg)					
Compound	SSAI2-03-1BPC SSAI2-03-1BPC_FD		RPD (Limits)	Difference (Limits)	Flags	A or P	
4,4'-DDE	660	220	100 (≤50)	-	J (all detects)	А	
4,4'-DDT	210	100	71 (≤50)	-	J (all detects)	Α	
alpha-BHC	130 30		125 (≤50)	-	J (all detects)	А	

	Concentra	ition (ug/Kg)				
Compound	SSAI2-03-1BPC	SSAI2-03-1BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
beta-BHC	200	100	67 (≤50)	_	J (all detects)	A
Dieldrin	13	1.2	_	11.8 (≤35)	-	-
Endosulfan I	1.8U	0.53	-	1.27 (≤1.8)	-	-
Endosulfan II	29	. 7,5	_	21.5 (≤35)	-	-
gamma-BHC	53	12	<u>-</u>	41 (≤35)	J (all detects)	А
Hexachlorobenzene	350	210	50 (≤50)	-	-	-
delta-BHC	3.7	1.1	- .	2.6 (≤1.8)	J (all detects)	Α
Endrin ketone	9.2	1.8U	`-	7.4 (≤1.8)	J (all detects) UJ (all non-detects)	А
Methoxychlor	26	24	8 (≤50)	-	<u>-</u>	-
4,4'-DDD	6.1	6.0	-	0.1 (≤1.8)	-	

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Chlorinated Pesticides - Data Qualification Summary - SDG 280-7047-1

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-7047-1	EB-09012010	4,4'-DDD	J+ (all detects)	А	Continuing calibration (%D) (c)
280-7047-1	SSAI2-03-1BPC	Aldrin alpha-Chlordane Chlordane (Technical) delta-BHC Endosulfan I Endosulfan sulfate Endrin Endrin aldehyde Endrin ketone gamma-Chlordane Heptachlor Heptachlor epoxide Methoxychlor Toxaphene 4,4'-DDD	J (all detects) UJ (all non-detects)	А	Surrogate recovery (%R) (s)
280-7047-1	SSAI2-03-5BPC	4,4'-DDD Aldrin alpha-Chlordane delta-BHC Dieldrin Endosulfan I Endosulfan II Endosulfan sulfate Endrin Endrin aldehyde Endrin ketone gamma-BHC gamma-Chlordane Heptachlor Methoxychlor Toxaphene	J (all detects) UJ (all non-detects)	А	Surrogate recovery (%R) (s)
280-7047-1	SSAI2-04-1BPC	Aldrin alpha-BHC alpha-Chlordane Chlordane (Technical) delta-BHC Dieldrin Endosulfan I Endosulfan sulfate Endrin Endrin aldehyde gamma-BHC gamma-Chlordane Heptachlor Heptachlor Toxaphene 4,4'-DDD Endrin ketone	J+ (all detects)	A	Surrogate recovery (%R) (s)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
280-7047-1	SSAI2-04-5BPC**	4,4'-DDD Aldrin alpha-Chlordane beta-BHC Chlordane (Technical) delta-BHC Dieldrin Endosulfan I Endosulfan sulfate Endrin Endrin aldehyde Endrin ketone gamma-Chlordane Heptachlor Heptachlor Methoxychlor Toxaphene	J (all detects) UJ (all non-detects)	А	Surrogate recovery (%R) (s)
280-7047-1	SSAI2-03-1BPC_FD	Aldrin alpha-BHC alpha-Chlordane Chlordane (Technical) delta-BHC Dieldrin Endosulfan I Endosulfan sulfate Endrin Endrin aldehyde Endrin ketone gamma-BHC gamma-Chlordane Heptachlor Heptachlor epoxide Methoxychlor Toxaphene 4,4-DDD	J+ (all detects)	A	Surrogate recovery (%R) (s)
280-7047-1	SSAI2-04-5BPC**	Hexachlorobenzene gamma-BHC 4,4'-DDE Endosulfan II 4,4'-DDT	J (all detects)	А	Project Quantitation Limit (RPD) (dc)
280-7047-1	SSAI2-03-1BPC SSAI2-03-5BPC SSAI2-04-1BPC SSAI2-04-5BPC** SSAI2-03-1BPC_FD EB-09012010	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
280-7047-1	SSAI2-03-1BPC - SSAI2-03-1BPC_FD	4,4'-DDE 4,4'-DDT alpha-BHC beta-BHC	J (all detects) J (all detects) J (all detects) J (all detects)	А	Field duplicates (RPD) (fd)
280-7047-1	SSAI2-03-1BPC SSAI2-03-1BPC_FD	gamma-BHC delta-BHC	J (all detects) J (all detects)	А	Field duplicates (Difference) (fd)
280-7047-1	SSAI2-03-1BPC SSAI2-03-1BPC_FD	Endrin ketone	J (all detects) UJ (all non-detects)	А	Field duplicates (Difference) (fd)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Chlorinated Pesticides - Laboratory Blank Data Qualification Summary - SDG 280-7047-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Chlorinated Pesticides - Equipment Blank Data Qualification Summary - SDG 280-7047-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #: 24140I3a SDG #: 280-7047-1 Stage 2B/4 Laboratory: Test America

Date:_	0/22/10
Page:_	_of/_
Reviewer:_	NG
2nd Reviewer:_	V

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
<u>l.</u>	Technical holding times	A	Sampling dates: 9 /o1 //o
11.	GC/ECD Instrument Performance Check	A	
111.	Initial calibration	A	% RSD = 20 2 V2
IV.	Continuing calibration/ICV	SW	% RSD = 20 2 V7 Cav/1 av ≤ 20 2
V.	Blanks	SW	
VI.	Surrogate spikes	SN	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	2C8 /b
IX.	Regional quality assurance and quality control	Z	
Xa.	Florisil cartridge check	N	9
Xb.	GPC Calibration	N	
XI.	Target compound identification	Ă	Not reviewed for Stage 2B validation.
XII.	Compound quantitation and reported CRQLs	s#V	Not reviewed for Stage 2B validation.
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	SW	D = 1, S
XV.	Field blanks	SN	EB = 6

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples: ** Indicates sample underwent Stage 4 validation

		So		Herwent Stage 4 validation H いんナルイ		
1	SSAI2-03-1BPC	۷	11)	MB 280 - 310 16 /- A	21	31
2	SSAI2-03-5BPC			Mb 286 - 30 492 1-A	1 1	32
3	SSAI2-04-1BPC		13	,	23	33
4	SSAI2-04-5BPC**		14		24	34
5	SSAI2-03-1BPC_FD		15		25	35
6 2	EB-09012010	W	16		26	36
7	SSAI2-04-5BPCMS	۶	17		27	37
8	SSAI2-04-5BPCMSD	V	18		28	38
9			19		29	39
10			20		30	40

Page: Lof 2 Reviewer: JV6 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	ı			
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) \leq 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 salibration				
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 <u>≤</u> 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?	4			
Was there contamination in the method blanks or clean-up blanks? If yes, please see the Blanks validation completeness worksheet.				
/I. Surrogate spikes				
Nere all surrogate %R within the QC limits?		4		
f the percent recovery (%R) of one or more surrogates was outside QC limits, was a eanalysis performed to confirm %R?				
f any %R was less than 10 percent, was a reanalysis performed to confirm %R?	1			
/II. Matrix spike/Matrix spike duplicates	,		<u>'</u>	

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: 17/6
2nd Reviewer: 2

Validation Area	Yes	No	NA	Findings/Comments
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrin this SDG? If no, indicate which matrix does not have an associated MS/MSD. So Water.	rix oil /			
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?	1	<u> </u>		
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?	1			
IX: Regional Quality Assurance and Quality Control	- /			
Were performance evaluation (PE) samples performed?		/		
Were the performance evaluation (PE) samples within the acceptance limits?				
X. Target compound identification				
Were the retention times of reported detects within the RT windows?				
XI Compound quantitation/CRQLs	- 1			
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.				
GV. Field duplicates				
ield duplicate pairs were identified in this SDG.	17			
arget compounds were detected in the field duplicates.				
V. Field blanks				
ield blanks were identified in this SDG.				
arget compounds were detected in the field blanks.				

VALIDATION FINDINGS WORKSHEET

METHOD: Pesticide/PCBs (EPASW 846 Method 8081/8082)

A. alpha-BHC	I. Dieldrin	Q. Endrin ketone	Y. Aroclor-1242	GG. Chlordane
B. beta-BHC	J. 4,4'-DDE	R. Endrin aldehyde	Z. Aroclor-1248	HH. Chlordane (Technical)
C. delta-BHC	K. Endrin	S. alpha-Chlordane	AA. Arocior-1254	П.
D. gamma-BHC	L. Endosulfan II	T. gamma-Chlordane	BB. Aroclor-1260	.لال
E. Heptachlor	M. 4,4'-DDD	U. Toxaphene	cc. 2,4'-DDD	KK.
F. Aldrin	N. Endosulfan sulfate	V. Aroclor-1016	DD. 2,4'-DDE	LL.
G. Heptachlor epoxide	O.4,4'-DDT	W. Aroclor-1221	EE. 2,4'-DDT	MM.
H. Endosulfan I	P. Methoxychlor	X. Aroclor-1232	FF. Hexachlorobenzene	NN.

Notes:

LDC# 74 140 T34

VALIDATION FINDINGS WORKSHEET Continuing Calibration

2nd Reviewer.__

Page: Reviewer:

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

Were Evaluation mix standards run before initial calibration and before samples? METHOD: GC Pesticides/PCBs (EPA SW 846 Method 8081/8082)

Were Endrin & 4,4'-DDT breakdowns acceptable in the Evaluation Mix standard (<15.0% for individual breakdowns)?

Was at least one standard run daily to verify the working curve?

Did the continuing calibration standards meet the percent difference (%D) / relative percent difference (RPD) criteria of <20.0%?

Level IV/D Only

N/A/N/A N)N/A Were the retention times for all calibrated compounds within their respective acceptance windows?

5

					Q%						_
#	Date	Standard ID	Column	Compound	(Limit < 20.0)	RT (Limits)	Asso	Associated Samples	Qualif	Qualifications	
6	14 10	053F 5301	1000	M (+)	24.9)) 6 . 1	MB 280-30492	K-A	3+ act/ X	
			121	M CF)	26.2)) (->		_	
)) (
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))				
A. alpha B. beta- C. delta D. gamr	A. alpha-BHC B. beta-BHC C. delta-BHC D. gamma-BHC	E. Heptachlor F. Aldrin G. Heptachlor epoxide H. Endosulfan I	I. Dieldrin J. 4,4-DDE K. Endrin L. Endosulfan II	M. 4,4'-DDD N. Endosulfan sulfate O. 4,4'-DDT P. Methoxychlor	٠	Q. Endrin ketone U. Toxa R. Endrin aldehyde V. Aroci S. alpha-Chlordane W. Aroci T. gamma-Chlordane X. Aroci	U. Toxaphene V. Aroclor-1016 W. Aroclor-1221 X. Aroclor-1232	Y. Aroclor-1242 Z. Aroclor-1248 AA. Aroclor-1254 BB. Aroclor-1260	CC. DB 608 DD. DB 1701 EE_Hexachlobenzene	GG. H.H. U.U.	•

24 146 I39 LDC#: SDG #:

VALIDATION FINDINGS WORKSHEET

Page: Reviewer:_ 2nd Reviewer:

3	

Blanks

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

	lank extraction date: Blank analysis date: Associated samples:					FF 0.602 / All results wither ND or > BX BIK)	<i>Y-y</i>	Blank ID Sample Identification	Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Were all samples associated with a method blank?	cies?	ction was perform the proper frequency ations below. Sample Identification Sample Identification	ions are iden high extractic livzed at the line qualificatic amples: sa sa san san san san	licable questions an tenever a sample ey please see the qual Associated samples: Associated samples: Asso	wered "N". Not applicable questions are identified as "n method blank? each matrix and whenever a sample extraction was per vere extract clean-up blanks analyzed at the proper frechod blanks? If yes, please see the qualifications below. Associated samples: Associated samples: Associated samples: Sample Identifications below.	ons answered I with a methoned for each remed, were enthemethod by a second of the method	Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". N/A Were all samples associated with a method blank? N/A Was a method blank beformed to reach match and wherever a sample extraction was performed? N/A Was a method blank beformed to reach match and wherever a sample extraction was performed? N/A Was a method blank blank? I extract clean-up was performed, were extract clean-up blanks analyzed at the proper frequencies? N/A Was there contamination in the method blanks? I was please see the qualifications below. All N/A Was there contamination in the method blanks? I was please see the qualifications below. All N/A Was there contamination in the method blanks? I was please see the qualifications below. All N/A Was there contamination All Sample identification Sample id
Blank ID Sample Identification Sample Identifica	Blank ID Sample Identification Sample Identification	Blank ID Sample Identification Sample Identification	Blank ID Sample Identification Sample Identification	Blank ID Sample Identification Sample Identification	Blank ID Sample Identification Sample Identifica	Blank ID Blank ID	Blank ID			ned? ncies?	on was perfor proper freque ons below.	nple extracticallyzed at the Information of the Inf	ienever a sar ip blanks ana please see th Associated sa	natrix and wh xtract clean-u lanks? If yes,	ned for each remed, were enthe method bl	hod blank perform lean-up was perform contamination in

ř

1.056

1.24

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT: All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 24 140 I 34 SDG #:

VALIDATION FINDINGS WORKSHEET Field Blanks

of of Page: Reviewer: 2nd Reviewer:

Were target compounds detected in the field planks? Field blanks were identified in this SDG.

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

45 /ts Associated sample units: Y N N/A Y N N/A Blank units:

ર્ σ Sampling date:

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

Sample Identification Associated Samples: 2 X rsults 4 Blank ID 0, 13 Compound

Associated sample units: Sampling date: Blank units:

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

Associated Samples:

Compound	Blank ID		Sa	Sample Identification	ion		
CROL							

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

FBLKASC.3S

LDC# 24 140 [34

VALIDATION FINDINGS WORKSHEET Surrogate Spikes

Page: 1 of 3 Reviewer:_ 2nd Reviewer. (s)

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

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

| Y | N/A | Were surrogates spiked into all samples, standards and blanks?
| Y | N/N/A | Did all surrogate percent recoveries (%R) meet the QC limits?

Qualifications	1 Gual FS. HHC					(4 may 10)				7				(gual MFS.C		
	J/11/15 /A	•						Ì		No one	,		1	J/45 /A		
%R (Limits)	(Sd-113)	((63-124)	(1	()	(SIL-JES)	(63-124)	(7)	()	(511-65)	([)	(63-124)	(1	(54-115)	(
/R (48	25	395	624		52	573	1021		hs	Q5	403	933	0	0	
Surrogate Compound	A	4	82	В		¥	8	В		A	Ą	20	स्ट	Å	A	
Column	(4P)	7		2		_		7	*	_	2	_	7		7	
Sample ID						1 RF				(xoz) 701				2		
Date																
#																

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

CMatrix interterence

43-124

0

2C) α

(s)

LDC#: 24140 I34

VALIDATION FINDINGS WORKSHEET Surrogate Spikes

Page: 2 of 3 Reviewer:_ 2nd Reviewer:

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

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

Were surrogates spiked into all samples, standards and blanks?

N/A

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

*	Date	Sample ID	Column	Surrogate Compound	%R (Limits)	Qualifications	
		2 (1000x)	1 200	A	(SH-BS) a	No smal	
			7	¥			
				В	7183 (63-124)		
			メ	ধ	(1) 889h	_	
		3		8	587 (💃)	3+ dets / (qual F & S HH C.	<u> </u>
			7	В	(/) (19	IHLNKRDT	
						0	
		3 RE		B	598 ()	J+ Acts (A (qual M &)	(g)
			٨	В	567 ()	, , ,	\
					()		
		(400) 196		4	(51-18) 44	No exact.	
			7	A	39 (1)		
				Ъ	630 (62-124)		
			>	В			
					()		
		72		A	(S11-12) Q	J/45 /A (que N F S & HH.	
			٨	¥	(1) 8284	C, J, TZ KKB	
			(В	50440 (63-124)	7 6 6 7 4)	
			7	4	304961		, r
Let	Letter Designation	Surrogate Compound		Recovery QC Limits (Soil)		Water) Comments	
	А	Tetrachoro-m-xylene					
	В	Decachlorobiphenyl					

VALIDATION FINDINGS WORKSHEET Surrogate Spikes

Page: > of > Reviewer: M 2nd 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".

| Y N N/A | Were surrogates spiked into all samples, standards and blanks?
| Y N N/A | Did all surrogate percent recoveries (%R) meet the QC limits?

					$\frac{\mathbb{S}}{\square}$		2	(2)	<u>, </u>										
Qualifications	No ruel				Statts /A (quag F A, S. HH		& D, T E G P U	(M)			h o sual			3 + dets /p (121)					
%R (Limits)	0 (19-115)	()) 0	74560 (63-124)	<i>\</i>	805	1 25/20	()	493 ()	() () (()	£83 ()	()) /~2	•	156 (63.124)	(()	()	()	(
Surrogate Compound	А	A		3	4		•	В			8			Ð					
Column	CH)	>		\ 	-	2			`\			7							
Sample ID	(2000x)				۲			S RF			(X01) 70 S	,		MB 280- 31016 /-A					
Date																			
#																			

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

Page: ⊥of ⊥ Reviewer: ⊅C 2nd Reviewer: ✓

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

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

LDC # 24 1 40 T 34 SDG # See Gary Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". AKN N/A

Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG?

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?

N N

																_										
Qualifications	No Thal	('', 507)																								
Associated Samples	4																									
RPD (Limits)	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()
MSD %R (Limits)	side limits	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()
MS %R (Limits)	compounds not sid		()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	(.)
Compound	All	1																								
OI OS/WSD	7/8	/																								
Date																										
) #																			1			ŀ			- 1	1

LDC#: 24140 I3A SDG#: 20 Com

VALIDATION FINDINGS WORKSHEET Compound Quantitation and Reported CRQLs

Page: 1 of A Reviewer: 502

METHOD: __GC__ HPLC

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

Level IV/D Only

ON N/A

V

ON N/A

ON N/A

CON N/A

CON N/A

Were CRQLs adjusted for sample dilutions, dry weight factors, etc.?

Did the reported results for detected target compounds agree within 10.0% of the recalculated results?

Did the percent difference of detected compounds between two columns./detectors < 40%?

If no, please see findings bellow.

tions	(de)	, ,	o		4						
Qualifications	J dots A	_			7		and high soft of the distributions are as a superior of the su				
RPB/D Between Two Columns/Detectors Limit (< 40%)	177.3	47, 3	84.7	198.3	105,8						
Sample ID	4				A						
Compound Name	FF	q	J	-1	0						
*											

Comments: See sample calculation verification worksheet for recalculations

LDC#: 24140l3a

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:	lof/_
Reviewer:_	n6
2nd Reviewer:	$\ddot{\mathcal{C}}$

Щ	ETHOD:	: GC Chlorinated Pesticides (EPA SW 846 Method 8081A)
<u> Y</u>	N NA	Were field duplicate pairs identified in this SDG?

Were target analytes detected in the field duplicate pairs?

Compound Name	Conc (ug/Kg)	RPD	Diff	Diff Limits	Quals
•	1	5	(≤50%)			(Parent Only)
4,4'-DDE	660	220	100			Jdet/A (fd)
4,4'-DDT	210	100	71			Jdet/A (fd)
alpha-BHC	130	30	125			Jdet/A (fd)
beta-BHC	200	100	67			Jdet/A (fd)
Dieldrin	13	1.2		11.8	≤35	
Endosulfan I	1.8U	0.53		1.27	≤1.8	
Endosulfan II	29	7.5		21.5	≤35	
gamma-BHC	53	12		41	≤35	Jdet/A (fd)
Hexachlorobenzene	350	210	50			
delta-BHC	3.7	1.1		2.6	≤1.8	Jdet/A (fd)
Endrin ketone	9.2	1.8U		7.4	≤1.8	Jefet A (fd)
Methoxychlor	26	24	8			/
4,4'-DDD	6.1	6.0		0.1	≤1.8	

V:\FIELD DUPLICATES\24140I3a.wpd

LDC # 24 146 T3W

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Page: 1 of 4

GC EPA SW 846 Method 8081A METHOD:

Hexachlorobenzene Parameter:

X^2					-			
×	Conc	4.00	10.00	25.00	50.00	75.00	100.00	
\	Area	44827.00	103588.00	249072.00	490208.00	730674.00	953705.00	
	Compound	Hexachlorobenzene						
	Column	CLP1		GCS_P2				
	Date	08/11/2010						

Regression Output:	out:		Reported	
Constant		0.00000	11 O	0.00000
Std Err of Y Est		8773.78312		
R Squared		0.99941	r2 =	0.999900
No. of Observations		6.00000		
Degrees of Freedom		5.00000		
X Coefficient(s)	9653.526874	-1.270906	= q	9638.000000
Std Err of Coef.	63.877363	0.79		

11206.75

10358.80

9962.88

9804.16

9742.32

9537.05

10101.99 Ave RF

LDC # 24 140 13x

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Page: 2 of 4

Reviewer: TVb 2nd Reviewer:

GC EPA SW 846 Method 8081A METHOD:

Hexachlorobenzene Parameter:

Xv2	16.00	100.00	625.00	2500.00	5625.00	10000.00	
Conc	4.00	10.00	25.00	50.00	75.00	100.00	
Υ Area	93334.00	210505.00	481272.00	894649.00	1284080.00	1628971.00	
Compound	Hexachlorobenzene						
Column	CLP2		GCS_P2				
Date	08/11/2010						

Regression Output:	ut:		Reported	
Constant		20708.90229	= 3	AN R
Std Err of Y Est		3835.69679		
R Squared		0.99998	r2 =	0.999990
No. of Observations		6.00000		
Degrees of Freedom		3.00000		
	:			NR
X Coefficient(s)	19034.788783	-29.504222	= q	N.
Std Err of Coef.	183.320239	1.76		

21051 19251 17893 17121 16290

23334

19156 Ave RF

LDC # 24/40 Isa

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

GC EPA SW 846 Method 8081A METHOD:

Parameter:

b-BHC

	<u> </u>						
X^2							
Υ Conc	4.00	10.00	25.00	50.00	75.00	100.00	
X Area	23110.00	52056.00	124514.00	245293.00	366609.00	479885.00	
Compound	b-BHC						
Column	CLP1		GCS_P2				
Date	08/11/2010						

Regression Output:			Reported	7
Constant		0000000	fi O	0.00000
Std Err of Y Est		3979.11102		
R Squared		0.99952	12 =	1.000000
No. of Observations		00000'9		
Degrees of Freedom		5.00000	ODERONI ORIENTANIA A NORTH HERMANA NORTH HERMANA NORTH HERMANA AND ROLL AND	
X Coefficient(s)	4848.652338	-1.270906	= q	4813.000000
Std Err of Coef.	28.969843	0.79		

4980.56 4905.86 4888.12 4798.85

5777.50 5205.60

5092.75 Ave RF

Page: 3 of 4

76 1 061 pg # DOT

Initial Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Reviewer: 1/2

Page: 4 of 4

GC EPA SW 846 Method 8081A METHOD:

P-BHC Parameter:

Date	Column	Compound	Y Area	Conc	X^2
08/11/2010	CLP2	b-BHC	46113.00	4.00	16.00
			103650.00	10.00	100.00
	GCS_P2		239958.00	25.00	625.00
			450061.00	50.00	2500.00
			648617.00	75.00	5625.00
			826471.00	100.00	10000.00

Regression Output:	ut		Reported	
Constant		9066.02542	= 3	NR
Std Err of Y Est		1421.92497		
R Squared		66666.0	r2 =	1.000000
No. of Observations		000000		-
Degrees of Freedom		3.00000		
			W II	NR
X Coefficient(s)	9529.795818	-13.537170	q	NR
Std Err of Coef.	67.958350	0.65		

10365 9598 9001 8648 8265

11528

Ave RF

9568

LDC# 74140 I 30

Continuing Calibration Calculation Verification **VALIDATION FINDINGS WORKSHEET**

Page: ___of__ Reviewer: ______

METHOD: GC_

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:

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

Recalculated %D		4.2	8.8	3.0	3.4									
Reported % D		2.8	7.2	3.0	3.4									
Recalculated	•	52.1	54.4	48.5	51.7	,								
Reported		51.4	53.6	48.5	51.7									
CCV Conc		50	90	50	50									
	pur	CLP1	CLP1	CLP2	CLP2									
	Compound	НСВ	DH8-q	HCB	b-BHC									
Calibration	Date	9/14/2010	20:36											
	Standard ID	020F2001												
	#	1					2			3			4	

		CCV1	CCV2	CCV3	CCV4	CCV5
	Slope	Area	Area	Area		
HCB CLP1	9638	502028				
b-BHC CLP1	4813	261834				

					(-b+ ())/2a	(-b -())/ 2a	261524771 16171.7275 48.5198868 596.639719	66100140.79 8130.19931 51.6945754 652.277955
						()^1/2	71 16171.72	79 8130.198
				Calculation		(b^2 - 4aT) ()^ 1/2	26152477	66100140.7
						T = Y-c	-854108.098	456462.9746
			Variotisticanist materialism statements de la company de l			final conc		
					Conc.	×	48.520	51,695
Area						U	20708.902	9066.025
Area				ن +		Ω	19034.789	9529.796
Area	502028	261834		$Y = a(X^2) + bX + c$		Ø	-29.504	-13.537
Slope	8696	4813			Area	>	874817	465529
	HCB CLP1	b-BHC CLP1					CCV1 HCB CLP2	CCV1 b-BHC 2

LDC #:_	2014	0 F 39
SDG #:	See	Com

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:_	l_of
Reviewer:_	NY
2nd reviewer:_	

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

The percent recove	ries (%R) of surrogates	were recalculated fo	r the compound:	s identified below us	na the followina c	alculation:

% Recovery: SF/SS * 100

Where: SF = Surrogate Found

SS = Surrogate Spiked

Sample ID: # 5

Surrogate	Column	Surrogate Spiked	Surrogate Found	Percent Recovery	Percent Recovery	Percent Difference
				Reported	Recalculated	
Tetrachloro-m-xylene	cep 1	20	0	D	O NE	NC
Tetrachloro-m-xylene	7		975.5	4878	4875	0
Decachlorobiphenyl		•	10088	50490 447.	50440	
Decachlorobiphenyl	7	1	60 9 92,2	304961	364961	1

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						

Notes:_					
_				 	

LDC#: 24 140 I 32

Matrix Spike/Matrix Spike Duplicates Results Verification VALIDATION FINDINGS WORKSHEET

Page: of Reviewer: JVC

2nd 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

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

MS = Matrix spike percent recovery

MSD = Matrix spike duplicate percent recovery

MS/MSD samples:

	ซี ั	pike	Sample	Spiked	Spiked Sample	Matrix	Matrix Spike	Matrix Spil	Matrix Spike Duplicate	W	MS/MSD
Compound	₹ ₹	Added (لام /أدر)	Concentration (16)	Concei (1/5	Soncentration (14, /k.)	Percent	Percent Recovery	Percent	Percent Recovery		RPD
	WS	0 MSD	0.	MS	MSD	Reported	Recalc.	Reported	Recalc.	Reported	Recalculated
gamma-BHC	17.9	17.7	137.9	214	73/	719	425	823	5,5	ð	8
4,4'-DDT		\rightarrow	250	65/1	1170	6659-	2467	1259-	2542.4		λ
Aroclor 1260											

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

Sample parent 7 3 from rsmt+ アカア

LDC#: 74 | 46 134

VALIDATION FINDINGS WORKSHEET

Laboratory Control Sample/Laboratory Control Sample Duplicate Results Verification

Page: lof 1
Reviewer: JVZ
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 duplicate were recalculated for the compounds identified below using the following calculation:

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

Where: SSC = Spiked sample concentration SA = Spike added

SC = Concentration

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

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

LCS/LCSD samples:

LCS 280-31016/2-A

	5	Ika Ika								
	Agr	Jed	Spiked	Sample	TC	rcs	TC	CSD	TCS	LCS/LCSD
Compound	(Å	(49 k)	(1/5 /c)	15)	Percent Recovery	\ecovery	Parcent	Percent December.	<u>'</u>	
	2	0		g				Necovery	×	RPD
	S	LCSD	SOT	LCSD	Reported	Recalc.	Reported	Recalc.	Reported	Rocalc
gamma-BHC	_6.	N.A	13. 457	44 	50	, ,				3000
4.4'-DDT			1		6	X X				
	*	4	12,053	_	7.5	73				
Aroclor 1260			`							
									-11	
		Ī								

Comments: Refer to Laboratory Control Sample/Laboratory Control Sample Duplicate findings worksheet for list of qualifications and associated samples when reported

LDC #: 24/40 I3a

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	
Reviewer:	JVG
2nd reviewer:	12

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

YN	N/A
YN	N/A
ノフ	

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:

Conc. =
$$\frac{(717660)(10ml)(5000)}{(9638)(30.49)(0.92)}$$

= 132974.6

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

Note:

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS Additional Sampling,

Henderson, Nevada

Collection Date:

August 30, 2010

LDC Report Date:

October 21, 2010

Matrix:

Soil/Water

Parameters:

Arsenic & Lead

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-6956-1

Sample Identification

BDT-1-S-10-6BPC BDT-1-S-15-10BPC BDT-1-S-10-8BPC BDT-1-S-15-12BPC BDT-1-S-5-10BPC BDT-1-S-15-14BPC** BDT-1-S-5-12BPC BDT-1-S-15-2BPC BDT-1-S-5-14BPC** BDT-1-S-15-4BPC BDT-1-S-5-8BPC BDT-1-S-15-6BPC BDT-1-S-5-2BPC BDT-1-S-15-8BPC BDT-1-S-5-4BPC BDT-1-S-15-2BPC FD BDT-1-S-5-6BPC SA33-1BPC EB-08302010 SA33-2BPC SSAQ5-03-1BPCMS SA33-3BPC SSAQ5-03-1BPCMSD SSAQ5-03-10BPC** BDT-1-S-10-8BPCMS SSAQ5-03-1BPC BDT-1-S-10-8BPCMSD SSAQ5-03-5BPC **BDT-1-S-5-14BPCMS** SA33-3BPC FD BDT-1-S-5-14BPCMSD BDT-1-S-10-10BPC BDT-1-S-10-12BPC BDT-1-S-10-14BPC**

BDT-1-S-10-2BPC BDT-1-S-10-4BPC

^{**}Indicates sample underwent Stage 4 review

Introduction

This data review covers 35 soil samples and one water sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 6020 for Arsenic and Lead.

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

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

Blanks are summarized in Section IV.

Field duplicates are summarized in Section XIV.

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

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. ICPMS Tune

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

III. Calibration

An initial calibration was performed.

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

IV. Blanks

Method blanks were reviewed for each matrix as applicable. No arsenic or lead was found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Lead	0.0206 mg/Kg	BDT-1-S-10-10BPC BDT-1-S-10-12BPC BDT-1-S-10-12BPC BDT-1-S-10-2BPC BDT-1-S-10-4BPC BDT-1-S-10-6BPC BDT-1-S-5-10-8BPC BDT-1-S-5-10BPC BDT-1-S-5-12BPC BDT-1-S-5-14BPC** BDT-1-S-5-8BPC BDT-1-S-5-8BPC BDT-1-S-5-8BPC BDT-1-S-5-8BPC BDT-1-S-5-8BPC BDT-1-S-5-8BPC BDT-1-S-5-8BPC BDT-1-S-5-6BPC

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

Sample EB-08032010 was identified as an equipment blank. No arsenic or lead 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 with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
BDT-1-S-10-8BPCMS/MSD (BDT-1-S-15-10BPC BDT-1-S-15-14BPC** BDT-1-S-15-14BPC BDT-1-S-15-4BPC BDT-1-S-15-4BPC BDT-1-S-15-6BPC BDT-1-S-15-8BPC BDT-1-S-10-10BPC BDT-1-S-10-12BPC BDT-1-S-10-14BPC** BDT-1-S-10-14BPC BDT-1-S-10-14BPC BDT-1-S-10-14BPC BDT-1-S-10-14BPC BDT-1-S-10-14BPC BDT-1-S-10-8BPC BDT-1-S-10-8BPC BDT-1-S-5-10-8BPC BDT-1-S-5-12BPC BDT-1-S-5-14BPC** BDT-1-S-5-14BPC** BDT-1-S-5-14BPC** BDT-1-S-5-14BPC** BDT-1-S-5-14BPC** BDT-1-S-5-14BPC** BDT-1-S-5-14BPC** BDT-1-S-5-4BPC BDT-1-S-5-4BPC BDT-1-S-5-4BPC BDT-1-S-5-4BPC BDT-1-S-5-6BPC)	Lead	• ·	56 (75-125)	·	J- (all detects) UJ (all non-detects)	Α
BDT-1-S-5-14BPCMS/MSD (BDT-1-S-15-10BPC BDT-1-S-15-14BPC** BDT-1-S-15-14BPC** BDT-1-S-15-4BPC BDT-1-S-15-4BPC BDT-1-S-15-6BPC BDT-1-S-15-8BPC BDT-1-S-15-2BPC_FD BDT-1-S-10-10BPC BDT-1-S-10-12BPC BDT-1-S-10-12BPC BDT-1-S-10-4BPC** BDT-1-S-10-4BPC BDT-1-S-10-6BPC BDT-1-S-10-6BPC BDT-1-S-5-10-8BPC BDT-1-S-5-10-8BPC BDT-1-S-5-14BPC** BDT-1-S-5-14BPC** BDT-1-S-5-4BPC BDT-1-S-5-4BPC BDT-1-S-5-4BPC BDT-1-S-5-4BPC BDT-1-S-5-4BPC BDT-1-S-5-4BPC BDT-1-S-5-4BPC BDT-1-S-5-4BPC	Lead	66 (75-125)	•		J- (all detects) UJ (all non-detects)	Α

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) and relative percent differences (RPD) were within QC limits.

IX. Internal Standards

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

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution analysis was performed by the laboratory. The analysis criteria were met with the following exceptions:

Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
BDT-1-S-10-8BPCL	Arsenic	12 (≤10)	SA33-1BPC SA33-2BPC SA33-3BPC SSAQ5-03-10BPC** SSAQ5-03-1BPC SSAQ5-03-5BPC SA33-3BPC_FD	J (all detects) UJ (all non-detects)	A

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 280-6956-1	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 BDT-1-S-15-2BPC and BDT-1-S-15-2BPC_FD and samples SA33-3BPC and SA33-3BPC_FD were identified as field duplicates. No arsenic or lead was detected in any of the samples with the following exceptions:

	Concentra	tion (mg/Kg)				
Analyte	BDT-1-S-15-2BPC	BDT-1-S-15-2BPC_FD	RPD (Limits)	Difference (Limits)	Flags	. A or P
Lead	6.6	6.9	4 (≤50)	-	-	-

	Concentra	tion (mg/Kg)				
Analyte	SA33-3BPC	SA33-3BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Arsenic	2.0	2.6	26 (≤50)	-	-	-

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Arsenic & Lead - Data Qualification Summary - SDG 280-6956-1

		<u>r</u>		<u> </u>	
SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-6956-1	BDT-1-S-15-10BPC BDT-1-S-15-12BPC BDT-1-S-15-14BPC** BDT-1-S-15-4BPC BDT-1-S-15-4BPC BDT-1-S-15-4BPC BDT-1-S-15-6BPC BDT-1-S-15-6BPC BDT-1-S-10-10BPC BDT-1-S-10-12BPC BDT-1-S-10-12BPC BDT-1-S-10-2BPC BDT-1-S-10-4BPC** BDT-1-S-10-4BPC BDT-1-S-10-8BPC BDT-1-S-5-10-8BPC BDT-1-S-5-12BPC BDT-1-S-5-12BPC BDT-1-S-5-12BPC BDT-1-S-5-2BPC BDT-1-S-5-2BPC BDT-1-S-5-2BPC BDT-1-S-5-4BPC BDT-1-S-5-4BPC BDT-1-S-5-4BPC BDT-1-S-5-6BPC	Lead	J- (all detects) UJ (all non-detects)	А	Matrix spike/Matrix spike duplicates (%R) (m)
280-6956-1	SA33-1BPC SA33-2BPC SA33-3BPC SSAQ5-03-10BPC** SSAQ5-03-1BPC SSAQ5-03-5BPC SA33-3BPC_FD	Arsenic	J (all detects) UJ (all non-detects)	А	ICP serial dilution (%D) (sd)
280-6956-1	BDT-1-S-15-10BPC BDT-1-S-15-12BPC BDT-1-S-15-14BPC** BDT-1-S-15-4BPC BDT-1-S-15-4BPC BDT-1-S-15-4BPC BDT-1-S-15-6BPC BDT-1-S-15-6BPC BDT-1-S-15-2BPC_FD SA33-1BPC SA33-2BPC SA33-3BPC SSAQ5-03-10BPC** SSAQ5-03-10BPC** SSAQ5-03-15BPC SA33-3BPC BDT-1-S-10-10BPC BDT-1-S-10-10BPC BDT-1-S-10-14BPC** BDT-1-S-10-4BPC BDT-1-S-5-10-4BPC BDT-1-S-5-10-4BPC BDT-1-S-5-10-BPC BDT-1-S-5-10-BPC BDT-1-S-5-10-BPC BDT-1-S-5-10-BPC BDT-1-S-5-10-BPC BDT-1-S-5-4BPC BDT-1-S-5-6BPC BDT-1-S-5-6BPC BDT-1-S-5-6BPC BDT-1-S-5-6BPC EB-08302010	All analytes reported below the PQL.	J (all detects)	Α	Sample result verification (PQL) (sp)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Arsenic & Lead - Laboratory Blank Data Qualification Summary - SDG 280-6956-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Arsenic & Lead – Equipment Blank Data Qualification Summary - SDG 280-6956-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #:_ 24140A4 SDG #: 280-6956-1 Stage 2B/4 Laboratory: Test America

Date: 10-0
Page: \of \
Reviewer: 02_
2nd Reviewer:

METHOD: As & Pb (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: 8 30/0
II.	ICP/MS Tune	À	
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	\mathcal{N}	,
VIII.	Laboratory Control Samples (LCS)	A	LCS/D
IX.	Internal Standard (ICP-MS)	A	
X.	Furnace Atomic Absorption QC	\mathcal{N}	Notutilized
XI.	ICP Serial Dilution	SW	/
XII.	Sample Result Verification	A	Not reviewed for Stage 2B validation.
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	Sw	(7,81,(11,15)
ΧV	Field Blanks	NO	EB=30, FB= FBO4067016-RZB, FB-04/3201
Note:	A = Acceptable ND = N	o compounds	s detected $D = Duplicate$ $C280-7.46$

N = Not provided/applicable

SW = See worksheet

R = Rinsate

FB = Field blank

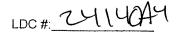
TB = Trip blank

EB = Equipment blank

Validated Samples: ** Indicates sample underwent Stage 4 validation

	all soil excer	<u> </u>	130 = WATEL				
1	BDT-1-S-15-10BPC	11	SA33-3BPC	21	BDT-1-S-10-6BPC	31	SSAQ5-03-1BPCMS
2	BDT-1-S-15-12BPC	12	SSAQ5-03-10BPC**	22	BDT-1-S-10-8BPC	32	SSAQ5-03-1BPCMSD
3	BDT-1-S-15-14BPC**	13	SSAQ5-03-1BPC	23	BDT-1-S-5-10BPC	33	BDT-1-S-10-8BPCMS
4	BDT-1-S-15-2BPC	14	SSAQ5-03-5BPC	24	BDT-1-S-5-12BPC	34	BDT-1-S-10-8BPCMSD
5	BDT-1-S-15-4BPC	15	SA33-3BPC_FD	25	BDT-1-S-5-14BPC**	35	BDT-1-S-5-14BPCMS
6	BDT-1-S-15-6BPC	16	BDT-1-S-10-10BPC	26	BDT-1-S-5-8BPC	36	BDT-1-S-5-14BPCMSD
7	BDT-1-S-15-8BPC	17	BDT-1-S-10-12BPC	27	BDT-1-S-5-2BPC	37	
8	BDT-1-S-15-2BPC_FD	18	BDT-1-S-10-14BPC**	28	BDT-1-S-5-4BPC	38	PBSI
9	SA33-1BPC	19	BDT-1-S-10-2BPC	29	BDT-1-S-5-6BPC	39	PB52
10	SA33-2BPC	20	BDT-1-S-10-4BPC	30	EB-08302010	40	PBW

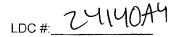
Notes:			
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VALIDATION FINDINGS CHECKLIST

Page: of Reviewer: 2nd Reviewer:

Method:Metals (EPA SW 846 Method 6010B/7000/6020)			,	
Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.				
Cooler temperature criteria was met.				
II. ICP/MS Tune		2		
Were all isotopes in the tuning solution mass resolution within 0.1 amu?				
Were %RSD of isotopes in the tuning solution ≤5%?			,	
III. Calibration				
Were all instruments calibrated daily, each set-up time?		ŕ		
Were the proper number of standards used?				
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury) QC limits?				
Were all initial calibration correlation coefficients > 0.995?				
IV. Blanks				
Was a method blank associated with every sample in this SDG?	/	(
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.				,
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?				
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?				
VI. Matrix spike/Matrix spike duplicates			,	
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.		_		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.			_	
Were the MS/MSD or duplicate relative percent differences (RPD) \leq 20% for waters and \leq 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were \leq 5X the RL, including when only one of the duplicate sample values were \leq 5X the RL.				
VII. Laboratory control samples	·	<u> </u>		
Was an LCS anaylzed for this SDG?				
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	/			·



VALIDATION FINDINGS CHECKLIST

Page: Zof Z Reviewer: _C 2nd Reviewer:

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

LDC#: 24140A4

VALIDATION FINDINGS WORKSHEET Sample Specific Element Reference

Page:	of)	
Reviewer:	CR	-
2nd reviewer:_		

All circled elements are applicable to each sample.

Sample ID Matrix	Target Analyte List (TAL)
1-8.16-29	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 ⁻ ,
9-15:30	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,
160700	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
7001	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
X:31.37	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,
33 34	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,
V3536	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN',
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN,
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Ti, V, Zn, Mo, B, Si, CN
	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
	Analysis Method.
ICP	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
ICP-MS	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,
GFAA	Al, Sh, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN;

Comments:_	Mercury by CVAA if performed	

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LDC #: 2	LDC #: 24140A4					VALIDATION FINDINGS WORKSHEET PB/ICB/CCB QUALIFIED SAMPLES	I FINDINGS B QUALIFIE	WORKSHE ED SAMPLE	EET	Reasc	Reason Code: bl	Pag Review	Page: of Reviewer: Q&	on the factor of
METHOD	METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)	(EPA SW 86	34 Method 6	010B/6020/7		Soil preparation factor applied: 100 x 5xdil	on factor app	olied: 100	x 5xdil			2nd Review	2nd Reviewer:	
Sample C	Sample Concentration units, unless otherwise noted:	nits, unless o	otherwise no	ited:	Associate	Associated Samples: 16-29	16-29							٠.
												and Samuel Section 1998		
Analyte	_	Maximum Maximum	Maximum	Action	N _o									
	PB ^a (ma/Ka)	PB³ (uα/L)	ICB/CCB ^a	Limit	Qualifiers									
£	0.006													•

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U".

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

LDC# 24140+5

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Reviewer._ 2nd Reviewer:

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

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

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

Were matrix spike percent recoveries (%R) within the control limits of 75-1259 If the sample concentration exceeded the spike concentration by a factor 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?

Y N/A W.

Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations. Y)N N/A

		T	7	T	T						T	Ī	П				٦
	Qualifications	9-1-04/A Cm)		7		0								The state of the s	School of the second se		
	Associated Samples	1-8/162)	62-9(9-1)												
	RPD (Limits)								:								
OSM	%Recovery	71															
MS	%Recovery			99													
	Analyte	P b		45													
	Matrix	\checkmark	,	2													
	OI OŚW/SW	32PH		35/36													
	#																

Comments:

LDC# 22/40/

VALIDATION FINDINGS WORKSHEET ICP Serial Dilution

Page: of Reviewer:_ 2nd Reviewer:

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

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

N N/A

If analyte concentrations were > 50X the MDL (ICP), or >100X the MDL (ICP/MS), was a serial dilution analyzed?

Were ICP serial dilution percent differences (%D) ≤10%?

Note ICP serial dilution percent differences (%D) ≤10%?

Is there evidence of negative interference? If yes, professional judgement will be used to qualify the data.

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

=			 		 	-	 =	 	$\overline{}$	 -	 	Т	$\overline{}$	T	T	T	 T	$\neg \neg$
	Qualifications	5/15/A (sd)																
raileet lei recalcalcalca.	Associated Samples	9-15																
רביםוכתומונים איסו	%D (Limits)	12	٠															
ספב רבאבו וא	Analyte	As																
s acceptable?	Matrix	2																
Well recalculated results acceptable; See Level IV incraiculation woo naticel for recalculations.	Diluted Sample ID	77																
T) N N/A	# Date																	

Comments:

LDC	<u>241</u>	<u> 140A4</u>	

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:(_	_of	
Reviewer:_	CC	=
2nd Reviewer:	سن	_

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

\bigcirc	Ν	NA
α	N	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
Analyte	7	8	RPD	Difference	Limits	(Parent Only)
Lead	6.6	6.9	4			

V:\FIELD DUPLICATES\FD_inorganic\24140A4.wpd

	Concentration	on (mg/Kg)	(≤50)	(mg/Kg)	(mg/Kg)	Qualifications
Analyte	11	15	RPD	Difference	Limits	(Parent Only)
Arsenic	2.0	2.6	26			

LDC# 2412049

Initial and Continuing Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Reviewer: 45

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

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

%R = Found × 100 True

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

					Recalculated	Reported	
Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	%R	%R	Acceptable (Y/N)
	ICP (Initial calibration)						
HCV HCV	ICP/MS (Initial calibration)	AS	41,5	9h	/¬@}	501) _
	CVAA (Initial calibration))				
	ICP (Continuing calibration)						
CVazza	CL.28 ICP/MS (Continuing calibration)	dd	48.7	\mathcal{Z}	47	6	2
	CVAA (Continuing calibration)		•				
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

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

24/2/45

VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

2nd Reviewer.

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

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

%R = 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:

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

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

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

%D = ||-SDR| × 100

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

					3		
			=		Recalculated	Reported	
Sample ID	Type of Analysis	Element	Found / S / 1 (Units) (N)	True / D / SDR (umits)	%R/RPD/%D	%R/RPD/%D	Acceptable (Y/N)
ASPS T	ICP interference check	Æ	103righ	100%	(03	103	>-
1.05	Laboratory control sample	£	193	92	126	79	
31	Matrix spike	£	(SSR-SR)	02	26	26	
12/2	Duplicate	99	24.4	21.1249.20	15	5	
22	ICP serial dilution	(V)	h'L	8,01	5.5	b'2)

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

LDC #: 24140A

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page: of Reviewer: 2nd reviewer:

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

# Sample ID	Analyte Pb	Reported Concentration (MSIS)	Calculated Concentration (W. C.)	
3	₽D.	6,5	1 11100	Acceptable (Y/N)
			6,5	4

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS Additional Sampling,

Henderson, Nevada

Collection Date:

August 31, 2010

LDC Report Date:

October 28, 2010

Matrix:

Soil

Parameters:

Arsenic

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-6983-1

Sample Identification

SSAR7-05-1BPC

SSAR7-05-2BPC

SSAR7-05-3BPC

SSAQ5-07-1BPC

SSAQ5-07-5BPC

SSAQ5-07-10BPC**

SSAR7-05-1BPCMS

SSAR7-05-1BPCMSD

SSAQ5-07-1BPCMS

SSAQ5-07-1BPCMSD

^{**}Indicates sample underwent Stage 4 review

Introduction

This data review covers 10 soil samples and one water sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 6020 for Arsenic.

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

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

Blanks are summarized in Section IV.

Field duplicates are summarized in Section XIV.

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

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. ICPMS Tune

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

III. Calibration

An initial calibration was performed.

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

IV. Blanks

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

No field blanks were identified in this SDG.

V. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

VI. Matrix Spike Analysis

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

VII. Duplicate Sample Analysis

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

VIII. Laboratory Control Samples (LCS)

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

IX. Internal Standards

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

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

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

XII. Sample Result Verification and Project Quantitation Limit

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

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG 280-6983-1	All analytes reported below the PQL.	J (all detects)	А

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

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Arsenic - Data Qualification Summary - SDG 280-6983-1

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-6983-1	SSAR7-05-1BPC SSAR7-05-2BPC SSAR7-05-3BPC SSAQ5-07-1BPC SSAQ5-07-5BPC SSAQ5-07-10BPC**	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Arsenic - Laboratory Blank Data Qualification Summary - SDG 280-6983-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Arsenic - Field Blank Data Qualification Summary - SDG 280-6983-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #: 24140B4 SDG #: 280-6983-1 Stage 2B/4 Laboratory: Test America

Date:	10-601
Page:_	Lof_\
Reviewer:	<u> </u>
2nd Reviewer:	

METHOD: As (EPA SW 846 Method 6020)

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

	Validation Area		Comments
1.	Technical holding times	A	Sampling dates: 8-31-10
II.	ICP/MS Tune	A	
111.	Calibration	A	
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	A	ms/D
VII.	Duplicate Sample Analysis	\mathcal{N}	
VIII.	Laboratory Control Samples (LCS)	A	LES
IX.	Internal Standard (ICP-MS)	A.	
X.	Furnace Atomic Absorption QC	\mathcal{N}	Moturilized
XI.	ICP Serial Dilution	A	
XII.	Sample Result Verification	A	Not reviewed for Stage 2B validation.
XIII.	Overall Assessment of Data	A,	
XIV.	Field Duplicates	N	
ΧV	Field Blanks	M	FB-FB0462010-BZB(25021312)-CR

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

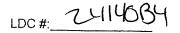
TB = Trip blank

EB = Equipment blank

Validated Samples: ** Indicates sample underwent Stage 4 validation

1	SSAR7-05-1BPC	11	21 805	31	
2	SSAR7-05-2BPC	12	22	32	
3	SSAR7-05-3BPC	13	23	33	
4	SSAQ5-07-1BPC	14	24	34	
5	SSAQ5-07-5BPC	15	25	35	
6	SSAQ5-07-10BPC**	16	26	36	
7	SSAR7-05-1BPCMS	17	27	37	
8	SSAR7-05-1BPCMSD	18	28	38	
9	SSAQ5-07-1BPCMS	19	29	39	
10	SSAQ5-07-1BPCMSD	20	30	40	

Notes:			



VALIDATION FINDINGS CHECKLIST

Page: of 7
Reviewer: 2nd Reviewer:

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

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

LDC#: ZYMBY

VALIDATION FINDINGS CHECKLIST

Page: Zof Z Reviewer: _____ 2nd Reviewer: _____

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

100 # 5417084

Initial and Continuing Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Page: 2nd Reviewer:__ Reviewer:_

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

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

%R = Found x 100 True

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

					Recalculated	Reported	
Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	%R	%R	Acceptable (Y/N)
	ICP (Initial calibration)						
ICV	ICP/MS (Initial calibration)	B	41,3	<i>0</i> h	103	501	<i>)</i> -
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
CC/	ICP/MS (Continuing calibration)	B	<i>5</i> 0.4	500	101	10))_
	CVAA (Continuing calibration)						
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

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

LDC # 24/4084

VALIDATION FINDINGS WORKSHEET **Level IV Recalculation Worksheet**

Reviewer: CR Page: 2nd Reviewer._

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

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

%R = Found x 100 True

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

True = Concentration of each analyte in the source.

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

RPD = <u>|S-D|</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 = |-SDR × 100

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

					Recalculated	Reported	
Sample ID	Type of Analysis	Element	Found / S / I (units) My/KS	True / D / SDR (units)	%R/RPD/%D	%R/RPD/%D	Acceptable (Y/N)
ICS (PR)	ICP interference check	Ps	102-29/	JBr (001	7201	201	2-
700	Laboratory control sample		b'b1	02	\OC\	8	
7	Matrix spike		(SSR-SR)	7.4	79	78	
01/6	Duplicate		23,0	1572	2	1	
	ICP serial dilution	\rightarrow	57	1.22	1,0	0.53	\

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 #: 2414834

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page: <u>↓</u>	of \
Reviewer:	ac_
2nd reviewer:	V

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

Please se Y N N/A Y N N/A Y N N/A	Have results be Are results with	for all questions answered "N". No een reported and calculated correct nin the calibrated range of the instr n limits below the CRDL?	:tly?		
Detected a	analyte results for	H5	were recald	ulated and verified	using the following
Concentratio	on = <u>(RD)(FV)(Dil)</u> (In. Vol.)	Recalculat (ion: 100m VS)(6,5)	418/4	
RD = FV = n. Vol. = Dil =	Raw data concentr Final volume (ml) Initial volume (ml) Dilution factor	or weight (G)	135)(0934)		3.098181
#	Sample ID	Analyte	Reported Concentration (MC)	Calculated Concentration (1%1Ks)	Acceptable (Y/N)
	6	As	3.1	3.1	4
lote:					

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS Additional Sampling,

Henderson, Nevada

Collection Date:

September 2 through September 3, 2010

LDC Report Date:

October 21, 2010

Matrix:

Soil/Water

Parameters:

Metals

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-7103-1

Sample Identification

^{**}Indicates sample underwent Stage 4 review

Introduction

This data review covers 49 soil samples and 6 water 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, Manganese, Magnesium, and Lead.

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
PB (prep blank)	Manganese	0.0770 mg/Kg	SSAO2-01-1BPC SSAO2-01-2BPC SSAO2-01-3BPC SSAP3-02-2BPC SSAP3-02-3BPC SSAN2-02-1BPC SSAN2-02-2BPC SSAN2-02-3BPC
PB (prep blank)	Manganese	0.276 mg/Kg	SSAM5-04-10BPC** SSAM5-04-1BPC SSAM5-04-5BPC SSAM5-04-5BPC_FD
ICB/CCB	Manganese	0.420 ug/L	SSAM5-04-10BPC** SSAM5-04-1BPC SSAM5-04-5BPC SSAM5-04-5BPC_FD
PB (prep blank)	Magnesium	4.91 mg/Kg	SSAP3-04-5BPC_FD
PB (prep blank)	Magnesium	0.657 mg/Kg	SSAP3-04-10BPC** SSAP3-04-1BPC SSAP3-04-5BPC SSAP3-03-10BPC SSAP3-03-1BPC SSAP3-03-5BPC

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
ICB/CCB	Magnesium	5.00 ug/L	SSAP3-03-1BPC SSAP3-03-5BPC SSAP3-04-5BPC_FD
ICB/CCB	Magnesium	2.30 ug/L	SSAP3-04-10BPC** SSAP3-04-1BPC SSAP3-04-5BPC SSAP3-03-10BPC

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

Samples EB-09022010 and EB-09032010 were identified as equipment blanks. No metal contaminants were found in these blanks with the following exceptions:

Equipment Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
EB-09032010	9/3/10	Manganese	2.4 ug/L	SSAO2-01-1BPC SSAO2-01-2BPC SSAO2-01-3BPC SSAN2-02-1BPC SSAN2-02-2BPC SSAN2-02-3BPC

Sample concentrations were compared to concentrations detected in the equipment 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.

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 280-7103-1	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 SSAP3-04-5BPC and SSAP3-04-5BPC_FD, samples SSAN7-05-1BPC and SSAN7-05-1BPC_FD, samples SSAM5-04-5BPC and SSAM5-04-5BPC_FD, samples SSAK8-08-3BPC and SSAK8-08-3BPC_FD, and samples SSAM7-07-3BPC and SSAM7-07-3BPC_FD were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

	Concentra					
Analyte	SSAP3-04-5BPC	SSAP3-04-5BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Magnesium	8300	11000	28 (≤50)	-	-	-

	Concentrati	on (mg/Kg)				
Analyte	SSAN7-05-1BPC	SSAN7-05-1BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Arsenic	24	20	18 (≤50)	-	-	_

	Concentrati	on (mg/Kg)				
Analyte	SSAM5-04-5BPC	SSAM5-04-5BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Arsenic	3.6	3.9	8 (≤50)	-	-	-
Lead	7.0	7.5	7 (≤50)	-	-	-
Manganese	290	360	22 (≤50)	-	-	-

	Concentrati	on (mg/Kg)				
Analyte	SSAK8-08-3BPC	SSAK8-08-3BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Arsenic	3.2	3.0	6 (≤50)	· -	-	-

	Concentrati					
Analyte	SSAM7-07-3BPC	SSAM7-07-3BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Arsenic	20	22	10 (≤50)	-	-	-

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Metals - Data Qualification Summary - SDG 280-7103-1

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-7103-1	SSAO2-01-1BPC SSAO2-01-2BPC SSAO2-01-3BPC SSAO2-01-3BPC SSAP3-04-10BPC** SSAP3-04-10BPC** SSAP3-04-5BPC SSAP3-03-10BPC SSAP3-03-1BPC SSAP3-02-1BPC SSAP3-02-3BPC SSAN2-02-3BPC SSAN2-02-3BPC SSAN2-02-3BPC SSAN2-02-3BPC SSAN2-02-3BPC SSAN7-06-3BPC SSAN7-06-3BPC SSAN7-06-3BPC SSAN7-05-3BPC SSAN7-05-1BPC SSAN5-04-5BPC SSAN5-04-5BPC SSAM5-04-5BPC SSAM5-04-5BPC SSAM5-04-5BPC SSAM5-04-5BPC SSAM5-04-5BPC SSAM5-04-5BPC SSAN7-04-1BPC SSAL8-03-3BPC SSAK8-08-1BPC SSAK8-08-3BPC SSAN7-04-1BPC SSAN7-07-2BPC SSAM7-07-3BPC SSAM7-07-3BPC EB-09022010 EB-09032010	All analytes reported below the PQL.	J (all detects)		Sample result verification (PQL) (sp)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Metals - Laboratory Blank Data Qualification Summary - SDG 280-7103-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Metals – Equipment Blank Data Qualification Summary - SDG 280-7103-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #:	24140C4	_ VALIDATION COMPLETE
SDG #:	280-7103-1	_ Stage 2E
Laborator	y: Test America	

3/4 Reviewer: C 2nd Reviewer:

netale METHOD: (As, Mn, Mg & Pb) (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: 9/2-3/10
11.	ICP/MS Tune	A	
111.	Calibration	A	
IV.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	STA	ms/D
VII.	Duplicate Sample Analysis	N	
VIII.	Laboratory Control Samples (LCS)	A	LCS
IX.	Internal Standard (ICP-MS)	A	
X.	Furnace Atomic Absorption QC	N	Notutitized
XI.	ICP Serial Dilution	Α	
XII.	Sample Result Verification	A	Not reviewed for Stage 2B validation.
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	BW	(6)16), (20,23), (26,27), (3132), (
ΧV	Field Blanks	SW	EB=40,41, see below for FB3 er

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

⊀ND = No compounds detected

R = Rinsate FB = Field blank D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples: ** Indicates sample underwent Stage 4 validation

	20111N9x	<u> </u>									
1	SSAO2-01-1BPC	5_	11	SSAP3-02-2BPC <		21	SSAN7-05-2BPC <	-	31	SSAK8-8-3BPC**	5
2	SSAO2-01-2BPC	Ĺ	12	SSAP3-02-3BPC	<u>ノ</u>	22	SSAN7-05-3BPC	,	32	SSAK8-08-3BPC_FD	i
3 1	SSAO2-01-3BPC		13	SSAN2-02-1BPC		23	SSAN7-05-1BPC_FD		33	SSAN7-04-1BPC	
42	SSAP3-04-10BPC**		14	SSAN2-02-2BPC		243	SSAM5-04-10BPC**		34	SSAN7-04-2BPC	
5	SSAP3-04-1BPC		15	SSAN2-02-3BPC		253	SSAM5-04-1BPC		35	SSAN7-04-3BPC	
6	SSAP3-04-5BPC		72 ₩	SSAP3-04-5BPC_FD		263	SSAM5-04-5BPC		36	SSAM7-07-1BPC	
7	SSAP3-03-10BPC		17	SSAM7-06-1BPC		273	SSAM5-04-5BPC_FD		37	SSAM7-07-2BPC	
8	SSAP3-03-1BPC		18	SSAM7-06-2BPC		28	SSAL8-03-1BPC		38	SSAM7-07-3BPC**	
9 V	SSAP3-03-5BPC		19	SSAM7-06-3BPC		29	SSAL8-03-3BPC		39	SSAM7-07-3BPC FD	2
10	SSAP3-02-1BPC	/	20	SSAN7-05-1BPC		30	SSAK8-08-1BPC	/	404	EB-09022010	W
									٦ 41	EB-09032010	

Notes:	FB= FB-07010-RZC (250-2250-2) eR	PPS1794	1
	1 = 13-04072010- RED (20022162) - CR	PB 5 7674	2
	= FB-041310-RIGZ-RZE CZ80-2400-Z) CR	PBS1862(Mn)	3
2	4140C4W.wpd	PB\$ 1857	4

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #:_ 24140C4 Stage 2B/4 SDG #: 280-7103-1 Laboratory: Test America

Date:1	07010
Page:	
Reviewer:_	<u>ند</u>
2nd Reviewer:	V

METHOD: As, Mn, Mg & Pb (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	Sampling dates:
11.	ICP/MS Tune	
111.	Calibration	
IV.	Blanks	
V.	ICP Interference Check Sample (ICS) Analysis	5
VI.	Matrix Spike Analysis	(V () /
VII.	Duplicate Sample Analysis	
VIII.	Laboratory Control Samples (LCS)	$\sim 2^{\circ} ()00$
IX.	Internal Standard (ICP-MS)	(X_{θ}, Q, Q)
X.	Furnace Atomic Absorption QC	
XI.	ICP Serial Dilution	
XII.	Sample Result Verification	Not (eyleyed for Stage 2B validation.
XIII.	Overall Assessment of Data	
XIV.	Field Duplicates	J
ΧV	Field Blanks	

Note:

A = Acceptable

SW = See worksheet

N = Not provided/applicable

ND = No compounds detected

R = Rinsate FB = Field blank D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples: ** Indicates sample underwent Stage 4 validation

42	EB-09032010MS	W	52	SSAP3-04-5BPC_FDMS S
43	EB-09032010MSD	7	53	SSAP3-04-5BPC_FDMSD
44	SSAO2-01-3BPCMS	5	54	SSAP3-03-1BPCMS
45	SSAO2-01-3BPCMSD	1	55	SSAP3-03-1BPCMSD
46	SSAM7-06-3BPCMS			
47	SSAM7-06-3BPCMSD			
48	SSAM7-07-3BPC_FDMS			
49	SSAM7-07-3BPC_FDMS	$\sqrt{1}$		
50	EB-09022010MS	W		
51	EB-09022010MSD	1		

Notes: ₋				

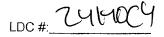
LDC #: 24140CY

VALIDATION FINDINGS CHECKLIST

Page: of Reviewer: 2nd Reviewer:

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

Method: Metals (EPA SW 846 Method 6010B/7000/6020)	,			
Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.				
Cooler temperature criteria was met.		<u> </u>	<u> </u>	
II. ICP/MS Tune	,			
Were all isotopes in the tuning solution mass resolution within 0.1 amu?				
Were %RSD of isotopes in the tuning solution ≤5%?				
III. Calibration				
Were all instruments calibrated daily, each set-up time?				
Were the proper number of standards used?				
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury) QC limits?	/			
Were all initial calibration correlation coefficients > 0.995?	/			
IV. Blanks				
Was a method blank associated with every sample in this SDG?	/			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	/			,
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?				
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?				
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.		ſ		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	/	(
Were the MS/MSD or duplicate relative percent differences (RPD) \leq 20% for waters and \leq 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were \leq 5X the RL, including when only one of the duplicate sample values were \leq 5X the RL.	/			
VII. Laboratory control samples				
Was an LCS anaylzed for this SDG?				
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?				·



VALIDATION FINDINGS CHECKLIST

Page: Z of Z Reviewer: c Z 2nd Reviewer: ______

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

LDC #: 24140BY

VALIDATION FINDINGS WORKSHEET Sample Specific Element Reference

Page: ___of__/
Reviewer: _______
2nd reviewer: ______

All circled elements are applicable to each sample.

C		
	atrix	Target Analyte List (TAL)
1-3,13-15,41		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,
4-9,16		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 ⁻ ,
10-12, 17-23,2	840	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 ⁻ ,
24-27		Al, Sb, As Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, M), 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
90:4243		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,
44,45		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 ⁻ ,
46.47		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,
48.49		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,
50,51		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 ⁻ ,
52,23		Ał, Sb(Xe), 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 5455		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, 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.
	<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,
ICB	Ī	Analysis Method Analysis Method Al Sh An Ro Ro Cd Co Cr Co Cu Eo Rh Ma Mn Ha Ni K Se An Na TI V Zn Mo R Si CN.
ICP MS		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		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,
IGFAA	لنسب	Al Sh. As. Ba. Be, Cd. Ca. Cr. Co. Cu. Fe, Ph. Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN.

Comments:	Mercury by CVAA if performed	

LDC#: 24140C4

VALIDATION FINDINGS WORKSHEET

PB/ICB/CCB QUALIFIED SAMPLES
Soil preparation factor applied: 100 x 5xdil
Associated Samples: 1-3, 11-15

Reason Code: bl

Page: Of Reviewer: CC 22

METHOD: 1 Sample Cor	METHOD : Trace metals (EPA SW 864 Method 6010B/6020/7000) Sample Concentration units, unless otherwise noted: mg/Kg	(EPA SW 86 lits, unless o	4 Method 60 therwise not	110B/6020/7(ed: mg/Kg		Neason Code: bi Neason Cod	Znd Reviewer:
				W			
Analyte	Maximum PB³ (mg/Kg)	Maximum PB ^a (ug/L)	Maximum ICB/CCB ^a (ug/L)	Action Limit	No Qualifiers		
Mn	0.0770						
Sample Cor	Sample Concentration units, unless otherwise noted:	nits, unless o	therwise not	ed: mg/Kg		Associated Samples: 24-27	
Analyte	Maximum PB* (mg/Kg)	Maximum PB³ (ug/L)	Maximum ICB/CCB ^a (ug/L)	Action Limit	No Qualifiers		
Mn	0.276		0.420	2.76			
Sample Cor	Sample Concentration units, unless otherwise noted:	nits, unless o	therwise not	ed: mg/Kg		Associated Samples: 16	
Analyte	Maximum PB³ (mg/Kg)	Maximum PB ^a (ug/L)	Maximum ICB/CCB ^a (ug/L)	Action Limit	No Qualifiers		
Mg	4.91			49.1			
Sample Cor	Sample Concentration units, unless otherwise noted:	nits, unless o	therwise not	ed: mg/Kg		Associated Samples: 4-9	Linear

Analyte	Maximum PB³ (mg/Kg)	Maximum PB ^a (ug/L)	Maximum ICB/CCB ^a (ug/L)	Action Limit	No Qualifiers		
Mg	0.657						
Sample Col	Sample Concentration units, unless otherwise noted:	nits, unless c	therwise not	ted: mg/Kg		Associated Samples: 8, 9, 16	
Analyte	Maximum PBª (mg/Kg)	Maximum PB³ (ug/L)	Maximum ICB/CCB ^a (ug/L)	Action Limit	No Qualifiers		
Mg			5.00				

LDC #: 24140C4

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: 100 x 5xdil

Associated Samples:

Page: C Reviewer: ____ 2nd Reviewer: ____

Reason Code: bl

No Qualifiers	
Action Limit	
Maximum ICB/CCB ^a (ug/L)	2.30
Maximum PB ^a (ug/L)	
Analyte Maximum Maximum Maximum PB ^a PB ^a ICB/CCB ^a (mg/Kg) (ug/L) (ug/L)	
Analyte	Mg

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U".

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

LDC #: 24140C4

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET

Field Blanks

2nd Reviewer:

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

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

Were target analytes detected in the field blanks? Blank units: ug/L Associated sample units: mg/Kg Y)N N/A

Sampling date: 9/3/10 Soil factor applied 100x Field blank type: (circle one) Field Blank / Rinsate / Other.

EB)

Reason: be

Associated Samples:

					-					
on										
Sample Identification										
Samp										
)										
	No Qualifiers									
	Action No Level	2.4								
Blank ID	41	2.4								
Analyte		Mn								

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

LDC 24140C4 SDG#: See Cover

VALIDATION FINDINGS WORKSHEET Field Duplicates

Reviewer: 2nd Reviewer:

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

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

	Concentrati	on (mg/Kg)	(≤50)	(mg/Kg)	(mg/Kg)	Qualifications
Analyte	6	16	RPD	Difference	Limits	(Parent Only)
Magnesium	8300	11000	28			

V:\FIELD DUPLICATES\FD_inorganic\24140C4.wpd

	Concentration	on (mg/Kg)	(≤50)	(mg/Kg)	(mg/Kg)	Qualifications
Analyte	20	23	RPD	Difference	Limits	(Parent Only)
Arsenic	24	20	18			

	Concentration (mg/Kg)		(≤50)	(mg/Kg)	(mg/Kg)	Qualifications
Analyte	26	27	RPD	Difference	Limits	(Parent Only)
Arsenic	3.6	3.9	8			
Lead	7.0	7.5	7			
Manganese	290	360	22			

	Concentration (mg/Kg)		(≤50)	(mg/Kg)	(mg/Kg)	Qualifications
Analyte	31	32	RPD	Difference	Limits	(Parent Only)
Arsenic	3.2	3.0	6			

Concentration		n (mg/Kg)	(≤50)	(mg/Kg)	(mg/Kg)	Qualifications
Analyte	38	. 39	RPD	Difference	Limits	(Parent Only)
Arsenic	20	22	10			

100 # 301/10Cd

VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification

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

True

Acceptable (Y/N) Reported (02 Recalculated 707 True (ug/L) R Found (ug/L) Element (A) ICP/MS (Continuing calibration) CVAA (Continuing calibration) GFAA (Continuing calibation) ICP (Continuing calibration) ICP/MS (Initial calibration) GFAA (Initial calibration) Type of Analysis CVAA (Initial calibration) ICP (Initial calibration) Standard ID

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

LDC#_ZUIYCY

VALIDATION FINDINGS WORKSHEET **Level IV Recalculation Worksheet**

Reviewer: 92 2nd Reviewer:

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

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

%R = 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:

RPD = $|S-D| \times 100$ (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 = ||-SDR| × 100

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

			T			
	Acceptable (Y/N)	}		-)
Reported	%R/RPD/%D	50)	(0)	93	6	0.83
Recalculated	_	501	(0)	93	6	980
	True / D / SDR (units)	1000gr	Q0h	Ud'J	384	253
	Found / S / I	DSugle	h'0h	(SSR-SR)	3%	350
	Element	£	P\$	X	کج	کے
	Type of Analysis	ICP interference check	Laboratory control sample	Matrix spike	Duplicate	ICP serial dilution
	Sample ID	TCSARS	527	7	Shlpp	~

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 #: 24140CY

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page: <u>↓</u>	of
Reviewer:_	ac_
2nd reviewer:_	

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

Y N N/A Y N N/A Y N N/A Are results within Are all detection Detected analyte results for equation:	or all questions answered "N". Not apen reported and calculated correctly? In the calibrated range of the instrume limits below the CRDL?	ents and within the line	ear range of the IC	P? using the following
Concentration = \(\frac{(RD)(FV)(Dil)}{(ln. Vol.)}\) RD = Raw data concentrate FV = Final volume (ml) In. Vol. = Initial volume (ml) or Dil = Dilution factor	recalculation: (IOML) weight (G) (I,O49)(O	(5) (13.49 mg/L) 1,899)	1000) = 7,7	1478/kg
# Sample ID	Analyte	Reported Concentration (17)	Calculated Concentration (Molts)	Acceptable (Y/N)
		7,2	3,8 7,2 290	
Note:				

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS Additional Sampling,

Henderson, Nevada

Collection Date:

September 7, 2010

LDC Report Date:

October 20, 2010

Matrix:

Soil

Parameters:

Metals

Validation Level:

Stage 2B

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-7117-1

Sample Identification

SSAN8-06-0BPC

SSAN8-05-0BPC

SSAN7-06-0BPC

SSAN7-07-0BPC

SSAN8-03-0BPC

SSAN8-04-0BPC

SSAN8-07-0BPC

SSAN8-07-0BPC_FD

SSAN8-05-0BPCMS SSAN8-05-0BPCMSD

SSAN7-06-0BPCMS

SSAN7-06-0BPCMSD

Introduction

This data review covers 12 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.

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

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. ICPMS Tune

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

III. Calibration

An initial calibration was performed.

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

IV. Blanks

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

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Manganese Lead	0.103 mg/Kg 0.0807 mg/Kg	SSAN8-06-0BPC SSAN7-06-0BPC SSAN7-07-0BPC SSAN8-03-0BPC SSAN8-04-0BPC SSAN8-07-0BPC SSAN8-07-0BPC_FD
ICB/CCB	Cobalt	0.440 ug/L	SSAN8-06-0BPC SSAN7-06-0BPC SSAN7-07-0BPC SSAN8-03-0BPC SSAN8-04-0BPC SSAN8-07-0BPC SSAN8-07-0BPC_FD
PB (prep blank)	Manganese Lead	0.208 mg/Kg 0.0871 mg/Kg	SSAN8-05-0BPC
ICB/CCB	Cobalt	0.0401 ug/L	SSAN8-05-0BPC

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

Sample EB-09072010 (from SDG 280-7183-1) was identified as an equipment blank. No metal contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
EB-09072010	9/7/10	Manganese	18 ug/L	All sample sin SDG 280-7117-1

Sample concentrations were compared to concentrations detected in the equipment 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
SSAN8-05-0BPCMS/MSD (SSAN8-05-0BPC)	Lead	-	56 (75-125)	-	J- (all detects) UJ (all non-detects)	А

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 280-7117-1	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

Samples SSAN8-07-0BPC and SSAN8-07-0BPC_FD were identified as field duplicates. No arsenic was detected in any of the samples with the following exceptions:

	Concentra	tion (mg/Kg)				
Analyte	SSAN8-07-0BPC	SSAN8-07-0BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Arsenic	10	13	26 (≤50)	-	-	-
Cobalt	26	36	32 (≤50)	-	-	-
Lead	83	130	44 (≤50)	-	-	-
Manganese	3800	5600	38 (≤50)	-	-	-

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Metals - Data Qualification Summary - SDG 280-7117-1

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-7117-1	SSAN7-06-0BPC	Lead	J- (all detects) UJ (all non-detects)	А	Matrix spike/Matrix spike duplicates (%R) (m)
280-7117-1	SSAN8-06-0BPC SSAN8-05-0BPC SSAN7-06-0BPC SSAN7-07-0BPC SSAN8-03-0BPC SSAN8-04-0BPC SSAN8-07-0BPC SSAN8-07-0BPC_FD	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Metals - Laboratory Blank Data Qualification Summary - SDG 280-7117-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Metals - Equipment Blank Data Qualification Summary - SDG 280-7117-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEE

LDC	#: <u>24140D4</u>	VA	LIDATIO	N COMP	PLETEN	IESS WOR	KSHEET			Date: <u>10201</u>
SDG	#:280-7117-1	_		S	Stage 2	3				Page:of!
Labo	ratory: Test America	_								viewer:
MET	Metale HOD:(As Co Bh & Ma)	EDΛ	C1/1 2/6 Ma	thad 6020	١				2nd Re	viewer:
NIE I	HOD:(As, Co, Pb, & Mn)	EFA	3 V V 040 IVIE	:1100 0020	,					ī
	samples listed below were		ewed for ea	ch of the f	ollowing	/alidation area	s. Validatio	n fin	dings are no	oted in attached
/alida	ation findings worksheets									
				T	1				A-1-401 A 11	
	Validation	Area	<u> </u>				Comm	ents		
1.	Technical holding times			A	Sampling	dates: 9/7	1/10			
II.	ICP/MS Tune			<u>A</u>						
111.	Calibration			A						
IV.	Blanks			BSW						
V.	ICP Interference Check Sar	mple (I	CS) Analysis	A					······	
VI.	Matrix Spike Analysis			SW	MS	\mathcal{V}				
VII.	Duplicate Sample Analysis			N						
VIII	Laboratory Control Samples	s (LCS)	A	LC.	<u> </u>				
IX.	Internal Standard (ICP-MS)			P						
Χ.	Furnace Atomic Absorption	QC		/V	Not	Utilizeb				
XI.	ICP Serial Dilution			A						
XII.	Sample Result Verification			N					·	
XIII	Overall Assessment of Data	3		A	<u> </u>					
ΧIV	. Field Duplicates			SW	(7,8)				
xv	Field Blanks		SWAT	SW		FB-04072			280-1280	12/-CR
Note:	A = Acceptable N = Not provided/applicable SW = See worksheet	e	R = Rin	o compound sate eld blank	EG= s detected	EG 0907 D = Dup TB = Tr EB = Ec	ZOIO Co olicate ip blank quipment blan		× Z80-	7183-1)
/alida	ted Samples:									
1	SSAN8-06-0BPC	11	SSAN7-06-0I	BPCMS	21	PRK C	,3-8)	31		
2	SSAN8-05-0BPC	12	SSAN7-06-0	BPCMSD	22	PBS C	2)	32		
3	SSAN7-06-0BPC	13			23			33		
4	SSAN7-07-0BPC	14			24			34		
5	SSAN8-03-0BPC	15			25		· · · · · · · · · · · · · · · · · · ·	35		
6	SSAN8-04-0BPC	16			26			36		
7	SSAN8-07-0BPC	17			27			37		
8	SSAN8-07-0BPC_FD	18			28			38		
9	SSAN8-05-0BPCMS	19			29			39		
10	SSAN8-05-0BPCMSD	20			30			40		
Notes	S:									
							·			

LDC#: 741400

VALIDATION FINDINGS WORKSHEET Sample Specific Element Reference

Page: of Reviewer: 2nd reviewer:

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-8		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,
60:9-12		Al, Sb, (As, Ba, Be, Cd, Ca, Cr(Co), Cu, Fe, (Pb), Mg, (Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Analysis Method
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
ICP-MS		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,
GEAA		Al Sh As Ba Be Cd Ca Cr Co Cu Fe Ph Mg Mn Hg Ni K Se Ag Na Ti V Zn Mo B Si CN

Comments: Mercury by CVAA if performed

VALIDATION FINDINGS WORKSHEET PB/ICB/CCB QUALIFIED SAMPLES
Soil preparation factor applied: 100 x 5xdil Associated Samples: 1, 3-8

Reason Code: bl

METHOD: 1	race metals	METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000)	34 Method 60)10B/6020/7(il preparation	n factor appl	ied: 100 x	5xdil		2nd Reviewer:	Reviewer:
Sample Con	centration ur	Sample Concentration units, unless otherwise noted: mg/Kg	otherwise not	ed: mg/Kg		Associated Samples: 1, 3-8	nples: 1,	3-8				/
				in and the states								
Analyte	Maximum PB ^a (ma/Kq)	Maximum Maximum PB ^a ICB/CCB ^a (uq/L)	Maximum ICB/CCB ^a (uq/L)	Action Limit	No Qualifiers							
လိ			0.440									
Mn	0.103											
Pb	0.0807										·	

mg/Kg
noted:
rwise
s othe
nnles
units,
ntration
Concer
Sample

Sample Concentration units, unless otherwise noted: mg/Kg	Maximum PB ^a	ᆕ	0	0.208	0.0871
wise noted: mg/Ko	Maximum Action ICB/CCB ^a Limit	ug/c)	0.0401		
Операти	No Qualifiers				
Associated Samples: 2					

LDC #: 24140D4

VALIDATION FINDINGS WORKSHEET Field Blanks

Page: __o Reviewer: ___ 2nd Reviewer:_

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

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

Were target analytes detected in the field blanks? Blank units: ug/L Associated sample units: mg/Kg

Sampling date: 9/7/10 Soil factor applied 100x

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

Reason: be

₹

Associated Samples:

						:						
	-								-			
						minimum mar and market						
	ation	:										
	Sample Identification											
	Š	-										
)					-				,			
		No Qualifiers										
		Action Level	18									
	Blank ID	Ш	18									
	Analyte		Min						-			

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

100h1h2 # 2017

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Reviewer:_ Page: 2nd Reviewer:

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

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". \(\frac{\gamma}{\gamma} \) \(\frac{\gamma}{\gamma} \)

Were matrix spike percent recoveries (%R) within the control limits(of 75-1259) If the sample concentration exceeded the spike concentration by a factor N/A

Were all duplicate sample relative percent differences (RPD) < 20% for water samples and <35% for soil samples? of 4 or more, no action was taken.

YN N/A

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

			T	Ī		Π				Γ				\sqcap
Qualifications	3 -/UJ/A (M)				The state of the s									
Associated Samples	1271-8as	21,												
RPD (Limits)														
MSD %Recovery	56													
MS %Recovery														
Analyte	(A)													
Matrix	8	>												
MS/MSD ID	91/6		111111111111111111111111111111111111111											

Comments:

3

LDC	24140D4
SDG#	: See Cover

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page	of
Review	er:
2nd Reviewer:	

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

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

V:\FIELD DUPLICATES\FD_inorganic\24140D4.wpd

	Concentration (mg/Kg)		(≤50)	(mg/Kg)	(mg/Kg)	Qualifications
Analyte	7	8	RPD	Difference	Limits	(Parent Only)
Arsenic	10	13	26			
Cobalt	26	36	32			
Lead	83	130	44			
Manganese	3800	5600	38			

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS Additional Sampling,

Henderson, Nevada

Collection Date:

September 7, 2010

LDC Report Date:

October 21, 2010

Matrix:

Soil/Water

Parameters:

Arsenic & Manganese

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-7183-1

Sample Identification

SSAP5-01-1BPC

EB-09072010

SSAP5-01-2BPC

SSAP5-01-1BPCMS SSAP5-01-1BPCMSD

SSAP5-01-3BPC

SSAP5-02-1BPC

SSAP5-02-2BPC SSAP5-02-3BPC

SSAP6-01-1BPC

SSAP6-01-2BPC**

SSAP6-01-3BPC

SSAP6-01-3BPC FD

SSAP6-02-10BPC**

SSAP6-02-1BPC

SSAP6-02-5BPC

SSAP6-03-10BPC

SSAP6-03-1BPC

SSAP6-03-5BPC

SSAP7-03-10BPC**

SSAP7-03-1BPC

SSAP7-03-5BPC

SSAP6-02-1BPC_FD

^{**}Indicates sample underwent Stage 4 review

Introduction

This data review covers 22 soil samples and one water sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 6020 for Arsenic 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 arsenic or manganese was found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Manganese	0.0591 mg/Kg	SSAP5-01-1BPC SSAP5-01-2BPC SSAP5-01-3BPC SSAP6-02-10BPC** SSAP6-02-1BPC SSAP6-02-5BPC SSAP6-03-10BPC SSAP6-03-1BPC SSAP6-03-1BPC SSAP7-03-10BPC** SSAP7-03-1BPC SSAP7-03-1BPC SSAP7-03-5BPC SSAP7-03-5BPC SSAP6-02-1BPC_FD

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

Sample EB-09072010 was identified as an equipment blank. No metal contaminants were found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
EB-09072010	9/7/10	Manganese	18 ug/L	SSAP5-01-1BPC SSAP5-01-2BPC SSAP5-01-3BPC SSAP6-02-1BPC SSAP6-02-1BPC SSAP6-03-1BPC SSAP6-03-1BPC SSAP6-03-5BPC SSAP7-03-1BPC SSAP7-03-1BPC SSAP7-03-5BPC SSAP7-03-5BPC SSAP6-02-1BPC_FD

Sample concentrations were compared to concentrations detected in the equipment 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.

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) and relative percent differences (RPD) were within QC limits.

IX. Internal Standards

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

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution 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 280-7183-1	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 SSAP6-01-3BPC and SSAP6-01-3BPC_FD and samples SSAP6-02-1BPC and SSAP6-02-1BPC_FD were identified as field duplicates. No arsenic was detected in any of the samples with the following exceptions:

Concentration (mg/Kg)						
Analyte	SSAP6-01-3BPC_FD	SSAP6-01-3BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Arsenic	3.1	3.4	9 (≤50)	-	-	-

	Concentra	ation (mg/Kg)				
Analyte	SSAP6-02-1BPC	SSAP6-02-1BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Arsenic	4.1	3.2	25 (≤50)	-	-	-
Manganese	320	300	6 (≤50)	-	-	

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Arsenic & Manganese - Data Qualification Summary - SDG 280-7183-1

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-7183-1	SSAP5-01-1BPC SSAP5-01-2BPC SSAP5-01-3BPC SSAP5-02-1BPC SSAP5-02-1BPC SSAP5-02-3BPC SSAP6-01-1BPC SSAP6-01-3BPC SSAP6-01-3BPC SSAP6-01-3BPC SSAP6-02-1BPC SSAP6-02-1BPC SSAP6-02-1BPC SSAP6-03-1BPC SSAP6-03-1BPC SSAP6-03-1BPC SSAP7-03-1BPC SSAP6-02-1BPC_FD EB-09072010	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Arsenic & Manganese - Laboratory Blank Data Qualification Summary - SDG 280-7183-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Arsenic & Manganese – Equipment Blank Data Qualification Summary - SDG 280-7183-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #:_ 24140E4 Stage 2B/4 SDG #: 280-7183-1 Laboratory: Test America

Date: <u>15-70</u> -10
Page: 1 of /
Reviewer:
2nd Reviewer:

METHOD: As, Mn (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.

		1	
	Validation Area		Comments
l.	Technical holding times	A	Sampling dates: 9/7/10
11.	ICP/MS Tune	A	
	Calibration	A	
IV.	Blanks	SW	
V.	ICP Interference Check Sample (ICS) Analysis	A	
VI.	Matrix Spike Analysis	A	mslp
VII.	Duplicate Sample Analysis	N	
VIII.	Laboratory Control Samples (LCS)	A	LCS/D
IX.	Internal Standard (ICP-MS)	A	
X.	Furnace Atomic Absorption QC	\mathcal{N}	Noturilized
XI.	ICP Serial Dilution	A	
XII.	Sample Result Verification	A	Not reviewed for Stage 2B validation.
XIII.	Overall Assessment of Data	A	
XIV.	Field Duplicates	SW	(9,10),(12,70)
ΧV	Field Blanks	6W	EBZI

Note:

A = Acceptable

N = Not provided/applicable SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples: ** Indicates sample underwent Stage 4 validation

	<u>all salex</u>	rent	21=water				
1	SSAP5-01-1BPC	11	SSAP6-02-10BPC**	21	EB-09072010	31	PBL
2	SSAP5-01-2BPC	12	SSAP6-02-1BPC	22	SSAP5-01-1BPCMS	32	PBS 582
3	SSAP5-01-3BPC	13	SSAP6-02-5BPC	23	SSAP5-01-1BPCMSD	33	
4	SSAP5-02-1BPC	14	SSAP6-03-10BPC	24		34	
5	SSAP5-02-2BPC	15	SSAP6-03-1BPC	25		35	
6	SSAP5-02-3BPC	16	SSAP6-03-5BPC	26		36	
7	SSAP6-01-1BPC	17	SSAP7-03-10BPC**	27		37	
8	SSAP6-01-2BPC**	18	SSAP7-03-1BPC	28		38	
9	SSAP6-01-3BPC	19	SSAP7-03-5BPC	29		39	
10	SSAP6-01-3BPC_FD	20	SSAP6-02-1BPC_FD	30		40	

Notes:_				
	 	 	 	

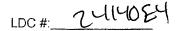
LDC #: 24140 E9

VALIDATION FINDINGS CHECKLIST

Page: of Z Reviewer: CZ 2nd Reviewer: V

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

Method: Metals (EPA SW 846 Method 6010B/7000/6020)				
Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times		,	·	
All technical holding times were met.			<u></u>	
Cooler temperature criteria was met.			<u> </u>	l
II. ICP/MS Tune				
Were all isotopes in the tuning solution mass resolution within 0.1 amu?				
Were %RSD of isotopes in the tuning solution ≤5%?				
III. Calibration				
Were all instruments calibrated daily, each set-up time?		,		
Were the proper number of standards used?				
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury) QC limits?		· \		
Were all initial calibration correlation coefficients > 0.995?				
IV. Blanks				
Was a method blank associated with every sample in this SDG?				
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.				,
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?				
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?				
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.				
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.		(
Were the MS/MSD or duplicate relative percent differences (RPD) \leq 20% for waters and \leq 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were \leq 5X the RL, including when only one of the duplicate sample values were \leq 5X the RL.				
VII. Laboratory control samples				1
Was an LCS anaylzed for this SDG?				
Was an LCS analyzed per extraction batch?				
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
VIII. Furnace Atomic Absorption QC				
If MSA was performed, was the correlation coefficients > 0.995?				
Do all applicable analysies have duplicate injections? (Level IV only)				
For sample concentrations > RL, are applicable duplicate injection RSD values < 20%? (Level IV only)				
Were analytical spike recoveries within the 85-115% QC limits?		L	_	
IX. ICP Serial Dilution	······		,	
Was an ICP serial dilution analyzed if analyte concentrations were > 50X the MDL (ICP)/>100X the MDL(ICP/MS)?				
Were all percent differences (%Ds) < 10%?				
Was there evidence of negative interference? If yes, professional judgement will be used to qualify the data.		/		
X. Internal Standards (EPA SW 846 Method 6020/EPA 200.8)		·····	,	p
Were all the percent recoveries (%R) within the 30-120% (6020)/60-125% (200.8) of the intensity of the internal standard in the associated initial calibration?		_		
If the %Rs were outside the criteria, was a reanalysis performed?				
XI. Regional Quality Assurance and Quality Control	,			
Were performance evaluation (PE) samples performed?				
Were the performance evaluation (PE) samples within the acceptance limits?	<u> </u>	<u> </u>		
XII. Sample Result Verification	1	т	T	
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?				
XIII. Overall assessment of data				T
Overall assessment of data was found to be acceptable.				
XIV. Field duplicates				
Field duplicate pairs were identified in this SDG.		<u> </u>	<u> </u>	
Target analytes were detected in the field duplicates.		<u>L</u>		
XV. Field blanks	<u> </u>			
Field blanks were identified in this SDG.				
Target analytes were detected in the field blanks.				

LDC#: 2414084

VALIDATION FINDINGS WORKSHEET Sample Specific Element Reference

Page:_	<u>of/</u>
Reviewer:	CR
2nd reviewer:	_ W

All circled elements are applicable to each sample.

	 1	
Sample ID Ma	atrix	Target Analyte List (TAL)
+3	au i	
4-10		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,
11-21		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, 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,
		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
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg(Mh) Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
ICP-MS		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,
IGEAA		JLAL Sh. As, Ha. He. Cd. Ca. Cr. Co. Cil. Fe, Fb, Mid. Mib. Fig. Nr. 5, 35, 79, 189, 153

Comments:_	Mercury by CVAA if performed	

LDC #: 24140E4

Maximum PB^a (mg/Kg)

Analyte

0.0591

를

Reviewer: 2nd Reviewer: Page: Reason Code: bl PB/ICB/CCB QUALIFIED SAMPLES Soil preparation factor applied: 100 x 5xdil VALIDATION FINDINGS WORKSHEET 1-3, 11-20 Associated Samples:_ No Qualifiers METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000) Sample Concentration units, unless otherwise noted: mg/Kg Action Limit Maximum ICB/CCB^a (ug/L) Maximum PB^a (ug/L)

LDC #: 24140E4

VALIDATION FINDINGS WORKSHEET

Field Blanks

Reviewer: 2nd Reviewer:

Page:

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

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

Sampling date: 9/7/10 Soil factor applied 100x Field blank type: (circle one) Field Blank / Rinsate / Other: Blank units: ug/L Associated sample units: mg/Kg

Associated Samples:

Reason: be

tion		-					-					
Sample Identification												
Saı												
									,			
	No Qualifiers											
	Action Level	18										
Blank ID		18									•	
Analyte		Mn										

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

LDC	24140E4	
SDG	* See Cover	

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:of
Reviewer:
2nd Reviewer: 🔾

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

Y	N	NA
\sqrt{Y}	Ŋ	NA

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

V:\FIELD DUPLICATES\FD_inorganic\24140E4.wpd

	Concentration	on (mg/Kg)	(≤50)	(mg/Kg)	(mg/Kg)	Qualifications	
Analyte	Analyte 9		RPD	Difference	Limits	(Parent Only)	
Arsenic	3.1	3.4	9				

	Concentration	on (mg/Kg)	(≤50)	(mg/Kg)	(mg/Kg)	Qualifications
Analyte	12	20	RPD	Difference	Limits	(Parent Only)
Arsenic	4.1	3.2	25			
Manganese	320	300	6			

100 # 2416E9

VALIDATION FINDINGS WORKSHEET Initial and Continuing Calibration Calculation Verification

Page: of Beviewer: CR

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

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

%R = Found x 100

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

True

					Recalculated	Reported	
Standard ID	Type of Analysis	Element	Found (ug/L)	True (ug/L)	%R	%R	Acceptable (Y/N)
	ICP (Initial calibration)						
AGA	ICP/MS (Initial calibration)	Mh	01H	COH	1075	63	7
	CVAA (Initial calibration)						
	ICP (Continuing calibration)						
CC (cs:rg)	(OS:R) ICP/MS (Continuing calibration)	As	5'bh	3	8	8	2
	CVAA (Continuing calibration)						
	GFAA (Initial calibration)						
	GFAA (Continuing calibation)						

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

5302172 # DOT

VALIDATION FINDINGS WORKSHEET **Level IV Recalculation Worksheet**

2nd Reviewer: Reviewer

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

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

%R = 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:

RPD = $|S-D|_{X} \times 100$ (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 = [I-SDR] × 100

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

			-		Recalculated	Reported	
Sample ID	Type of Analysis	Element	Found 1871	True / D / SDR (units)	%R / RPD / %D	%R/RPD/%D	Acceptable (Y/N)
1csfr	LCSRB 10P interference check	Æ	10018/10	100 Mg/L	∞	100	2
S	Laboratory control sample	B	19.1	02	96	8	
72	Matrix spike	R	(SSR-SR)	61	96	8	
zhz	Duplicate	E	338	325	7	<u></u>	
	ICP serial dilution	8	280	386	9,1	<u></u>	

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

LDC #: 2414054

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:	of\
Reviewer:	a _
2nd reviewer:	\sim

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

1 1/ Y 1 1/1 Y 1 1/1 Y	<u>N/A</u> <u>N/A</u> <u>N/A</u> ed analyte	Have results Are results w	been reported an eithin the calibrate tion limits below the	d calculated cord range of the interest of the	rectly? nstruments	and within the line		P? using the following
Concent RD V n. Vol. Dil	= =	(RD)(FV)(Dil) (In. Vol.) Raw data conce Final volume (m Initial volume (m Dilution factor	1)	Recald	culation: (Icom CI.	L)(5) (0.91 188) (0.915)	5er/opourly	812) = 3,06
#	Sar	mple ID		Analyte		Reported Concentration (MAK)	Calculated Concentration (178/15)	Acceptable (Y/N)
		8		75		3.1	3.1	
Note:_								

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS Additional Sampling,

Henderson, Nevada

Collection Date:

September 8, 2010

LDC Report Date:

October 28, 2010

Matrix:

Soil

Parameters:

Metals

Validation Level:

Stage 2B

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-7229-1

Sample Identification

SSAO8-04-0BPC SSAO8-07-0BPC SSAO7-04-0BPC SSAO8-04-0BPCMS SSAO8-04-0BPCMSD

Introduction

This data review covers 5 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.

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

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. ICPMS Tune

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

III. Calibration

An initial calibration was performed.

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

IV. Blanks

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

Method Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Manganese	0.0642 mg/Kg	All samples in SDG 280-7229-1
ICB/CCB	Cobalt	0.0222 ug/L	All samples in SDG 280-7229-1

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

No field blanks were identified in this SDG.

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. Results 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. 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 280-7229-1	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 Additional Sampling, Henderson, Nevada Metals - Data Qualification Summary - SDG 280-7229-1

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-7229-1	SSAO8-04-0BPC SSAO8-07-0BPC SSAO7-04-0BPC	All analytes reported below the PQL.	J (all detects)	А	Sample result verification (PQL) (sp)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Metals - Laboratory Blank Data Qualification Summary - SDG 280-7229-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Metals - Field Blank Data Qualification Summary - SDG 280-7229-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

		_	LIDATIO	5	Stage		S WORKS	SHEET	Date: <u>0.7010</u> Page: <u>0.0f</u> Reviewer: <u>0.70</u> 2nd Reviewer: <u>0.70</u>
	amples listed below were tion findings worksheets.		ewed for ea	ch of the	followir	g valida	ition areas.	Validation fir	ndings are noted in attached
	Validation	Area						Comment	s
1.	Technical holding times			A	Sampl	ing dates:	9-8-1	0	
II.	ICP/MS Tune			A					
111.	Calibration			A					
IV.	Blanks			SW					
V.	ICP Interference Check San	nple (I	CS) Analysis	P					
VI.	Matrix Spike Analysis			Ä	W.	<u> </u>			
VII.	Duplicate Sample Analysis			N					
VIII.	Laboratory Control Samples	(LCS)	A	LC	<u>ک</u>			
IX.	Internal Standard (ICP-MS)			A					
X.	Furnace Atomic Absorption	QC		N	No	+ Uti	tized		
XI.	ICP Serial Dilution			A					
XII.	Sample Result Verification			N					
XIII.	Overall Assessment of Data	1		A					
XIV.	Field Duplicates			\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\					
ΧV	Field Blanks			\mathcal{N}					
Note:	A = Acceptable N = Not provided/applicable SW = See worksheet	•	R = Rin	o compound sate eld blank	ds detect	ed	D = Duplic TB = Trip EB = Equi		
/alidat	ed Samples:								
1	SSAO8-04-0BPC	11	005		2	21		31	
2	SSAO8-07-0BPC	12	7 /			22		32	
3	SSAO7-04-0BPC	13			;	23		33	
4	SSAO8-04-0BPCMS	14				24		34	
5	SSAO8-04-0BPCMSD	15				25		35	
6		16				26		36	``
7		17			;	27		37	
8		18				28		38	
9		19				29		39	
10		20			;	30		40	
Notes	•								

LDC#_ZYMOFY

VALIDATION FINDINGS WORKSHEET Sample Specific Element Reference

Page:	of \
Reviewer:	OZ
2nd reviewer:	

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-3		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 ⁻ ,
0045		Al, Sb,(As) Ba, Be, Cd, Ca, Cr,(Co, Cu, Fe(Pb), Mg,(Mb), Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
		Analysis Method
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
ICP-MS		Al, Sb, (As) Ba, Be, Cd, Ca, Cr, (Cd), Cu, Fe, (Pb) Mg, (Mn) Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
GEAA		Al Sh As Ba Be Cd Ca Cr Co Cu Fe Ph Mg Mn Hg Ni K Se Ag Na Tl V 7n Mo B Si CN

Comments: Mercury by CVAA if performed

LDC #: 24140F4

VALIDATION FINDINGS WORKSHEET

PB/ICB/CCB QUALIFIED SAMPLES
Soil preparation factor applied: 100 x 5xdil
Associated Samples: All

Reason Code: bl

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Sample Concentration units, unless otherwise noted: mg/Kg Associated Samples: All Associated Samples: All Associated Samples: All Analyte Maximum Maxi	METHOD:	Trace metals	(EPA SW 86	METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000))10B/6020/7(ິ ິ ິ	il preparation factor applied: 100 x 5xdil	r applied: 100 x 5xdil		2nd Revi	2nd Reviewer:
nalyte Maximum Maximum Maximum Action PB³ (ug/L) (ug/L) (ug/L) (ug/L) 0.0642	Sample Col	ncentration u	inits, unless o	otherwise not	ed: mg/Kg		Samples: All				
nalyte Maximum Maximum Maximum Action PB* PB* ICB/CCB* Limit (mg/Kg) (ug/L) (ug/L) 0.0222											
0.0642	Analyte		Maximum PB ^a (ug/L)	Maximum ICB/CCB ^a (ug/L)	Action Limit	No Qualifiers					
	ల			0.0222							
	Mn	0.0642									

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS Additional Sampling,

Henderson, Nevada

Collection Date:

September 10, 2010

LDC Report Date:

October 28, 2010

Matrix:

Soil

Parameters:

Metals

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-7342-1

Sample Identification

SSAO7-08-0BPC SSAO7-07-0BPC** SSAO8-12-0BPC SSAO8-09-0BPC SSAO8-06-0BPC SSAO8-12-0BPC_FD SSAO7-07-0BPCMS

SSAO7-07-0BPCMSD

^{**}Indicates sample underwent Stage 4 review

Introduction

This data review covers 8 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
PB (prep blank)	Manganese	0.717 mg/Kg	All samples in SDG 280-7342-1
ICB/CCB	Cobalt	0.0221 ug/L	All samples in SDG 280-7342-1
ICB/CCB	Manganese	0.338 ug/L	SSAO8-09-0BPC SSAO8-06-0BPC SSAO8-12-0BPC_FD

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

No field blanks were identified in this SDG.

V. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

VI. Matrix Spike Analysis

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

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
SSAO7-07-0BPCMS/MSD (All samples in SDG 280-7342-1)	Lead	131 (75-125)	-	<u>-</u>	J+ (all 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	Finding	Flag	A or P
All samples in SDG 280-7342-1	All analytes reported below the PQL.	J (all detects)	, A

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

XIII. Overall Assessment of Data

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

XIV. Field Duplicates

Samples SSAO8-12-0BPC and SSAO8-12-0BPC_FD were identified as field duplicates. No metals were detected in any of the samples with the following exceptions:

	Concentrati					
Analyte	SSAO8-12-0BPC	SSAO8-12-0BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Arsenic	4.0	4.3	7 (≤50)	-	-	-
Cobalt	29	26	11 (≤50)	-	-	-
Lead	8.0	7.6	5 (≤50)	-	-	-
Manganese	2100	2100	0 (≤50)	-	-	-

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Metals - Data Qualification Summary - SDG 280-7342-1

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-7342-1	SSAO7-08-0BPC SSAO7-07-0BPC** SSAO8-12-0BPC SSAO8-09-0BPC SSAO8-06-0BPC SSAO8-12-0BPC_FD	Lead	J+ (all detects)	А	Matrix spike/Matrix spike duplicates (%R) (m)
280-7342-1	SSAO7-08-0BPC SSAO7-07-0BPC** SSAO8-12-0BPC SSAO8-09-0BPC SSAO8-06-0BPC SSAO8-12-0BPC_FD	All analytes reported below the PQL.	J (all detects)	А	Sample result verification (PQL) (sp)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Metals - Laboratory Blank Data Qualification Summary - SDG 280-7342-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Metals – Equipment Blank Data Qualification Summary - SDG 280-7342-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET LDC #: 24140G4 SDG #: 280-7342-1 Stage 2B/4 Laboratory: Test America Reviewer: C METHOD:(As, Co, Pb, & Mn) (EPA SW 846 Method 6020) 2nd Reviewer: 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 A Sampling dates: 9-10-10 Technical holding times A II. ICP/MS Tune 0 Calibration III. SW IV. Blanks V. ICP Interference Check Sample (ICS) Analysis VI. Matrix Spike Analysis VII. **Duplicate Sample Analysis** VIII. Laboratory Control Samples (LCS) IX. Internal Standard (ICP-MS) Notutilized Furnace Atomic Absorption QC X. XI. ICP Serial Dilution XII. Sample Result Verification Not reviewed for Stage 2B validation. XIII. Overall Assessment of Data XIV. **Field Duplicates** XV Field Blanks ND = No compounds detected Note: A = Acceptable D = Duplicate N = Not provided/applicable R = Rinsate TB = Trip blank SW = See worksheet FB = Field blank EB = Equipment blank Validated Samples: ** Indicates sample underwent Stage 4 validation SSAO7-08-0BPC 11 21 31 SSAO7-07-0BPC** 12 22 32 SSAO8-12-0BPC 13 23 33 SSAO8-09-0BPC 14 24 34 SSAO8-06-0BPC 15 25 35 SSAO8-12-0BPC_FD 16 26 36 SSAO7-07-0BPCMS 17 27 37 SSAO7-07-0BPCMSD 8 18 28 38

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LDC#: 7914064

VALIDATION FINDINGS CHECKLIST

Method:Metals (EPA SW 846 Method 6010B/7000/6020)	,			
Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times	-			
All technical holding times were met.				
Cooler temperature criteria was met.				
II. ICP/MS Tune			,	
Were all isotopes in the tuning solution mass resolution within 0.1 amu?				
Were %RSD of isotopes in the tuning solution ≤5%?	,-/			
III. Calibration				
Were all instruments calibrated daily, each set-up time?				
. Were the proper number of standards used?				
Were all initial and continuing calibration verification %Rs within the 90-110% (80-120% for mercury) QC limits?	/	(
Were all initial calibration correlation coefficients > 0.995?	/			
IV. Blanks				
Was a method blank associated with every sample in this SDG?		-		
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.	/			,
V. ICP Interference Check Sample				
Were ICP interference check samples performed daily?				
Were the AB solution percent recoveries (%R) with the 80-120% QC limits?				
VI. Matrix spike/Matrix spike duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.				
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.				·
Were the MS/MSD or duplicate relative percent differences (RPD) \leq 20% for waters and \leq 35% for soil samples? A control limit of +/- RL(+/-2X RL for soil) was used for samples that were \leq 5X the RL, including when only one of the duplicate sample values were \leq 5X the RL.		/		
VII. Laboratory control samples	·	<u></u>	,	
Was an LCS anaylzed for this SDG?				
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% QC limits for water samples and laboratory established QC limits for soils?	/			·

VALIDATION FINDINGS CHECKLIST

Page: Zof Z Reviewer: c Z 2nd Reviewer: _____

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

LDC #: 2414064

VALIDATION FINDINGS WORKSHEET Sample Specific Element Reference

Page: __of__/
Reviewer: __ < </p>
2nd reviewer: ___<

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1-6		Al, Sb(As) Ba, Be, Cd, Ca, Cr(Co), Cu, Fe, Pt, Mg(Mh, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN ⁻ ,
00:14		Al, Sb (As, Ba, Be, Cd, Ca, Cr, Cb, Cu, Fe, Pb, Mg (Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
3- 70		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,
		Ał, 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,
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		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,
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	 	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>	Analysis Method
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Si, CN,
ICP-MS		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,
GEAA.		Al, Sh, 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>		

Comments:	Mercury by CVAA if performed	

LDC #: 24140G4

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: 100 x 5xdil
Associated Samples: All

Reason Code: bl

Reviewer: C

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Sample Concentration units, unless otherwise noted: mg/Kg		Analyte	
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100 # 2414064

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Reviewer._ Page: 2nd Reviewer:

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

Bease 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? A N

Were matrix spike percent recoveries (%R) within the control limits of 75-125) If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

Were all duplicate sample relative percent differences $(RPD) \le 20\%$ for water samples and $\le 35\%$ for soil samples? Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations. Y N N/A W. Y)N N/A

MSMSDIN Marky Analyse William Accordance Semples Accordance Semples Challications 7/6 9/5 1/6					 		 						
MSMSDID MATRIX Analyte %Recovery (NS MSD) 13 HS HS MSD 13 HS HS MSD MS	Qualifications	THOSE (M)	No Qual (455:10)										
MS/MSD Matrix Analyte %Becovery %Becovery 7/8 S PD 13 IV	Associated Samples		7										
MS/MSD ID Matrix Analyte %Recovery 7/8 S PD YMO	RPD (Limits)		84										
MS/MSD ID Matrix Analyte %Recovery 7/8 S PD YMO	MSD %Recovery	131											
MS/MSD ID Matrix													
7 (8)	Analyte	GD	MD										
	Matrix	9											
	MS/MSD ID	7/8											
	#			上									_

Comments:

LDC	24140G4
SDG#	: See Cover

VALIDATION FINDINGS WORKSHEET Field Duplicates

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Page:of
Reviewer:
2nd Reviewer:

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

$\widehat{\wedge}$	X	N	NA
	Y	N	NA

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

V:\FIELD DUPLICATES\FD_inorganic\24140G4.wpd

	Concentration (mg/Kg)		(≤50)	(mg/Kg)	(mg/Kg)	Qualifications
Analyte	. 3	3 6		Difference	Limits	(Parent Only)
Arsenic	4.0	4.3	7			
Cobalt	29	26	11			
Lead	8.0	7.6	5			
Manganese	2100	2100	0			

488/KZ #7007

Initial and Continuing Calibration Calculation Verification VALIDATION FINDINGS WORKSHEET

Page: 2nd Reviewer: Reviewer.

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

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

%R = Found × 100 True

Where,

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

Acceptable (Y/N) Reported B Recalculated <u>5</u> True (ug/L) 0.0% 9 Found (ug/L) クのて T. Element (N) (A) CCV(12:46) ICP/MS (Continuing calibration) CVAA (Continuing calibration) GFAA (Continuing calibation) ICP (Continuing calibration) ICP/MS (Initial calibration) GFAA (Initial calibration) Type of Analysis CVAA (Initial calibration) ICP (Initial calibration) Standard ID

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

450h1/52 #007

VALIDATION FINDINGS WORKSHEET **Level IV Recalculation Worksheet**

Reviewer. 2nd Reviewer:

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

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

%R = Found x 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 = $\frac{|S-D|}{(S+D)/2} \times 100$

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

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

%D = [I-SDR] × 100

Where, 1= Initial Sample Result (mg/L) SDR = Serial Dilution Result (mg/L) (Instrument Reading x 5)

					Recalculated	Reported		
Sample ID	Type of Analysis	Element	Found 1871 (white) (white)	True / D / SDR (units)	%R/RPD/%D	%R/RPD/%D	Acceptable (Y/N)	
ICS (2003)	ICP interference check	X	Ulaylo	Dengli)(7)	[9]	7	
53	Laboratory control sample	ල	9751	02	\mathscr{X}	38		
7	Matrix spike	4	(SSR-SR)	h.92	104	601		
7/4	Duplicate	8	76.4	7'52	3	~		
2	ICP serial dilution	Mn	3100	31700	23	7.1)	

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

LDC # 24140 G4

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	of \
Reviewer:	ac_
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METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Please Y N I Y N I Y N I	N/A Have results b	v for all questions answered "N". Not a een reported and calculated correctly? hin the calibrated range of the instrum on limits below the CRDL?	?		
Detect equation	ed analyte results for on:	<u></u>	were recalcu	ılated and verified ı	using the following
Concent RD V n. Vol. Dil	ration = \(\frac{(RD)(FV)(Dil)}{(In. Vol.)}\) = Raw data concent = Final volume (ml) = Initial volume (ml) = Dilution factor	Recalculation tration or weight (G)	(CO981)(19)	3481) = Z	.87.6 mg/k
#	Sample ID	Analyte	Reported Concentration (M9 I.C.)	Calculated Concentration (Mo/KS)	Acceptable (Y/N)
	7	As Co Pb Mn	8,1 790 70 31000	8.1 290 20 31000	
Note:					

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS Additional Sampling,

Henderson, Nevada

Collection Date:

September 10, 2010

LDC Report Date:

October 28, 2010

Matrix:

Soil

Parameters:

Arsenic

Validation Level:

Stage 2B

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-7344-1

Sample Identification

SSAO5-06-1_01_BPC SSAO5-06-1-01_BPC-FD SSAO5-06-5_01_BPC

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.

No field blanks were identified in this SDG.

V. ICP Interference Check Sample (ICS) Analysis

The frequency of analysis was met.

The criteria for analysis were met.

VI. Matrix Spike Analysis

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

VII. Duplicate Sample Analysis

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

VIII. Laboratory Control Samples (LCS)

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

IX. Internal Standards

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

X. Furnace Atomic Absorption QC

Graphite furnace atomic absorption was not utilized in this SDG.

XI. ICP Serial Dilution

ICP serial dilution 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 280-7344-1	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

Samples SSAO5-06-1_01_BPC and SSAO5-06-1_01_BPC-FD were identified as field duplicates. No arsenic was detected in any of the samples with the following exceptions:

	Concentr	ation (ug/L)				
Analyte	SSAO5-06-1_01_BPC	SSAO5-06-1_01_BPC-FD	RPD (Limits)	Difference (Limits)	Flags	A or P
Arsenic	2.1	2.7	-	0.6 (≤0.6)	-	-

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Arsenic - Data Qualification Summary - SDG 280-7344-1

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-7344-1	SSAO5-06-1_01_BPC SSAO5-06-1-01_BPC-FD SSAO5-06-5_01_BPC	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Arsenic - Laboratory Blank Data Qualification Summary - SDG 280-7344-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Arsenic - Field Blank Data Qualification Summary - SDG 280-7344-1

No Sample Data Qualified in this SDG

	i ronox northgate Henderson
DC #: 24140H4	VALIDATION COMPLETENESS WORKSHEET
SDG #: 280-7344-1	Stage 2B
aboratory: Test America	· · · · · ·

Date: 10-20-10
Page: 1 of 1
Reviewer: 12 2nd Reviewer:

METHOD: As (EPA SW 846 Method 6020)

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

	Validation Area		Comments
l.	Technical holding times	A	Sampling dates: 9-10-1()
II.	ICP/MS Tune	A	
111.	Calibration	A	·
IV.	Blanks	A	
V.	ICP Interference Check Sample (ICS) Analysis	A	,
VI.	Matrix Spike Analysis	M	Client Specified
VII.	Duplicate Sample Analysis	<i>N</i>	
VIII.	Laboratory Control Samples (LCS)	P	LCS
IX.	Internal Standard (ICP-MS)	A	
X.	Furnace Atomic Absorption QC	N	NOTUL 1720
XI.	ICP Serial Dilution	N	Notpertained
XII.	Sample Result Verification	N	4
XIII.	Overall Assessment of Data	LA	
XIV.	Field Duplicates	SW	(1,2)
ΧV	Field Blanks	\sim	

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:

1	SSAO5-06-1_01_BPC	11	PP5	21		31	
2	SSAO5-06-1-01_BPC-FD	12		22		32	
3	SSAO5-06-5_01_BPC	13		23		33	
4		14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27	,	37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes:_		
_	·	

LDC_	2414	<u>10H4</u>
SDG#	: See	Cover

VALIDATION FINDINGS WORKSHEET Field Duplicates

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

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

V:\FIELD DUPLICATES\FD_inorganic\24140H4.wpd

	Concentration (mg/Kg)		(≤50)	(mg/Kg)	(mg/Kg)	Qualifications
Analyte	1	2	RPD	Difference	Limits	(Parent Only)
Arsenic	2.1	2.7		0.6	(≤0.6)	

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, PCS Additional Sampling,

Henderson, Nevada

Collection Date:

September 2, 2010

LDC Report Date:

October 26, 2010

Matrix:

Soil/Water

Parameters:

Perchlorate

Validation Level:

Stage 2B & 4

Laboratory:

TestAmerica, Inc.

Sample Delivery Group (SDG): 280-7103-1

Sample Identification

SSAM7-06-1BPC

SSAM7-06-2BPC

SSAM7-06-3BPC

SSAN7-05-1BPC

SSAN7-05-2BPC

SSAN7-05-3BPC

SSAN7-05-1BPC_FD

SSAM5-04-10BPC**

SSAM5-04-1BPC

SSAM5-04-5BPC

SSAM5-04-5BPC_FD

SSAN7-04-1BPC

SSAN7-04-2BPC

SSAN7-04-3BPC

SSAM7-07-1BPC

SSAM7-07-2BPC

SSAM7-07-3BPC** SSAM7-07-3BPC FD

EB-09022010

SSAM7-06-3BPCMS

SSAM7-06-3BPCMSD

^{**}Indicates sample underwent Stage 4 review

Introduction

This data review covers 20 soil samples and one water sample listed on the cover sheet. The analyses were per EPA Method 314.0 for Perchlorate.

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

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

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

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

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met.

III. Blanks

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

Sample EB-09022010 was identified as an equipment 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.

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 280-7103-1	All analytes reported below the PQL.	J (all detects)	А

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

VIII. Overall Assessment

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

IX. Field Duplicates

Samples SSAN7-05-1BPC and SSAN7-05-1BPC_FD, samples SSAM5-04-5BPC and SSAM5-04-5BPC_FD, and samples SSAM7-07-3BPC** and SSAM7-07-3BPC_FD were identified as field duplicates. No perchlorate was detected in any of the samples with the following exceptions:

	Concentra	tion (mg/Kg)					
Analyte	SSAN7-05-1BPC	SSAN7-05-1BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P	
Perchlorate	3.5	3.8	8 (≤50)	-	-	_	

	Concentration (mg/Kg) SSAM5-04-5BPC SSAM5-04-5BPC_FD					
Analyte			RPD (Limits)	Difference (Limits)	Flags	A or P
Perchlorate	120	110	8 (≤50)	-	-	-

	Concentration (mg/Kg)						
Analyte	SSAM7-07-3BPC**	SSAM7-07-3BPC_FD	RPD (Limits)	Difference (Limits)	Flags	A or P	
Perchlorate	5.8	5.3	9 (≤50)	-	-	-	

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Perchlorate - Data Qualification Summary - SDG 280-7103-1

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
280-7103-1	SSAM7-06-1BPC SSAM7-06-2BPC SSAM7-06-3BPC SSAN7-05-1BPC SSAN7-05-3BPC SSAN7-05-3BPC SSAN7-05-1BPC_FD SSAM5-04-10BPC** SSAM5-04-10BPC** SSAM5-04-5BPC SSAM5-04-5BPC SSAN7-04-1BPC SSAN7-04-1BPC SSAN7-04-2BPC SSAN7-04-3BPC SSAM7-07-3BPC** SSAM7-07-3BPC** SSAM7-07-3BPC_FD EB-09022010	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Perchlorate - Laboratory Blank Data Qualification Summary - SDG 280-7103-1

No Sample Data Qualified in this SDG

Tronox LLC Facility, PCS Additional Sampling, Henderson, Nevada Perchlorate - Equipment Blank Data Qualification Summary - SDG 280-7103-1

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

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							- · J	٠.				_				

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
l.	Technical holding times	A	Sampling dates: 9(2/10
lla.	Initial calibration	A	·
IIb.	Calibration verification	P	
Ш.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	A	mS/D
V	Duplicates		
VI.	Laboratory control samples	A	LCS/D
VII.	Sample result verification	A	Not reviewed for Stage 2B validation.
VIII.	Overall assessment of data	P	
IX.	Field duplicates	SW	(4,7),(10,11),(17,18)
х	Field blanks	ND	EB-19, FB-FB-04132010-RIGZ-RZE-0

Note:

A = Acceptable

N = Not provided/applicable

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

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples: ** Indicates sample underwent Stage 4 validation

	41121100	<u> </u>	1-00100				
1	SSAM7-06-1BPC	11	SSAM5-04-5BPC_FD	21	\$55Am706-3-188CM	D	PBS
2	SSAM7-06-2BPC	12	SSAN7-04-1BPC	22		32	PBW
3	SSAM7-06-3BPC	13	SSAN7-04-2BPC	23		33	
4	SSAN7-05-1BPC	14	SSAN7-04-3BPC	24		34	
5	SSAN7-05-2BPC	15	SSAM7-07-1BPC	25		35	
6	SSAN7-05-3BPC	16	SSAM7-07-2BPC	26		36	
7	SSAN7-05-1BPC_FD	17	SSAM7-07-3BPC**	27		37	
8	SSAM5-04-10BPC**	18	SSAM7-07-3BPC_FD	28		38	
9	SSAM5-04-1BPC		EB-09022010	29		39	
10	SSAM5-04-5BPC	20	55Am7-06-34-BRCM5	30		40	

Notes:			
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LDC#: 24140CY

VALIDATION FINDINGS CHECKLIST

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

VI. Regional Quality Assurance and Quality Control

Were the performance evaluation (PE) samples within the acceptance limits?

Were performance evaluation (PE) samples performed?

VALIDATION FINDINGS CHECKLIST

Page: 2 of Reviewer: 2 2nd Reviewer: V

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

LDC#:_	24140C6
SDG#	See Cover

VALIDATION FINDINGS WORKSHEET Field Duplicates

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Inorganics, Method See Cover

•	Y	N	NA	
Ĺ	Y	N	NA	

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

Analyte	Concentrati 4	on (mg/Kg)	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Perchlorate	3.5	3.8	8			

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Analyte	Concentrati	on (mg/Kg) 11	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Perchlorate	120	110	9			

	Concentrati		DDD (50)	D:#	Limite	Qualification
Analyte	17	18	RPD (≤50)	Difference	Limits	(Parent only)
Perchiorate	5.8	5.3	9			

DC# 2410CB

Validatin Findings Worksheet Initial and Continuing Calibration Calculation Verification

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Method: Inorganics, Method 3/0

The correlation coefficient (r) for the calibration of \mathbb{ClQ}_{ℓ} was recalculated Calibration date: $\overline{Q/l}$

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

%R = Found X 100

Where,

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

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

			•		Recalculated	Reported	Acceptable
Type of analysis	Analyte	Standard	Conc. (mg/l)	Area	r or r²	r or r²	(Y/N)
Initial calibration		s1	-	0.00348			
		s2	2.5	0.00708	0.999552	0.999157	
		s3	Ŋ	0.01			
		84	10	0.03			>
)	s5	20	90.0			
		9s	40	0.13			
		4		Fand(udic)		ı	
Calibration verification		77	9	19,723	<u>) </u>	/	
Calibration verification		777	R	32,773	103	1	
Calibration verification		-	()	299'01	107		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.

6701/h2, #2017

VALIDATION FINDINGS WORKSHEET **Level IV Recalculation Worksheet**

Reviewer: (R 2nd Reviewer:_ Page:

METHOD: Inorganics, Method SEC COVER

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

Where, %R = Found × 100

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

True = concentration of each analyte in the source.

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

Where, RPD = $1S-D1 \times 100$ (S+D)/2

N 0

Original sample concentration Duplicate sample concentration

			_		Recalculated	Reported	
Sample ID	Type of Analysis	Element	Found / S (units) (mod K)	True / D (units)))(S	%R/RPD	%R/RPD	Acceptable (Y/N)
57	Laboratory control sample) J	131000	0,01	X	28	>
	Matrix spike sample	-	(SSR-SR))		
20			19,0	6,557	<u> </u>	X01	
12/02	Duplicate sample	\		7	7	\(\tau_{\cup} \))
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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#: 24140CY

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

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Please see qualification Y N N/A Have Y N N/A Are re Y N N/A Are all Compound (analyte) re	ed using the following equation: Recalculations O	rectly? struments?	orted with a positi	ve detect were
# Sample ID	Analyte	Reported Concentration	Calculated Concentration	Acceptable (Y/N)
8	ClOu	1200	100	9
	,			
Note:				