Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Data Validation Reports LDC #21991

Semivolatiles



Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date: August 3 through August 4, 2009

LDC Report Date: November 19, 2009

Matrix: Water

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0904290

Sample Identification

M-31AB

M-50B

M-21B

FB080409-GW

Introduction

This data review covers 4 water 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) as there are no current guidelines for the method stated above.

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

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 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990.

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were greater than or equal to 0.05 as required.

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).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

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

Date	Compound	%D	Associated Samples	Flag	A or P
8/3/09	Di-n-octylphthalate	25.2	M-31AB M-50B 92830-MB	J- (all detects) UJ (all non-detects)	A

All of the continuing calibration RRF values were greater than or equal to 0.05.

V. Blanks

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

Sample FB080409-GW was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB080409-GW	8/4/09	Diethylphthalate	0.22 ug/L	M-21B

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
92830-LCS/D (M-31AB M-50B 92830-MB)	Pyridine 1,4-Dioxane	33 (50-120) 45 (50-120)	40 (50-120) 44 (50-120)	-	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	Р
93316-LCS/D (M-21B FB080409-GW 93316-MB)	Pyridine	23 (50-120)	49 (50-120)	73 (≤30)	J (all detects) UJ (all non-detects)	Р
93316-LCS/D (M-21B FB080409-GW 93316-MB)	1,4-Dioxane	44 (50-120)	46 (50-120)	-	J- (all detects) UJ (all non-detects)	Р

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 R0904290	All compounds reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

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

XVI. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0904290

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0904290	M-31AB M-50B	Di-n-octylphthalate	J- (all detects) UJ (all non-detects)	А	Continuing calibration (ICV %D) (c)
R0904290	M-31AB M-50B	Pyridine 1,4-Dioxane	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0904290	M-21B FB080409-GW	Pyridine	J (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R)(RPD) (I,Id)
R0904290	M-21B FB080409-GW	1,4-Dioxane	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0904290	M-31AB M-50B M-21B FB080409-GW	All compounds reported below the PQL.	J (all detects)	А	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0904290

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0904290

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

LDC #:	21991A2a	VALIDATION COMPLETENESS WORKSHEET
SDG #:	R0904290	Stage 2B
aborato	ry [.] Columbia An	alytical Services

	Date:	11/18/09
	Page:_	1 of)
	Reviewer:	JV4
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: 8/03-04/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	Á	3 KZD r~
IV.	Continuing calibration/ICV	SW	3 RSD r~ CW/1W = 25 B
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	Client skec
VIII.	Laboratory control samples	SW	Client spec US/D
IX.	Regional Quality Assurance and Quality Control	N	
Χ.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	И	
XVII.	Field blanks	SM	FB = 4

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:

Wate	1			
1 M-31AB	11 1 92830- MB	(6740) 21	31	
2 \ M-50B	12 7 93316-	22	32	
3 M-21B	13	23	33	
4 7 FB080409-GW	14	24	34	
5	15	25	35	-7.
6	16	26	36	
7	17	27	37	
8	18	28	38	
9	19	29	39	
10	20	30	40	

VALIDATION FINDINGS WORKSHEET

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

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

Please 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)

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SDG# Lee Gran

N N N Y

Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis 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 ${\le}25$ %D and ${\ge}0.05$ RRF ${?}$

Qualifications	J-/NJ (G)														
Associated Samples	1,2, 92830-MB	*													
Finding RRF (Limit: >0.05)															
Finding %D (Limit: <25.0%)	2.5%														
Compound	FFF (C)														
Standard ID	AU 435	(8)													
# Date	1/8														

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LDC #:	SDG #:

VALIDATION FINDINGS WORKSHEET Field Blanks

10,1 50,2 50,5	7
Page: Reviewer:_	2nd Reviewer:

Were field blanks identified in this SDG?

YN N/A

Were target compounds detected in the field blanks?

Blank units: 13 / L Associated sample units: 13 / L

Sampling date: 8 / 0 4 / 0 1

Sampling date:

3 (ND)						
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amples:	Sample Identification					
Associated Samples:	Ö					
ther:						
/ Rinsate / O						
Field Blank	Blank 1D	4	0.22			
ampling date: 3/04/07 ield blank type: (circle one) Field Blank/ Rinsate / Other.	Compound		11			CRQL

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Field blank type: (circle one) Field Blank / Rinsate / Other:	e) Field Blank	k / Rinsate / Other:	Associated Samples:	amples:		
Compound	Blank ID		Se	Sample Identification		
CROL						

LDC #: 21991 A2a

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: 2nd Reviewer. Reviewer:

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

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

VAN N/A

Were the LCS/LCSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits? ANN NY

L								
*	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Custome
Ш		47830-1686	RKK	३३ (३०-११०)	(021-05) 04		1,2, 92520-MB	J-/47 /0 (L)
			$\tau \tau \tau$	45 (1)	(1) 64	0	J	
				()	()	(
				(()	()		
		93216-16512	RRR	23 ()	49 ()	(96) 62	3.4. 43316-MB	JE/M3 /P (114)
			777	4 ()	(1) 7	()	ł	5-145 (2)
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Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date: September 8, 2009

LDC Report Date: November 19, 2009

Matrix: Soil/Water

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905115

Sample Identification

EB090809-SO1

SA54-10B

SA54-20B

SA54-31B

SA50-12B

SA50009-12B

SA50-25B

SA50-36B

SA135-0.5B

SA135-10B

SA135009-10B

SA135-25B

SA135-37B

SA54-31BMS

SA54-31BMSD

Introduction

This data review covers 14 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) as there are no current guidelines for the method stated above.

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

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 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990.

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were greater than or equal to 0.05 as required.

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).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
9/15/09	Di-n-octylphthalate	28.2	EB090809-SO1 SA50-12B SA50009-12B SA50-25B SA50-36B SA135-0.5B SA135-10B SA135009-10B SA135-25B SA135-37B SA54-31BMS SA54-31BMSD 95854-MB	J+ (all detects)	A

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 RRF values were greater than or equal to 0.05.

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
95624-MB	9/10/09	Di-n-butylphthalate	39 ug/Kg	All soil samples in SDG R0905115
95854-MB	9/14/09	Butylbenzylphthalate Di-n-butylphthalate	0.35 ug/L 0.89 ug/L	All water samples in SDG R0905115

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
SA54-10B	Di-n-butylphthalate	49 ug/Kg	49U ug/Kg
SA54-31B	Di-n-butylphthalate	73 ug/Kg	73∪ ug/Kg
SA50-12B	Di-n-butylphthalate	44 ug/Kg	44U ug/Kg
SA50009-12B	Di-n-butylphthalate	62 ug/Kg	62U ug/Kg

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
SA50-25B	Di-n-butylphthalate	44 ug/Kg	44U ug/Kg
SA50-36B	Di-n-butylphthalate	45 ug/Kg	45U ug/Kg
SA135-37B	Di-n-butylphthalate	77 ug/Kg	77U ug/Kg
EB090809-SO1	Butylbenzylphthalate	0.30 ug/L	0.30U ug/L

Sample EB090809-SO1 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
EB090809-SO1	9/8/09	Bis (2-ethylhexyl) phthalate Butylbenzylphthalate	0.33 ug/L 0.30 ug/L	SA54-10B SA54-20B SA54-31B SA50-12B SA50009-12B SA50-25B SA50-36B

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

Samples FB072909-SO (from SDG R0904226) and FB080309-SO (from SDG R0904279) were identified as field blanks. No semivolatile contaminants were found in these blanks with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072909-SO	7/29/09	Butylbenzylphthalate	0.11 ug/L	SA54-10B SA54-20B SA54-31B SA50-12B SA50009-12B SA50-25B SA50-36B
FB080309-SO	8/3/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Diethylphthalate	2.0 ug/L 0.14 ug/L 0.36 ug/L	SA135-0.5B SA135-10B SA135009-10B SA135-25B SA135-37B

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
95854-LCS/D (All water samples in	Pyridine	18 (50-120)	19 (50-120)	48 (≤30)	J (all detects) UJ (all non-detects)	Р
SDG R0905115)	1,4-Dioxane	31 (50-120)	48 (50-120)	42 (≤30)	J (all detects) UJ (all non-detects)	

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 R0905115	All compounds reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

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

XVI. Field Duplicates

Samples SA50-12B and SA50009-12B and samples SA135-10B and SA135009-10B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentrati	on (ug/Kg)	222	D.W		
Compound	SA50-12B	SA50009-12B	RPD (Limits)	Difference (Limits)	Flags	A or P
2-Methylnaphthalene	4.3	3.5	•	0.8 (≤7.0)	-	-
Acenaphthene	10	6.7	-	3.3 (≤7.0)	-	-
Anthracene	18	11	-	7 (≤7.0)	-	-
Benzo(a)anthracene	28	18	-	10 (≤7.0)	J (all detects)	А
Benzo(a) pyrene	21	12	-	9 (≤7.0)	J (all detects)	Α
Benzo(b)fluoranthene	20	13	•	7 (≤7.0)	-	-
Benzo(g,h,i)perylene	14	9.2	-	4.8 (≤7.0)	-	-
Benzo(k)fluoranthene	17	11	-	6 (≤7.0)	-	-
Chrysene	35	22	-	13 (≤7.0)	J (all detects)	А

	Concentrati	on (ug/Kg)	555	D.//		
Compound	SA50-12B	SA50009-12B	RPD (Limits)	Difference (Limits)	Flags	A or P
Di-n-butylphthalate	44	62	-	18 (≤180)	-	-
Dibenzo(a,h)anthracene	5.0	2.5	-	2.5 (≤7.0)	-	-
Fluoranthene	71	44	47 (≤50)	-	-	-
Fluorene	8.5	6.0	-	2.5 (≤7.0)	-	-
Hexachlorobenzene	240	210	13 (≤50)	-	-	-
Indeno(1,2,3-cd)pyrene	13	8.5	_	4.5 (≤7.0)	-	-
Naphthalene	3.2	2.5	-	0.7 (≤7.0)	-	-
Phenanthrene	76	50	41 (≤50)	•	-	-
Pyrene	72	43	50 (≤50)	-	-	-
Octachlorostyrene	37	35	6 (≤50)	•	-	-

	Concentra	tion (ug/Kg)	555	Difference	i i	
Compound	SA135-10B	SA135009-10B	RPD (Limits)	Difference (Limits)	Flags	A or P
Benzo(a)anthracene	21U	2.1	-	18.9 (≤21)	-	-
Chrysene	12	7.4	-	4.6 (≤21)	-	-
Fluoranthene	6.4	21U	-	14.6 (≤21)	-	-
Hexachlorobenzene	34	21	-	13 (≤21)	-	-
Phenanthrene	6.4	21U	-	14.6 (≤21)	-	-
Pyrene	7.4	5.3	-	2.1 (≤21)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0905115

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905115	EB090809-SO1 SA50-12B SA50009-12B SA50-25B SA50-36B SA135-0.5B SA135-10B SA135009-10B SA135-25B SA135-37B	Di-n-octylphthalate	J+ (all detects)	Α	Continuing calibration (%D) (c)
R0905115	EB090809-SO1	Pyridine 1,4-Dioxane	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)(RPD) (I,Id)
R0905115	EB090809-SO1 SA54-10B SA54-20B SA54-31B SA50-12B SA50009-12B SA50-25B SA50-36B SA135-0.5B SA135-10B SA135-10B SA135-25B SA135-25B SA135-37B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0905115	SA50-12B SA50009-12B	Benzo(a)anthracene Benzo(a)pyrene Chrysene	J (all detects) J (all detects) J (all detects)	А	Field duplicates (Difference) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0905115

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905115	SA54-10B	Di-n-butylphthalate	49U ug/Kg	A	bl
R0905115	SA54-31B	Di-n-butylphthalate	73U ug/Kg	Α	bl
R0905115	SA50-12B	Di-n-butylphthalate	44U ug/Kg	А	bl
R0905115	SA50009-12B	Di-n-butylphthalate	62U ug/Kg	А	bl

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905115	SA50-25B	Di-n-butylphthalate	44U ug/Kg	А	bl
R0905115	SA50-36B	Di-n-butylphthalate	45∪ ug/Kg	А	bl
R0905115	SA135-37B	Di-n-butylphthalate	77U ug/Kg	Α	bl
R0905115	EB090809-SO1	Butylbenzylphthalate	0.30U ug/L	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Equipment Blank Data Qualification Summary - SDG R0905115

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0905115

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

LDC #:	21991B2a	VALIDATION COMPLETENESS WORKSHEET
SDG #:	R0905115	Stage 2B
Laborator	y: Columbia	nalytical Services

Page: 1 of 1 Reviewer: 3V 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	Á	Sampling dates: 9 /6 8 /6 9
II.	GC/MS Instrument performance check	A	·
Ш.	Initial calibration	Á	2 RSD r
IV.	Continuing calibration/ICV	SW	2 RSD r7 COV/10 & 25 Z
V.	Blanks	SW	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	us /p
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	zM	$D_1 = 5.6$ $D_2 = 10.11$ EB = 1 $FB = FB072909 - 50$ (from R09042) V = FB080309 - 50 (from R0904279
XVII.	Field blanks	SW	EB = 1 FB = FB072909-50 (from R09042

A = Acceptable Note:

N = Not provided/applicable SW = See worksheet

ND = No compounds detected

R = Rinsate FB = Field blank D = Duplicate

TB = Trip blank EB = Equipment blank

Validated Samples:

/alida	ited Samples:	Wate	: <u>r</u>	+ 50il		
1 >	EB090809-SO1	W		SA135009-10B D S	1 95624 - MB	31
2	SA54-10B	٤	12	SA135-25B	22 7 95854 - 1	32
3	SA54-20B		13	SA135-37B	23	33
4	SA54-31B		14	SA54-31BMS	24	34
5	SA50-12B	D,	15	SA54-31BMSD	25	35
6	SA50009-12B	b,	16		26	36
7	SA50-25B		17	(**************************************	27	37
8	SA50-36B		18		28	38
9	SA135-0.5B		19		29	39
10_	SA135-10B	0×)	20		30	40

VALIDATION FINDINGS WORKSHEET

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

A. Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene"	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene**	T. 4-Chloroaniline	II. 4-Nitrophenol*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	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	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TT. 1,4. Dioxane
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	unu octachlurostymene
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.

	VALIDATION FINDINGS WORKSHEET	
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LDC# 2/99/ B24

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Continuing Calibration

SDG #: Color Color (Color SW 846 Method 8270C)

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 ? Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis for each instrument?

X N NIA V N NIA

v J+ 1451 Qualifications LEB 9585 Associated Samples 5-131415 Finding RRF (Limit: >0.05) Finding %D (Limit: <25.0%) 28.7 Œ Compound Standard ID A1031 15/69 Date S #

57	3
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194	y
Λ,	44.
# OC	SDG #
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VALIDATION FINDINGS WORKSHEET Blanks

Page: \ of \	Reviewer: WE	2nd Reviewer:
	æ	2nd Re

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?

YN N/A Was the blank contaminated? If yes, please see qualification below. Blank extraction date: 4/4/6/1 Blank analysis date: 4/4/6/1 Conc. units: 4/5/ K<

(19)

7 \$ 12 Sample Identification A11 501/5 44 /4 62 Associated Samples: 44 /2 \mathcal{P} 4 2 0 49 95624-MB Blank ID 39 × Compound Conc. units:

Associated Samples: Blank extraction date: 9/4/69 Blank analysis date: 5/5/09 Conc. units: 14

Blank extraction date: 9/4 /6/9 Blank analysis date: 4/15/6/9	Blank analys	sis date: 4/5/69	-	
Conc. units: Mg / L		Associated Samples:		(70)
Compound	Blank ID		Sample Identification	
	9 58 54. INB			
AAA	AAA 0.35 0.30/u	0,30/10		
XX	0,89			

5x Phthalates 2x all others

LDC#: 21991 B29 SDG #:

VALIDATION FINDINGS WORKSHEET Field Blanks

2nd Reviewer:__ Page: Reviewer:

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

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

Y N N/A

Note: Were target compounds detected in the field blanks?

Blank units: 1/2 / L. Associated sample units: 1/

Sampling date:

CAN 817 Sample Identification Associated Samples: Field blank type: (circle one) Field Blank / Rinsate / Other. Blank ID 0.33 °. % EFE AAA Compound CRQL

Associated sample units: W / Kg Blank units: 49 /L

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

Associated Samples:

8.8

Compound	Blank ID	Sample Identification
	FB073909-80	
AAA	(1,0	
CROI		

VALIDATION FINDIN	Field B

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Reviewer: JVC 2nd Reviewer: A

(MD)

9-13

VALIDATION FINDINGS WORKS	Field Blanks
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DC#: 21991 Bya	VALIDATION FINDINGS WORKSHEE
10G#: See Com	Field Blanks
FETHOD: GC/MS BNA (EPA SW 846 Method 8270)	
Y N/A Were field blanks identified in this SDG?	67
	ne field blanks?
Mank units: 19/L, Associated sample units: 1/5/15/	15/Tex
sampling date: 8/03/05	3
ield blank type: (circle one) kield Blank) Rinsate / Other.	Other: Associated Samples:

-					 	 	1
_							-
Sample Identification							
Sam							
Blank ID	FB080304-50	2.0	41.0	0,36			
		EFF		7			
Compound						7.	
						CROL	

Associated sample units:

Blank units: Associated	Sampling date:	Field blank type: (circle one) Field Blank / Rinsate / Other.	Compound Blank ID				CROL
Associated sample units:		I Blank / Rin	ik ID				
its:		sate / Other:					
	•	A					
		Associated Samples:	Sam				
	; ;	iples:	Sample Identification				

VALIDATION FINDINGS WORNSHEET

Surrogate Recovery

Reviewer: 2nd Reviewer:_

r aye.

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

SDG#: 「こしつ #:

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

Were percent recoveries (%R) for surrogates within QC limits?

Y N N/A Y N N/A

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?

			П									$\overline{\ \ }$											" 1		
Qualifications	(m)y 1mt)																								
Qualif	No mal																								QC_Limits (Water) 21-100 10-123 33-110*
imits)	(45-135)	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	OC Limits (Soil) 25-121 19-122 20-130*
%R (Limits)	143																								5 (2FP)= 2-Fluorophenol 6 (TBP) = 2,4,6-Tribromophenol 7 (2CP) = 2-Chlorophenol-d4 8 (DCB) = 1,2-Dichlorobenzene-d4
Surrogate	NBZ																								w w w w
OI el																									OC Limits (Water) 35-114 43-116 33-141 10-94
Sample ID	r																								OC Limits (Soil) e-d5 23-120 enyl 30-115 14 18-137 24-113
Date																									* QC limits are advisory S1 (NBZ) = Nitrobenzene-d5 2 S2 (FBP) = 2-Fluorobiphenyl 3 S3 (TPH) = Terphenyl-d14 1 S4 (PHL) = Phenol-d5
#																									* QC limi S1 (NBZ) S2 (FBP) S3 (TPH) S4 (PHL)
																									•

829 SDG #: 5cc Gray LDC #: 21941

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Page 1 of 1 Reviewer: 2nd Reviewer:

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

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. Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Y N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG.

Y N N/A

Was a MS/MSD analyzed every 20 samples of each matrix?

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

	SMS											
Qualifications	i de Tual (MSMS)	<i>a</i>										
Associated Salitples												
Limits)	(०५)	()	1 ()	,	, i	, (
RPD (Limits)	3				,							
MSD %R (Limits)	()	()	()	(()						
** **		(
MS %R (Limits)	(())	~	,	(
Compound	RRR											
MS/MSD ID	JIS .											
MS/N	14/											
Date					,							
*												

		QC Limits	RPD	QC Limits	RPD			QC Limits	RPD	QC Limits	RPD
	Compound	(Soil)	(Soil)	(Water)	(Water)		Compound	(Solf)	(Soll)	(Water)	(Water)
∢ċ	Phenol	76-90%	%9€ >	12-110%	<u>< 42%</u>	99 .	Acenaphthene	31-137%	<u><</u> 19%	46-118%	< 31%
ပ	C. 2-Chlorophenol	25-102%	> 50%	27-123%	< 40%	=	4-Nitrophenol	11-114%	< 50%	10-80%	< 50%
ய்	1,4-Dichlorobenzene	28-104%	< 27%	36-97%	< 28%	ξ	2,4-Dinitrotoluene	%68-82	< 47%	24-96%	× 38%
اد	N-Nitroso-di-n-propy/amine	41-126%	< 38%	41-116%	< 38%	F	Pentachlorophenol	17-109%	< 47%	9-103%	< 50%
œ	1,2,4-Trichlorobenzene	38-107%	< 23%	39-98%	< 28%	Z	Pyrene	35-142%	< 36%	26-127%	< 31%
>	4-Chioro-3-methylphenol	26-103%	< 33%	23-97%	< 42%						

LDC #: 21 991 B2 A SDG #: 84c Cross

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: lof 2nd Reviewer: Reviewer:

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

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

| V | N/A| Was a LCS required?
| Y | N/A| Were the LCS/LCSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

Ď	Date	LCSACSDID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		95624- L151D	SS	125 (50-120)	ľ		841-15021 95624-118	
			nnn	135 (((.	
				J	())		
				()		()		
				()	(()		
		9 5254 · USVB	まま	()	()	3) (30)	1 95854-MB	No gue (1656
			RKR	(00)-05) 81	19 (50-120)	48 (30)		/N3/p (
			Tヤナ	(†) (٤	(1) 84	Ĭ	->	1
				(,		*
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				`	`	()		
		-)	()	()		

LDC#: 21991B2a SDG#:See cover

Pyrene

Octachlorostyrene

VALIDATION FINDINGS WORKSHEET Field Duplicates

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

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

Commound Name	Conc (ug/Kg)	RPD	Diff	Diff Limits	Quais
Compound Name	5	6	(≤50%)	Dill	Om Limits	(Parent Only)
2-Methylnaphthalene	4.3	3.5		0.8	≤7.0	
Acenaphthene	10	6.7		3.3	≤7.0	
Anthracene	18	11		7	≤7.0	
Benzo(a)anthracene	28	18		10	≤7.0	J dets/A
Benzo(a)pyrene	21	12		9	<, 7.0	
Benzo(b)fluoranthene	20	13		7	≤7.0	
Benzo(g,h,i)perylene	14	9.2		4.8	≤7.0	
Benzo(k)fluoranthene	17	11		6	≤ 7.0	
Chrysene	35	22		13	≤ 7.0	J dets/A
Di-n-butylphthalate	44	62		18	≤ 180	
Dibenzo(a,h)anthracene	5.0	2.5		2.5	< 7.0	
Fluoranthene	71	44	47			
Fluorene	8.5	6.0		2.5	≤7.0	
Hexachlorobenzene	240	210	13			
indeno(1,2,3-cd)-pyrene	13	8.5		4.5	≤ 7.0	
Naphthalene	3.2	2.5		0.7	≤ 7.0	
Phenanthrene	76	50	41			

Compound Name	Conc (ug/Kg)	RPD	Diff	Diff Limits	Quals
Compound Nume	10	11	(≤50%)			(Parent Only)
Benzo(a)anthracene	21U	2.1		18.9	≤21	
Chrysene	12	7.4		4.6	≤21	
Fluoranthene	6.4	21U		14.6	≤21	

43

35

50

6

72

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LDC#: 21991B2a SDG#:See cover

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page	e: <u> </u>	
Reviewer:		
2nd Reviewer:	1	

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

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
Sompound Hams	10	11	(≤50%)			(Parent Only)
Hexachlorobenzene	34	21		13	≤21	
Phenanthrene	6.4	21U		14.6	≤21	
Pyrene	7.4	5.3		2.1	≤21	

V:\FIELD DUPLICATES\21991B2a.wpd

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date: September 3, 2009

LDC Report Date: November 19, 2009

Matrix: Soil/Water

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905072

Sample Identification

SA58-0.5B SA204-45B SA58-10B EB090309-SO2

SA58009-28B

SA58-28B

SA53-10B

SA53-25B

SA53-32B

SA106-12B

SA106-20B

SA106-35B

RSAU7-0.5B

RSAU7009-0.5B

RSAU7-10B

RSAU7-25B

RSAU7-40B

RSAU7-54B

SA204-0.5B

SA204-10B

SA204009-10B

SA204-30B

Introduction

This data review covers 21 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) as there are no current guidelines for the method stated above.

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

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.

1. 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 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990.

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were greater than or equal to 0.05 as required.

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).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

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 RRF values were greater than or equal to 0.05.

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
95517-MB	9/9/09	Bis (2-ethylhexyl) phthalate Butylbenzylphthalate Di-n-butylphthalate	0.26 ug/L 0.41 ug/L 1.5 ug/L	All water samples in SDG R0905072
95520-MB	9/9/09	Di-n-butylphthalate Naphthalene	88 ug/Kg 1.0 ug/Kg	SA58-0.5B SA58-10B SA58009-28B SA58-28B SA53-10B SA53-25B SA53-32B SA106-12B SA106-20B SA106-35B RSAU7-0.5B RSAU7-0.5B RSAU7-25B RSAU7-25B RSAU7-40B RSAU7-40B RSAU7-54B SA204-0.5B SA204-10B
95624-MB	9/10/09	Di-n-butylphthalate	39 ug/Kg	SA204009-10B SA204-30B SA204-45B

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

Sample	Compound	Reported	Modified Final
	TIC (RT in minutes)	Concentration	Concentration
EB090309-SO2	Bis(2-ethylhexyl)phthalate	1.2 ug/L	1.2U ug/L
	Butylbenzylphthalate	0.37 ug/L	0.37U ug/L
	Di-n-butylphthalate	0.97 ug/L	0.97U ug/L
SA58-10B	Di-n-butylphthalate	58 ug/Kg	58U ug/Kg
SA58-28B	Di-n-butylphthalate	63 ug/Kg	63U ug/Kg
	Naphthalene	1.1 ug/Kg	1.1U ug/Kg
SA53-10B	Di-n-butylphthalate	47 ug/Kg	47U ug/Kg
SA53-25B	Di-n-butylphthalate	58 ug/Kg	58U ug/Kg

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
SA53-32B	Di-n-butylphthalate	60 ug/Kg	60U ug/Kg
SA106-12B	Di-n-butylphthalate	77 ug/Kg	77U ug/Kg
SA106-35B	Naphthalene	1.6 ug/Kg	1.6U ug/Kg
RSAU7-0.5B	Di-n-butylphthalate Naphthalene	40 ug/Kg 1.0 ug/Kg	40U ug/Kg 1.0U ug/Kg
RSAU7009-0.5B	Di-n-butylphthalate	46 ug/Kg	46U ug/Kg
RSAU7-40B	Di-n-butylphthalate	59 ug/Kg	59U ug/Kg
RSAU7-54B	Naphthalene	1.4 ug/Kg	1.4U ug/Kg
SA204-0.5B	Di-n-butylphthalate	91 ug/Kg	91U ug/Kg
SA204-10B	Di-n-butylphthalate Naphthalene	52 ug/Kg 1.1 ug/Kg	52U ug/Kg 1.1U ug/Kg
SA204-30B	Di-n-butylphthalate	75 ug/Kg	75U ug/Kg
SA204-45B	Di-n-butylphthalate	53 ug/Kg	53U ug/Kg

Sample EB090309-SO2 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
EB090309-SO2	9/3/09	Bis (2-ethylhexyl) phthalate Butylbenzylphthalate Diethylphthalate	1.2 ug/L 0.37 ug/L 0.97 ug/L	RSAU7-0.5B RSAU7-009-0.5B RSAU7-10B RSAU7-25B RSAU7-40B RSAU7-54B SA204-0.5B SA204-0.5B SA204-10B SA204009-10B SA204030B SA204-30B

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

Samples FB072909-SO (from SDG R0904226) and FB080309-SO (from SDG R0904279) were identified as field blanks. No semivolatile contaminants were found in these blanks with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072909-SO	7/29/09	Butylbenzylphthalate	0.11 ug/L	SA58-0.5B SA58-10B SA58009-28B SA58-28B SA53-10B SA53-25B SA53-32B SA106-12B SA106-20B SA106-35B
FB080309-SO	8/3/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Di-n-butylphthalate	2.0 ug/L 0.14 ug/L 0.36 ug/L	RSAU7-0.5B RSAU7-09-0.5B RSAU7-10B RSAU7-25B RSAU7-40B RSAU7-54B SA204-0.5B SA204-10B SA20409-10B SA204-30B SA204-45B

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
95517-LCS/D (All water samples in SDG R0905072)	Pyridine	16 (50-120)	26 (50-120)	44 (≤30)	J (all detects) UJ (all non-detects)	P
95517-LCS/D (All water samples in SDG R0905072)	1,4-Dioxane	46 (50-120)	46 (50-120)	-	J- (all detects) UJ (all non-detects)	Р
95520-LCS/D (SA58-0.5B SA58-10B SA58-09-28B SA58-28B SA53-10B SA53-25B SA53-32B SA106-12B SA106-20B SA106-35B RSAU7-0.5B RSAU7-0.5B RSAU7-10B RSAU7-25B RSAU7-40B RSAU7-40B RSAU7-54B SA204-0.5B SA204-10B 95520-MB)	Hexachlorobenzene Octachlorostyrene	129 (50-120) 132 (50-120)	128 (50-120) 126 (50-120)	-	J+ (all detects) J+ (all detects)	P
95624-LCS/D (SA204009-10B SA204-30B SA204-45B 95624-MB)	Hexachlorobenzene Octachlorostyrene	125 (50-120) 125 (50-120)	125 (50-120) 122 (50-120)	-	J+ (all detects) J+ (all detects)	Р

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 R0905072	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

Samples SA58009-28B and SA58-28B, samples RSAU7-0.5B and RSAU7009-0.5B, and samples SA204-10B and SA204009-10B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentration (ug/Kg)		DDD			
Compound	RSAU7-0.5B	RSAU7009-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P
Benzo(a)anthracene	1.0	4.2	-	3.2 (≤6.9)	-	-
Benzo(a)pyrene	6.9U	4.5	-	2.4 (≤6.9)	-	-
Benzo(b)fluoranthene	6.9U	3.1	-	3.8 (≤6.9)	-	-
Benzo(g,h,i)perylene	6.9U	2.8	-	4.1 (≤6.9)	-	-
Benzo(k)fluoranthene	6.9U	3.1	-	3.8 (≤6.9)	-	-
Chrysene	1.7	5.9	-	4.2 (≤6.9)		-
Di-n-butylphthalate	40	46	-	6 (≤180)	-	-
Fluoranthene	1.7	6.6	-	4.9 (≤6.9)	-	-
indeno(1,2,3-cd)pyrene	1.4	2.8	-	1.4 (≤6.9)	-	-

	Concentration (ug/Kg)					
Compound	RSAU7-0.5B	RSAU7009-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P
Naphthalene	1.0	6.9U	-	5.9 (≤6.9)	-	-
Phenanthrene	6.9U	3.8	-	3.1 (≤6.9)	-	-
Pyrene	2.1	6.3	-	4.2 (≤6.9)	-	-

	Concentration (ug/Kg)					
Compound	SA204-10B	SA204009-10B	RPD (Limits)	Difference (Limits)	Flags	A or P
Acenaphthylene	4.6	4.2	•	0.4 (≤21)	-	-
Benzo(a)anthracene	35	35	-	0 (≤21)	-	-
Benzo(a)pyrene	34	34	-	0 (≤21)	-	-
Benzo(b)fluoranthene	45	52	<u>-</u>	7 (≤21)	-	-
Benzo(g,h,i)perylene	36	42	-	6 (≤21)	-	-
Benzo(k)fluoranthene	35	31	<u>-</u>	4 (≤21)	-	-
Chrysene	50	52	-	2 (≤21)	-	-
Di-n-butylphthalate	52	540U	-	488 (≤540)	-	-
Dibenzo(a,h)anthracene	9.9	13	-	3.1 (≤21)	-	-
Dimethyl phthalate	14	540U	-	526 (≤540)	-	-
Fluoranthene	71	69	-	2 (≤21)	-	-
Hexachlorobenzene	75	84	-	9 (≤21)		-
Indeno(1,2,3-cd)pyrene	30	34	-	4 (≤21)		-
Naphthalene	1.1	21U	-	19.9 (≤21)	-	-
Phenanthrene	19	19	-	0 (≤21)	-	-

	Concentration (ug/Kg)		555			
Compound	SA204-10B	SA204009-10B	RPD (Limits)	Difference (Limits)	Flags	A or P
Pyrene	76	70	-	6 (≤21)	-	-
Octachlorostyrene	20	22	-	2 (≤21)	-	-

	Concentration (ug/Kg)		200	D.14		
Compound	SA58009-28B	SA58-28B	RPD (Limits)	Difference (Limits)	Flags	A or P
Di-n-butyl phthalate	190U	63	-	127 (≤190)	-	_
Naphthalene	7.5U	1.1	-	6.4 (≤7.5)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0905072

	_			4 5	D (0.1)
SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905072	EB090309-SO2	Pyridine	J (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R)(RPD) (I,Id)
R0905072	EB090309-SO2	1,4-Dioxane	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0905072	SA58-0.5B SA58-10B SA58009-28B SA58-28B SA53-10B SA53-25B SA53-32B SA106-12B SA106-20B SA106-35B RSAU7-0.5B RSAU7-0.5B RSAU7-0.5B RSAU7-10B RSAU7-25B RSAU7-40B RSAU7-40B RSAU7-54B SA204-0.5B SA204-10B SA204-0.5B SA204-10B SA204-30B SA204-30B SA204-45B	Hexachlorobenzene Octachlorostyrene	J+ (all detects) J+ (all detects)	P	Laboratory control samples (%R) (I)
R0905072	SA58-0.5B SA58-10B SA58-10B SA58-28B SA53-25B SA53-25B SA53-32B SA106-12B SA106-20B SA106-35B RSAU7-0.5B RSAU7-0.5B RSAU7-10B RSAU7-25B RSAU7-40B RSAU7-40B RSAU7-54B SA204-0.5B SA204-10B SA204-0.5B SA204-10B SA204-30B SA204-30B SA204-45B EB090309-SO2	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0905072

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905072	EB090309-SO2	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Di-n-butylphthalate	1.2U ug/L 0.37U ug/L 0.97U ug/L	A	Ы
R0905072	SA58-10B	Di-n-butylphthalate	58U ug/Kg	А	bl
R0905072	SA58-28B	Di-n-butylphthalate Naphthalene	63U ug/Kg 1.1U ug/Kg	Α	bl
R0905072	SA53-10B	Di-n-butylphthalate	47U ug/Kg	А	bl
R0905072	SA53-25B	Di-n-butylphthalate	58U ug/Kg	Α	bl
R0905072	SA53-32B	Di-n-butylphthalate	60U ug/Kg	А	bl
R0905072	SA106-12B	Di-n-butylphthalate	77U ug/Kg	А	bi
R0905072	SA106-35B	Naphthalene	1.6U ug/Kg	А	bl
R0905072	RSAU7-0.5B	Di-n-butylphthalate Naphthalene	40U ug/Kg 1.0U ug/Kg	A	bl
R0905072	RSAU7009-0.5B	Di-n-butylphthalate	46U ug/Kg	А	bl
R0905072	RSAU7-40B	Di-n-butylphthalate	59U ug/Kg	А	bl
R0905072	RSAU7-54B	Naphthalene	1.4U ug/Kg	А	bl
R0905072	SA204-0.5B	Di-n-butylphthalate	91U ug/Kg	A	bl
R0905072	SA204-10B	Di-n-butylphthalate Naphthalene	52U ug/Kg 1.1U ug/Kg	А	bl
R0905072	SA204-30B	Di-n-butylphthalate	75U ug/Kg	А	bl
R0905072	SA204-45B	Di-n-butylphthalate	53U ug/Kg	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Equipment Blank Data Qualification Summary - SDG R0905072

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0905072

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

LDC #:_	21991C2a	VALIDATION COMPLETENESS WORKSHEET
SDG #:_	R0905072	Stage 2B

Page: 1 of) Reviewer: JVL

2nd Reviewer:__

Laboratory: Columbia Analytical Services

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

Validation Area

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

l.	Technical holding times	A	Sampling dates: 9 /6 3 /64
II.	GC/MS Instrument performance check	<u> </u>	<u>'</u>
Ш.	Initial calibration	A	3 RSD rx
IV.	Continuing calibration/ICV	A	2 RSD rY COV/101 & 25 ?
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	Client Spec
VIII.	Laboratory control samples	Sw	client spec
IX.	Regional Quality Assurance and Quality Control	N	
Χ.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	D,=3,4 D2 = 11,12 D3 = 18,19
XVII.	Field blanks	SN)	$D_1 = 3.4$ $D_2 = 11, 12$ $D_3 = 18, 19$ $EB = 22$ $EB = FB072909-S0$ (from R0906 $EB = D_1 = D_2 = 11, 12$ $D_3 = 18, 19$ $EB = 18, 19$

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

Comments

Validated Samples:

Soil + WATER

1 1	SA58-0.5B	Ç 11	RSAU7-0.5B D > S	21 SA204-45B	\$11 955 20 - MB
2 1	SA58-10B	12	RSAU7009-0.5B b	22 3 EB090309-SO2 W	132 7 . 95624 - 1
3 1	SA58009-28B 0 ,	13	RSAU7-10B	23	+ 33 3 95517 - +
4 1	SA58-28B b	14	RSAU7-25B	24	34
5 1	SA53-10B	15	RSAU7-40B	25	35
6 1	SA53-25B	16	RSAU7-54B	26	36
7 1	SA53-32B	17	SA204-0.5B	27	37
8 1	SA106-12B	18	SA204-10B D3	28	38
9 1	SA106-20B	19	SA204009-10B b ₃	29	39
10 1	SA106-35B	20	SA204-30B	30	40

VALIDATION FINDINGS WORKSHEET

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

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

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

21991C29	See lived
LDC #:	SDG #:

VALIDATION FINDINGS WORKSHEET Blanks

Page: of 2 2nd Reviewer:___ Reviewer:__

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

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

Was a method blank analyzed for each matrix?

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. Blank extraction date: 4/6/6/4 Blank analysis date: 4/0/6/4

(BB) Sample Identification 22 Associated Samples: 0,37 /y 0.97/4 1.2/4 9 55 17- MB Blank ID 6.26 0 4 N AAD ×× 233 Compound Conc. units:

Associated Samples: Blank extraction date: 4 64 64 Blank analysis date: 9 1 10 9 Conc. units:

Compound	Blank ID				Š	Sample Identification	ıtion			
	gn-06226	8	4	۲.	9	7	8	16	11	Σ
XX	88	18/N	11/89	47 /4	h/ 85	h/07	77/4		40/4	46/11
5	1.6		1.1/4					1.6/4	10/11	

991C24	Le Cons
LDC #: 21	SDG #:

VALIDATION FINDINGS WORKSHEET

Blanks

Page: Yof Y

2nd Reviewer:___ Reviewer:

> Please 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)

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?

YN N/A Was the blank contaminated? If yes, please see qualification below. Blank extraction date: 4/6/5 Blank analysis date:

(79)

Sample Identification 1.1/4 52/4 ∞ Associated Samples: ē 4 1/65 <u>n</u> 95520-MB Blank ID 0 8 8 × Compound Conc. units:

Associated Samples: Blank extraction date: $\frac{9 \sqrt{6} \sqrt{61}}{\sqrt{6}}$ Blank analysis date: $\frac{9 \sqrt{44} \sqrt{6}}{\sqrt{6}}$ Conc. units: $\frac{9 \sqrt{6} \sqrt{6}}{\sqrt{6}}$

19-21

(79)

Į.					 	 	
	on						
	Sample Identification						
	Sar			-			
Associated Salliples.							
Associate		2	h/25				
		07	15/4				
	Blank ID	9W-5225b	39				
Ŷ			XX				
Conc. units: "1/ec	Compound						
3	L					<u> </u>	

5x Phthalates 2x all others

21991 C2a	in Com
LDC #: 2	SDG #:

VALIDATION FINDINGS WORKSHEET Field Blanks

	2/5	
Page:	Reviewer:	2nd Reviewer:

METHOD: GC/MS BNA (EPA SW 846 Method 8270)
Y/N N/A Were field blanks identified in this SD
X/N N/A Were target compounds detected in the standard s

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

Were target compounds detected in the field blanks?

Blank units: "5 / Associated sample units: "5 / Sampling date: 9 / 62 / 63

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

7

1

Sample Identification Associated Samples: 5 VD ei the the B エンミナ ラマ Blank ID 0.37 0,97 22 <u>.</u> × AAA 力が Compound CROL

Clamaco I	Associated salidia ulits.
140.	
	clama posiciono

Sampling date:

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

Sample Identification Associated Samples: Blank ID

LDC #: 2/941024 See 622 SDG #:

VALIDATION FINDINGS WORKSHEET

Page: of Y Reviewer: JVC

2nd Reviewer:

Field Blanks

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

Blank units: 1/2 / L Associated sample units: 45 /kg

Sampling date: 7/2 f /6 1 Y N/A

Were field blanks identified in this SDG?

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

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

(an)

91-1

Sample Identification Associated Samples: F B072909 Blank ID <u>۔</u> ص AAA Compound

Blank units: 49/L, Associated sample units: 49/kg

Sampling date: 8/02/61

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

7 - 1

Associated Samples:

FB> Sample Identification 5 S ther SUITS ニせし FB 080309 50 Blank ID 0.36 2,0 0.14 AAA EEE 7

CRQL

LDC#: 21991C29 SDG#: St. Gne

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: __lof__

Reviewer: 176 2nd Reviewer: 11/

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". X N N/A Was a LCS required?

N N/A

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

Deta LOSACIAD Compound With Climary With										
RRR 16 $(57-120)$ 26 $(59-120)$ 44 (50)	*	Dete	DI OSOTOSO ID	Compound	LCS %R (Limits)		LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
TTT 46 () 46 () 1 ()			9 521-153 6	RRR	1-25)	20)		_		J/11 4/2/15
XX 134 (TTT	76 ((~	1	K
XX 34 () () () 1-18, 4550-MB 55 0 - MB 55 0					J	1)	`		
124 () 16 () 17 () 18 18 18 18 18 18 18			7 221 - 210			7		1		
124 () 128 () () 127 () 128 () 127 ()			d>537-0259b	XX	134 (7	()	~	∞	No grad (LCSDm)
126 () () () () () () () () () (SS	129 (^	() 8 %	()		J+dets/P (2)
Mun 125 () () () () 19-21, 9524-mp Mun 125 () 125 () 192 () () 192-1, 9524-mp () () () () () () () () () (unn	132 (î	() 951	()		->
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LDC#: 21991C2a SDG#:See cover

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:	of
Reviewer:	N6
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	11	12	(≤50%)	Dill	Dan Environ	(Parent Only)
Benzo(a)anthracene	1.0	4.2		3.2	≤6.9	1
Benzo(a)pyrene	6.9U	4.5	<i>:</i>	2.4	≤6.9	_
Benzo(b)fluoranthene	6.9U	3.1		3.8	≤6.9	_
Benzo(g,h,i)perylene	6.9U	2.8		4.1	≤6.9	-
Benzo(k)fluoranthene	6.9U	3.1		3.8	≤6.9	1
Chrysene	1.7	5.9		4.2	≤6.9	,
Di-n-butylphthalate	40	46		6	≤180	,
Fluoranthene	1.7	6.6		4.9	≤6.9	1
Indeno(1,2,3-cd)-pyrene	1.4	2.8		1.4	≤ 6.9	_
Naphthalene	1.0	6.9U		5.9	≤6.9	
Phenanthrene	6.9U	3.8		3.1	≤6.9	,
Pyrene	2.1	6.3		4.2	≤6.9	

Compound Name	Conc (ug/Kg)	RPD	Diff	Diff Limits	Quals
Compound Name	18	19	(≤50%)		Dill Limits	(Parent Only)
Acenaphthylene	4.6	4.2		0.4	≤21	_
Benzo(a)anthracene	35	35		0	≤21	
Benzo(a)pyrene	34	34		0	≤21	_
Benzo(b)fluoranthene	45	52		7	≤21	1
Benzo(g,h,i)perylene	36	42		6	≤ 21	
Benzo(k)fluoranthene	35	31		4	≤21	1
Chrysene	50	52		2	≤21	·
Di-n-butylphthalate	52	540U		488	≤ 540	_
Dibenzo(a,h)anthracene	9.9	13		3.1	≤21	,
Dimethyl phthalate	14	540U		526	≤ 540	_

LDC#: 21991C2a SDG#:See cover

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page:_	~of_	2
Reviewer:		6
2nd Reviewer:	比	$\overline{/}$

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? Y N NA

Compound Name	Conc (ug/Kg)	RPD	Diff	Diff Limits	Quals
Compound Name	18	19	(≤50%)	5	5 m Emilio	(Parent Only)
Fluoranthene	71	69		2	s 2 1	^
Hexachirobenzene	75	84		9	S 21	
Indeno(1,2,3-cd)-pyrene	30	34		4	≤ 21	_
Naphthalene	1.1	21U		19.9	≤21	-
Phenanthrene	19	19		0	≤ 21	,
Pyrene	76	70		6	≤ 21	,
Octachlorostyrene	20	22		2	≤21	

Compound Name	Conc (ug/Kg)	RPD	Diff	Diff Limits	Quals
Sompound Name	3	4	(≤50%)	1		(Parent Only)
Di-n-butyl phthalate	190U	63		127	± 190	1
Naphthalene	7.5U	1.1		6.4	≤7.5	_

V:\FIELD DUPLICATES\21991C2a.wpd

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date: September 10, 2009

LDC Report Date: November 19, 2009

Matrix: Soil/Water

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905177

Sample Identification

EB091009-SO1 SA126-40BMS EB091009-SO2 SA126-40BMSD

SA102-10B

SA102-30B

SA109-10B

SA109-25B

SA109-34B

SA124009-10B

SA124-0.5B

SA124-10B

SA125-25B

SA125-39B

SA125009-39B

SA125-0.5B

SA125-10B

SA126-0.5B

SA126-10B

SA126-18B

SA126-25B

SA126-40B

Introduction

This data review covers 20 soil samples and 2 water 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) as there are no current guidelines for the method stated above.

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

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 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990.

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were greater than or equal to 0.05 as required.

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).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
9/15/09	Di-n-octylphthalate	28.2	EB091009-SO1 95854-MB	J+ (all detects)	А
9/22/09	Fluoranthene	29.2	SA102-10B SA102-30B SA109-30B SA109-34B SA125-25B SA125-39B SA125-0.5B SA125-10B SA126-40B SA126-40B SA126-40BMS SA126-40BMSD 95859-MB	J+ (all detects)	А

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 RRF values were greater than or equal to 0.05.

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
95854-MB	9/14/09	Butylbenzylphthalate Di-n-butylphthalate	0.35 ug/L 0.89 ug/L	All water samples in SDG R0905177

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

Sample	Compound	Reported	Modified Final
	TIC (RT in minutes)	Concentration	Concentration
EB091009-SO1	Butylbenzylphthalate	0.30 ug/L	0.30U ug/L
EB091009-SO2	Butylbenzylphthalate	0.42 ug/L	0.42U ug/L
	Di-n-butylphthalate	1.0 ug/L	1.0U ug/L

Samples EB091009-SO1 and EB091009-SO2 were identified as equipment blanks. No semivolatile contaminants were found in these blanks with the following exceptions:

Equipment Blank ID	Sampling Date	Compound	Concentration	Associated Samples
EB091009-SO1	9/10/09	Bis (2-ethylhexyl) phthalate Butylbenzylphthalate	0.98 ug/L 0.30 ug/L	All soil samples in SDG R0905177
EB091009-SO2	9/29/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Di-n-butylphthalate	0.89 ug/L 0.42 ug/L 1.0 ug/L	All soil samples in SDG R0905177

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

Sample FB072909-SO (from SDG R0904226) was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072909-SO	7/29/09	Butylbenzylphthalate	0.11 ug/L	All soil samples in SDG R0905177

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
95854-LCS/D (All water samples in	Pyridine	18 (50-120)	29 (50-120)	48 (≤30)	J (all detects) UJ (all non-detects)	Р
SDG R0905177)	1,4-Dioxane	31 (50-120)	48 (50-120)	42 (≤30)	J (all detects) UJ (all non-detects)	

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 R0905177	All compounds reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

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

XVI. Field Duplicates

Samples SA124009-10B and SA124-10B and samples SA125-39B and SA125009-39B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentrati	ion (ug/Kg)	222	Difference	<u> </u>	
Compound	SA124009-10B	SA124-10B	RPD (Limits)	(Limits)	Flags	A or P
Benzo(a)anthracene	21	16	-	5 (≤8.5)	-	-
Benzo(a)pyrene	16	13	-	3 (≤8.5)	-	-
Benzo(b)fluoranthene	22	17	-	5 (≤8.5)	-	-
Benzo(g,h,i)perylene	11	8.6	-	2.4 (≤8.5)	-	-
Benzo(k)fluoranthene	19	16	•	3 (≤8.5)	-	-
Chrysene	24	19	-	5 (≤8.5)	-	-
Dibenz(a,h)anthracene	3.0	2.9	-	0.1 (≤8.5)	-	-
Fluoranthene	28	24	-	4 (≤8.5)	-	-
Hexachlorobenzene	3.0	2.9	-	0.1 (≤8.5)	-	-
Indeno(1,2,3-cd)pyrene	11	8.6	-	2.4 (≤8.5)	-	-
Phenanthrene	6.8	5.7	-	1.1 (≤8.5)		
Pyrene	22	20	_	2 (≤8.5)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0905177

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905177	EB091009-SO1	Di-n-octylphthalate	J+ (all detects)	Α	Continuing calibration (%D) (c)
R0905177	SA102-10B SA102-30B SA109-10B SA109-34B SA125-25B SA125-39B SA125-09-39B SA125-0.5B SA125-10B SA126-40B	Fluoranthene	J+ (all detects)	Α	Continuing calibration (%D) (c)
R0905177	EB091009-SO1 EB091009-SO2	Pyridine 1,4-Dioxane	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R)(RPD) (I,Id)
R0905177	EB091009-SO1 EB091009-SO2 SA102-10B SA102-30B SA109-10B SA109-25B SA109-34B SA124009-10B SA124-0.5B SA124-10B SA125-25B SA125-39B SA125-39B SA125-0.5B SA125-10B SA126-10B SA126-10B SA126-10B SA126-10B SA126-25B SA126-40B	All compounds reported below the PQL.	J (all detects)	А	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0905177

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905177	EB091009-SO1	Butylbenzylphthalate	0.30U ug/L	A	bl
R0905177	EB091009-SO2	Butylbenzylphthalate Di-n-butylphthalate	0.42U ug/L 1.0U ug/L	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Equipment Blank Data Qualification Summary - SDG R0905177

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0905177

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

LDC #:	21991D2a	VALIDATION COMPLETENESS WORKSHEET	Date: 11/19/60
SDG #:	R0905177	_ Stage 2B	Page: lof /
Laborato	ry: Columbia Analytica	N Services	Reviewer: <u>JV6</u>
			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 / 6 / 6 g
П.	GC/MS Instrument performance check	Á	,
III.	Initial calibration	A	2 RSD rr
IV.	Continuing calibration/ICV	SW	ca/a = 25}
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SM	LCS/D
IX.	Regional Quality Assurance and Quality Control	N	
Χ.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	$D_1 = 8 10$ $D_2 = 12.13$
XVII.	Field blanks	τM	EB = 1,2 FB = FB 0729 09-50 (from Roge

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

XND = No compounds detected D = Duplicate

R = Rinsate FB = Field blank

TB = Trip blank EB = Equipment blank

Validated Samples:

Water

	7.00						
1	EB091009-SO1	W	11	SA125-25B S	21	SA126-40BMS S	5 31 1 95854- MB
2	EB091009-SO2	J	12	SA125-39B Dy	22	SA126-40BMSD	32 > 95859-
3	SA102-10B	ی	13	SA125009-39B D-	23		33
4	SA102-30B		14	SA125-0.5B	24		34
5	SA109-10B		15	SA125-10B	25		35
6	SA109-25B		16	SA126-0.5B	26		36
7	SA109-34B	\bot	17	SA126-10B	27		37
8	SA124009-10B		18	SA126-18B	28		38
9	SA124-0.5B		19	SA126-25B	29		39
10	SA124-10B D ,	√	20	SA126-40B	30		40

VALIDATION FINDINGS WORKSHEET

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

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

2nd Reviewer: Reviewer:_

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

27 a41 D29

LDC #:

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

Qualifications ⋖ J+ acts St Zets 3-5 7 11-15 20-22 Associated Samples 95854- MB 914-65856 Finding RRF (Limit: >0.05) Finding %D (Limit: <25.0%) 4 29.7 28 \mathcal{E} (± Compound 1111 Standard ID AV 168 40021 60/xc/ 4/12/69 Date 4

1 D29	Carr
2169	7
_DC #:	3DG #:

VALIDATION FINDINGS WORKSHEET Blanks

of	29	~
	Reviewer:	2nd Reviewer:

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

ualifications 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?
રીease see dna	Y N/A	Y N/A

Was a method blank associated with every sample?

N/A Was the blank contaminated? If yes, please see qualification below. Stank extraction date: 9/14/64 Blank analysis date: 9/15/61 Y N N/A

Associated Samples: Conc. units:_

colle, aims,			איטטענע	Associated Samples.					
Compound	Blank ID				S	Sample Identification	·		
	9 5854.NB	•	2						
AAA	0,35	0.30/y	10,40/y						
XX	0,89		h/01						
	:								
Blank extraction date:	Blank analysis date:	sis date:							
Conc. units:			Associal	Associated Samples:					
Compound	Blank ID				S	Sample Identification	uc		

SDG #: See Cone LDC #: 21991 D2a

VALIDATION FINDINGS WORKSHEET

Field Blanks

Page: 1 of Reviewer: 376 2nd Reviewer:_

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

√ N/A

Were target compounds detected in the field blanks?

Blank units: 49/L Associated sample units: 40/L Associated sample units:

中四 Sampling date: 4 1/0 1/69
Field blank type: (circle one) Field Blank / Rinsate / Other.

Associated Samples:

11 Soils

Compound Blank ID Blank ID Sample Identification	rield blaink type: (clicle olic) i icid blaink i mado i clicle	יו וכות הומו ו	C I MI ISORC I			isosolaroa cambisos.	2			
EEE 0,98 0.89 (A11 AAA 0.30 0.42 XX 1.0	Compound	Blank ID	Blank 10		į	S	ample Ider	ntificatio	Ē	
EEE 0,98 0.89 (A11 AAA 0.30 0.42 XX 1.0			٨							
AAA 0,30 XX	373	0,18	0.89	[\ \]	rsults	either.	Vρ	2	> EB	
XX		0,30		ر		:				
CROL				l						
CROL										
CROL										
CROL										
	CROL									

Blank units: 49 1/2, Associated sample units: 45 /5

Sampling date: 7 /24 /69
Field blank type: (circle one)(Field Blank / Rinsate / Other:

И

Associated Samples:

A11 SOILS

Compound	Blank ID	Sample Identification
	FB072909-50	06-50
44A 0.11	0.11	(All results either ND or > FB)
CROL		

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7	S
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4	2

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Page: \of_ Reviewer:_ 2nd Reviewer:_

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

Pease 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 XN N/A

MS/MSD. Soil / Water.

X N N/A

Was a MS/MSD analyzed every 20 samples of each matrix?

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

							, , , , , , , , , , , , , , , , , , , ,		
) #	Date	CI CSM/SM	Company	MS %D (1 imite)	IS imite)	MSD (*)	COO CONTRACTOR	S projection A	
		21/22	214	╙	ĺ			Associated samples	:11
		Ŋ.	777	53	(05/-05)	(()	9	No stral (MSD to)
					(()			
					(()	()		
)	(())		
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					,	,			
)	(()	()		
				J	,	()	()		
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)	(()			
)	î	()	()		
					(()	()		
)	^	()	()		
					·	()	()		
)) (()	(

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
Κ̈	Phenoi	26-90%	≥ 35%	12-110%	<u>< 42%</u>	99	Acenaphthene	31-137%	<u>< 19%</u>	46-118%	≥ 31%
ن	C. 2-Chlorophenol	25-102%	< 50%	27-123%	< 40%	=	4-Nitrophenol	11-114%	< 50%	10-80%	< 50%
ш	1,4-Dichlorobenzene	28-104%	< 27%	36-97%	< 28%	χ Έ	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%	< 50%
œ	1,2,4-Trichlorobenzene	38-107%	< 23%	39-98%	< 28%	ZZ.	Pyrene	35-142%	%9E >	26-127%	< 31%
>	4-Chloro-3-methylphenol	26-103%	< 33%	23-97%	< 42%						

LDC #: 21991 D26 SDG#:

VALIDATION FINDINGS WORKSHEET **Laboratory Control Samples (LCS)**

Page: __lof__)

2nd Reviewer: Reviewer:

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

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

| V A N/A | N/A | Was a LCS required? | Y N N/A | Were the LCS/LCSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

Date LCSLCSD Compound WR (Limits) WR (Limits)		<u>2.</u>	· 74	_	1		<u>. </u> [Т	<u> </u>	-	7	· -	_	_	7							-	_				
Date LCSLICSD Compound WR (Limits) SAR (Limits) SASOCIAGED	Qualifications	qual	143 P (R				No grad	_	C MS/MSD in															-		
Date LCSLCSD Compound WR (Limits) WR (Limits)	Associated Samples			*			svils	`	_																	
Date	RPD (Limits)		£8 ())	(+) 14	()	()	()	()		(()	()	(()	()	(()	()		()	()	()	()	()	()	()
Date LCS/LCSD ID Compound %RQ 18 18 18 18 18 18 18 1	LCSD %R (Limits)	())	43 (1)	()	()	()	()	~	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()
158 54 - LCS DD 158 54 - LCS DD 158 54 - LCS Δ	LCS %R (Limits)	()			()	()		128 ()	16 ())	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()
Date	Compound	334	RRR	TTT			tef.	××	RRR																	
 	TCS/TCSD ID	9 527-15856					g 521-12 82p																			
	# Date																									

LDC#: 21991D2a SDG#:See cover

Y/N NA

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:	_of
Reviewer:	27/6
2nd Reviewer:	N

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

YN 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	8	10	(≤50%)	DIII	Dill Cillins	(Parent Only)
Benzo(a)anthracene	21	16		5	<8.5	_
Benzo(a)pyrene	16	13		3	≤8.5	
Benzo(b)fluoranthene	22	17		5	≤8.5	-
Benzo(g,h,i)perylene	11	8.6		2.4	≤8.5	~
Benzo(k)fluoranthene	19	16		3	≤8.5	,
Chrysene	24	19		5	≤8.5	-
Dibenz(a,h)anthracene	3.0	2.9		0.1	≤8.5	`
Fiuoranthene	28	24		4	≤8.5	_
Hexao hiro benzene	3.0	2.9		0.1	≤8.5	_
Indeno(1,2,3-cd)/pyrene	11	8.6		2.4	≤8.5	_
Phenanthrene	6.8	5.7		1.1	<8.5	_
Pyrene	22	20		2	≤8.5	-

V:\FIELD DUPLICATES\21991D2a.wpd

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date: September 9, 2009

LDC Report Date: November 19, 2009

Matrix: Soil

Parameters: Semivolatiles

Validation Level: Stage 4

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905138

Sample Identification

SA187-10B RSAQ5-41BMS SA187-25B RSAQ5-41BMSD

SA187-39B

SA45-10B

SA45-25B

SA45-36B

SA186-10B

SA186-25B

SA186-37B

SA188-10B

SA188-25B

0/(100-200

SA188-37B

RSAQ5-0.5B

RSAQ5-10B

RSAQ5-25B

RSAQ5-41B

SA31-20B

SA31-32B

SA31-0.5B

SA31-10B

Introduction

This data review covers 22 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) as there are no current guidelines for the method stated above.

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

The following are definitions of the data qualifiers:

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

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990.

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were greater than or equal to 0.05 as required.

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).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
9/22/09	Fluoranthene	29.2	SA188-37B SA31-10B 95859-MB	J+ (all detects)	A

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 RRF values were greater than or equal to 0.05.

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
95732-MB	9/11/09	Di-n-butylphthalate	41 ug/Kg	SA187-10B SA187-25B SA187-39B SA45-10B SA45-25B SA45-36B SA186-10B SA186-25B SA186-37B SA188-10B SA188-25B SA188-37B RSAQ5-0.5B RSAQ5-10B RSAQ5-10B RSAQ5-25B RSAQ5-10B RSAG5-25B RSAG5-10B RSAG5-25B RSAG5-10B RSAG5-25B RSAG5-25B RSAG5-25B RSAG5-25B RSAG5-25B RSAG5-25B RSAG5-25B RSAG5-25B RSAG5-25B RSAG5-25B RSAG5-25B

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
SA187-10B	Di-n-butylphthalate	82 ug/Kg	82U ug/Kg
SA187-25B	Di-n-butylphthalate	45 ug/Kg	45U ug/Kg
SA187-39B	Di-n-butylphthalate	130 ug/Kg	130U ug/Kg

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
SA45-10B	Di-n-butylphthalate	62 ug/Kg	62U ug/Kg
SA45-25B	Di-n-butylphthalate	80 ug/Kg	80U ug/Kg
SA45-36B	Di-n-butylphthalate	67 ug/Kg	67U ug/Kg
SA186-37B	Di-n-butylphthalate	74 ug/Kg	74U ug/Kg
SA188-10B	Di-n-butylphthalate	52 ug/Kg	52U ug/Kg
SA188-37B	Di-n-butylphthalate	69 ug/Kg	69U ug/Kg
RSAQ5-10B	Di-n-butylphthalate	47 ug/Kg	47U ug/Kg
SA31-20B	Di-n-butylphthalate	47 ug/Kg	47U ug/Kg
SA31-32B	Di-n-butylphthalate	77 ug/Kg	77U ug/Kg
SA31-0.5B	Di-n-butylphthalate	83 ug/Kg	83U ug/Kg

Sample FB072909-SO (from SDG R0904226) was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Field Blank ID Date Compound		Concentration	Associated Samples
FB072909-SO	7/29/09	Butylbenzylphthalate	0.11 ug/L	All samples in SDG R0905138

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
95859LCS/D (SA31-10B 95859-MB)	Pyridine	16 (50-120)	5 (50-120)	106 (≤30)	J (all detects) R (all non-detects)	Р

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

All target compound identifications were within validation criteria.

XII. Project Quantitation Limit

All project quantitation limits were within validation criteria

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0905138	All compounds reported below the PQL.	J (all detects)	Α

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable.

XV. Overall Assessment

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

XVI. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0905138

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905138	SA188-37B SA31-10B	Fluoranthene	J+ (all detects)	A	Continuing calibration (%D) (c)
R0905138	SA31-10B	Pyridine	J (all detects) R (all non-detects)	Р	Laboratory control samples (%R)(RPD) (I,Id)
R0905138	SA187-10B SA187-25B SA187-39B SA45-10B SA45-25B SA45-36B SA186-10B SA186-25B SA186-37B SA188-10B SA188-25B SA188-37B RSAQ5-0.5B RSAQ5-0.5B RSAQ5-10B RSAQ5-25B RSAQ5-41B SA31-20B SA31-32B SA31-32B SA31-0.5B SA31-10B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0905138

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905138	SA187-10B	Di-n-butylphthalate	82U ug/Kg	А	bl
R0905138	SA187-25B	Di-n-butylphthalate	45U ug/Kg	А	bl
R0905138	SA187-39B	Di-n-butylphthalate	130U ug/Kg	Α	bl
R0905138	SA45-10B	Di-n-butylphthalate	62U ug/Kg	Α	bl
R0905138	SA45-25B	Di-n-butylphthalate	80U ug/Kg	Α	bl
R0905138	SA45-36B	Di-n-butylphthalate	67U ug/Kg	А	bl
R0905138	SA186-37B	Di-n-butylphthalate	74U ug/Kg	Α	bl

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905138	SA188-10B	Di-n-buty/phthalate	52U ug/Kg	А	bl
R0905138	SA188-37B	Di-n-butylphthalate	69U ug/Kg	А	bl
R0905138	RSAQ5-10B	Di-n-butylphthalate	47U ug/Kg	А	bl
R0905138	SA31-20B	Di-n-butylphthalate	47U ug/Kg	Α	bl
R0905138	SA31-32B	Di-n-butylphthalate	77U ug/Kg	А	bl
R0905138	SA31-0.5B	Di-n-butylphthalate	83U ug/Kg	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0905138

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

LDC #:	21991E2a	VALIDATION COMPLETENESS	WORKSHEET
SDG #:	R0905138	Stage 4	
Laborator	y: <u>Columbia <i>A</i></u>	nalytical Services	

Reviewer: 316 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 /6 9 /6 9
11.	GC/MS Instrument performance check	A	
III.	Initial calibration	Ä	2 KLD 12
IV.	Continuing calibration/ICV	SW	cala Ezcz
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	LCS/D
IX.	Regional Quality Assurance and Quality Control	N	
Χ.	Internal standards	A	
XI.	Target compound identification	*	
XII.	Compound quantitation/CRQLs	A	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	A	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	SW	FB = FB 0729 09-50 (from R09 04226)

A = Acceptable Note:

N = Not provided/applicable SW = See worksheet

ND = No compounds detected

R = Rinsate FB = Field blank D = Duplicate

TB = Trip blank EB = Equipment blank

Validated Samples:

		Soil					
1	SA187-10B	11	SA188-25B	21	RSAQ5-41BMS	+ 31	95732 -MB
2	SA187-25B	12	SA188-37B	22	RSAQ5-41BMSD	32 🗡	95859 - MB
3	SA187-39B	13	RSAQ5-0.5B	23		33	
4	SA45-10B	14	RSAQ5-10B	24		34	***
5	SA45-25B	15	RSAQ5-25B	25		35	W-1
6	SA45-36B	16	RSAQ5-41B	26		36	
7	SA186-10B	17	SA31-20B	27		37	
8	SA186-25B	18	SA31-32B	28		38	
9	SA186-37B	19	SA31-0.5B	29		39	
10	SA188-10B	20	SA31-10B	30_		40	

VALIDATION FINDINGS CHECKLIST

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

Method: Semivolatiles (EPA SW 846 Method 8270C)

Method: Semivolatiles (EPA SW 846 Method 8270C)	T i			
Validation Area	Yes	No	NA	Findings/Comments
encine streets tuned			Secretary of	
All technical holding times were met.				
Cooler temperature criteria was met.				
Were the DFTPP performance results reviewed and found to be within the specified criteria?				
Were all samples analyzed within the 12 hour clock criteria?				and the second s
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?				
			60.44	国际企业 等的企业
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?		/		
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?				
		3.4 <u>.</u>		
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	/			
Was a MS/MSD analyzed every 20 samples of each matrix?			ļ	
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?		/		
Was an LCS analyzed for this SDG?	/			

VALIDATION FINDINGS CHECKLIST

Page: 2 of 2
Reviewer: 1/4
2nd Reviewer: 1/4

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?				
	A min Sag			
Were performance evaluation (PE) samples performed?				
Were the performance evaluation (PE) samples within the acceptance limits?			,	
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?				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?				
Did compound spectra meet specified EPA "Functional Guidelines" criteria?			ļ	
Were chromatogram peaks verified and accounted for?		_	V 72 (75)	
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?				
Still Tenather Doubled Compounds (1925)) / (C.2)			A Committee of the Comm
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.	/			
Field duplicate pairs were identified in this SDG.				en de en
Target compounds were detected in the field duplicates.				
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-butyiphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methyiphenol**	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	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	тт.
M. Isophorone	BB. 2-Nitroanlline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	ብበበ
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	WV.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	WWW.

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

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Reviewer:

Page:

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

24991 B24 くろなり

LDC#:

Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis 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?

N N/A X)N N/A

Qualifications	J+ 16t5 /A (c)														
Associated Samples	12, 20 95859- MB														
Finding RRF (Limit: >0.05)															
Finding %D (Limit: <25.0%)	29.2														
Compound	(t) \														
Standard ID	811VA														
Date	9	1													

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199	र्भ
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VALIDATION FINDINGS WORKSHEET Blanks

Page: 2nd Reviewer:

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

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

Was a method blank analyzed for each matrix?

Was a method blank analyzed for each concentration preparation level?

Y N N/A

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

Y/N N/A Was a method blank associated with every sample?	lank associate	ed with ever	y sample?						(
$\frac{\sqrt{N N/A}}{8}$ Was the blank contaminated? If yes, please see qualification below. Blank extraction date: $\frac{\sqrt{N/6}}{8}$ Blank analysis date: $\frac{\sqrt{N/6}}{8}$	ontaminated? Blank analy	If yes, pleas sis date: 9	se see qualific	ation below.	•				(77)	\bigcirc	
Conc. units: 44 /rk			Associa	Associated Samples:	<u> </u>	61-			,		
O Compound	Blank ID					Sample Identification	ation				
	95732-MB	1	8	٧	4	र	9	6	0)	9	
XX	4)	h/ 28	45/4	n/ 061	4/29	n/ 08	11/49	74 /4	4/25	69/4	
Blank extraction date:	Blank analysis date:	sis date:	Same	to rear	بو	,					-

Associated Samples: (D)	Campa
	Riank ID
Conc. units:	palloamo

Blank analysis date:

Blank extraction date: •

			·	 	,	
ion						
Sample Identification						
Š	19	N/E8				
	18	77/4	,			
	17	47 /4				
	4 4	47/u				
Blank ID	45732-MB	41	-			
Compound		XX				

5x Phthalates 2x all others

45	}
21991	かれ
LDC #:	SDG #:

VALIDATION FINDINGS WORKSHEET

Page: 1 of

Reviewer: 2nd Reviewer:

Field Blanks

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

Y/N N/A

Which is the standard compounds detected in the field blanks?

Sampling date: 7/20 / 4

Sampling date: 7/20 / 4

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

40 Sample Identification 5 Associated Samples: Š either 24/202 14 FB072909-50 Blank ID 0 AAA Compound CROL

Associated sample units: Blank units:

Sampling date:

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

Compound Blank ID Sample Identification	Field blank type: (circle one) Field Blank / Rinsate / Other:	e) Field Blank	ι / Rinsate / Other:	Associated	Associated Samples:		
	Compound	Blank ID			Sample Identification		
							The state of the s

21991 E26 3DG #:

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Page: \of_ 2nd Reviewer: Reviewer:_

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

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

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 YN N/A

MS/MSD. Soil / Water.

ξ.		MS/MSD. Soil / Water.		on door to solution	Cylind			
N N	Z Z Z	Was a MS/MSD analyzed every 20 samples of each matrix. Were the MS/MSD percent recoveries (%R) and the relative	zed every zu rcent recover	ries (%R) and the rela	was a MS/MSD analyzed every ZO samples of each man's? Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?	es (RPD) within the QC) limits?	
				MS	MSD			900 000
#	Date	MS/MSD ID	Compound	%R (Limits)	%R (Limits)	RPD (Limits)	Associated Samples	Cuamincanons
		22/ K	444	()	157 (50-150)		٥	No grad (MSm)
				()	()	()		2
					()			
				-	()	()		
)		()		
<u></u>				()	()	()		
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				())	()		
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)	()	()		
)	(()		
				()				

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
خ	A. Phenol	26-90%	< 35%	12-110%	< 42%	99 .	Acenaphthene	31-137%	×61 ≥	46-118%	≥ 31%
٥	C 2-Chlorophenol	25-102%	< 50%	27-123%	< 40%	=	4-Nitrophenol	11-114%	< 50%	10-80%	< 50%
j u	1 4-Dichlorobenzene	28-104%	< 27%	36-97%	< 28%	<u>秦</u>	KK. 2,4-Dinitrotoluene	28-89%	< 47%	24-96%	< 38%
j -	N-Nitroso-di-n-propylamine	41-126%	< 38%	41-116%	< 38%	Ή.	Pentachlorophenol	17-109%	< 47%	9-103%	< 50%
3 02		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 # 2 | 991 E24 SDG #:

VALIDATION FINDINGS WORKSHEET **Laboratory Control Samples (LCS)**

Page: _

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

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

N N/A

Was a LCS required?

Y N N/A**

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

	7			_												7		_			_				
Qualifications	No grace (Msin					No guel (Lesp	^	J/R/P (1,1																	
Associated Samples	GW-256 61-1					20, 95359-MB			•																
RPD (Limits)	()	()	(()	()	()	()	(08) 901	,	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()
LCSD %R (Limits)	(2) (50-120)	()	()	()	()	()	()	(20-120)	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()
LCS %R (Limits)	123 (50-120)	()	()	()	()	147 (50-150)	() 8 2 1	(1) 1	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()
Compound	莊					723	ХX	RRR																	
TCS/TCSD ID	95732-465/D					95859-1CC 1D																			
Date																									
#																									

SDG #: See Coper

VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

Reviewer: 106.

Page: 1 of 1

METHOD: GC/MS BNA (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_a)(A_a)(C_x)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

 $A_{u} = A$ $C_{x} = A$ $C_{x} = Concentration of compound, <math>C_{u} = C$ $C_{x} = Concentration of the RRFs, <math>C_{x} = Ms$

A_b = Area of associated internal standard
C_b = Concentration of internal standard
X = Mean of the RRFs

Receiminted 12.49 %RSD 4.63 200 やのか シフィ 4.78 3.14 7.48 3.54 12.48 3.74 Reported 4.63 69.9 2,09 3.19 4.78 4.03 7.49 6,05 Average RRF 3)9 787. 1. 10S 266-1 . 278 1.217 (initial) 412. 80 80 80 1.670 220-580. 1,626 Average RRF 1-278 7101 1.075 401.1 - V 1.084 235 020. 1.839 Reported 1214 (initial) 1.626 Recalculated 1227 1.133 Std) 620. 1.197 1.219 1.196 705 1.567 1.091 ノペー 1.095 1254 (1,0 std) 1337 Reported 1, 133 1.015 1.196 1.219 125. 1-204 1.705 1.053 1001 1.197 1.058 Compound (Reference Internal Standard) Bie(2 eth/thexyd)phthalate (5th internal standard) Bis(2-ethylhexyl)phthalate (5th internal standard) Bis(2-ethylhexyl)phthalate (5th internal standard) Pentachibrophenol (4th internal standard) Pentachidrephenol (4th internal standard) Pentachlorophenol (4th internal standard) Benzo(a)pyrene (6th internal standard) Benzo(a)nyrene (6th internal standard) Naphthalene (2nd internal standard) Naphthalene (2nd internal standard) Naphthalene (2nd internal standard) Fluorene (3rd internal standard) Fluorene (3rd internal standard) Fluorene (3rd internal standard) R.R.K. Phenot-(1st internal standard) Phenol (St internal standard) Phenol (1st internal standard) Calibration 9/0/69 9/8/69 Date Standard ID 1821 18 #

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 1.123 0.893 (.427 1.126 1.691 9/18 1CALE 1.239 1.939 1.052 1.833 1.23/1.126 1.087 1.997 1.105 1.594 1.179 0,955 161-1 1.45 4/6 1CAL 5.0 1.142 1.267 1.089 1-226 .403 . 587 1.22.18 1337 03: T LT OZZ OZZ OZZ OZZ ZZZ results

SDG#: See Cover

VALIDATION FINDINGS WORKSHEET Continuing Calibration Results Verification

Page: 1 of 1 Reviewer: 36 2nd Reviewer:

METHOD: GC/MS BNA (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 = $100 * (ave. RRF - RRF)/ave. RRF RRF = (A,)(C_*)/(A_*)(C_x)$

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

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

A_b = Area of associated internal standard C_b = Concentration of internal standard

L					Reported	Recalculated	Reported	Recalculated
*	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	RRF (CC)	RRF (CC)	Q%	ď%
L	AVOGS	9/16/69	Phenot (1st internal standard)	1.626	1.944	1.949	19.6	19.6
		,	Naphthalene (2nd internal standard)	1.034	211'1	1.115	2,9	2, 9
			Fluorene (3rd internal standard)	1.214	151 1	1.154	4.9	4.9
			Pantachlorophonel (4th internal standard)	1, 295	1. 243	1.243	2'0	9,0
			Bis(2-ethythexy)phthelate (5th internal standard)	ر 10 · ا	201-1	1.107	5'9	5'0
			Renzo(a)pyrene (6th internal standard)	1.278	11.098	1.298	9'1	7.1
7	AV 136	9/2/64	Prenof (1st internal standard)	1.839	1.747	1.747	۵٬۵	5.0
		, ,	Naphthalene (2nd internal standard)	1.075	160-1	1.097	۵۰۲	2.0
			Fluorene (3rd internal standard)	1.070	780.1	1.084	.3	5,1
			Rentachidrophenol (4th internal standard)	1.217	1.227	1.237	6, 8	6.8
			Bis(2-ethythetyd)phthalete (5th internal standard)	1.105	991.1	1, 100	ه ک	2-0
			Renzo(s)pyrene (6th internal standard)	1.319	1.334	1.324		(•)
ო	AN 168	69/25/6	RAPA Phenol (1st internal standard)		658 -	1.820	0 -1	1.0
			Naphthalene (2nd internal standard)		911 1	1.116	3′€	3.8
			Fluorene (3rd internal standard)		1,024	1.024	4,3	4.3
			Pentachistrophenol (4th internal standard)		1. 232	1,233	1.3	1.3
			Bie(2-ethylinexyl)phthatate (5th internal standard)		1. 116	1.116	1.0	9.7
			Benzo(a)pyrene (6th internal standard)		1.326	1.324	5.0	5'9

Comments: Refer to Continuing Calibration findings worksheet for list of qualifications and associated samples when reported results do not agree within 10.0% of the recalculated results. LDC #: 21991 = 29 SDG #: Sre Cover

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:_	lof t
Reviewer:	JV
2nd reviewer:	ш/

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	2.00	1.88	94	94	٥
2-Fluorobiphenyl		1.05	83	83	1
Terphenyl-d14		1.99	100	17)	F
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chiorophenol-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-Chiorophenol-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					

LDC #: 21911 15 X SDG #: Sa Cary

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates Results Verification

Page: Lof L Reviewer: WL 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 Whe

Where: SSC ≈ Spiked sample concentration SA ≈ Spike added

SC = Sample concentation

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

MS = Matrix spike percent recovery

MSD = Matrix spike duplicate percent recovery

MS/MSD samples:

samples: 24/27

	JS SE	oike.	Sample	Spiked S	ample	Matrix Spike	Spike	Matrix Spike Duplicate	• Duplicate	MS//WSD	SD
Compound	۸۵ (م)	Added (US/L)	Concentration $(+c, -k)$	Concentration	tration	Percent Recovery	всочегу	Percent Recovery	ecovery	RPD	
	MS	O MSD		MS	/ MSD	Renorted	Recalc	Reported	Recalc	Renorted	Recalculated
Phenol											
N-Nitroso-di-n-propylamine											
4-Chloro-3-methylphenol											
Acenaphthene	145	145	0	142	144	20	98	<u>م</u>	/ Q)	N	٩
Pentachlorophenol											
Pyrene	145	145	0	173	177	=	1.9	122	7.5	7	\ \

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

LDC #: 41791 626 SDG #: See Cover

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

Reviewer: 106 2nd Reviewer: ________

Page: lof 1

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

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

% Recovery = 100 * (SC/SA

SSC = Spike concentration SA = Spike added Where:

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

9 58 59 - 100 LCS/LCSD samples:

	Š	ike	gS 	ike		CS	10	csn	I/SD I	CS/LCSD
Compound	Ad (אל)	Added (US /ES,)	Concentration (Ac /L-1)	ntration	Percent Recovery	Recovery	Percent F	Percent Recovery	RPD	Q
	SOT	0 1 CSD	SOI	O LCSD	Reported	Recaic	Reported	Recalc	Reported	Receiculated
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol								,		
Acenaphthene	133	133	کدر	135	94	94	ا با	19)	9	9
Pentachlorophenol										
Pyrene	461	3	(2)	158	ا کر ا	711	611	611	þ	K
							,			,

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#:_	21	991	E	29
SDG #	Coe	Can-	./	

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:	tott_
Reviewer:	116
2nd reviewer:	N

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

Y	N	N/A
X	M	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 =	$(A_{r})(I_{r})(V_{r})(DF)(2.0)$
(A	_)(RRF)(V_)(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)

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

Volume of extract injected in microliters (ul)

Volume of the concentrated extract in microliters (ul)

Dilution Factor. Df =

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

Example:

Sample I.D. # / , XX

Conc. = (1845056)(1.0)(1.0)(1.0)(1.0)(1.0) (453283)(1.782)(307)(0.932)(0.932)

= 81.69 2 82 ug/kg

2.0	= Factor of 2 to account	t for GPC cleanup			
#	Sample ID	Compound	Reported Concentration ()	Calculated Concentration ()	Qualification
		4.14			
					!
					1

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date: September 10 through September 16, 2009

LDC Report Date: November 19, 2009

Matrix: Soil

Parameters: Semivolatiles

Validation Level: Stage 4

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905192

Sample Identification

SA102-10BSPLP2

SA102-10BSPLP3

SA102-30BSPLP2

SA102-30BSPLP3

SA30-9BSPLP2

SA30-9BSPLP3

SA128-10BSPLP2

SA128-10BSPLP3

SA128-29BSPLP2

SA128-29BSPLP3

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) as there are no current guidelines for the method stated above.

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

Blank results are summarized in Section V.

Field duplicates are summarized in Section XVI.

The following are definitions of the data qualifiers:

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

I. Technical Holding Times

All technical holding time requirements were met.

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

II. GC/MS Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration

Initial calibration was performed using required standard concentrations.

Percent relative standard deviations (%RSD) were less than or equal to 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990.

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were greater than or equal to 0.05 as required.

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).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

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 RRF values were greater than or equal to 0.05.

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
96999-BLK	9/28/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Di-n-butylphthalate Diethylphthalate	0.30 ug/L 0.48 ug/L 3.6 ug/L 0.27 ug/L	SA128-10BSPLP3 SA128-29BSPLP3
SPLP3-BLK1	9/17/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate	0.27 ug/L 0.14 ug/L	SA102-10BSPLP3 SA102-30BSPLP3 SA30-9BSPLP3
SPLP2-BLK2	9/28/09	Butylbenzylphthalate	0.22 ug/L	SA128-10BSPLP2 SA128-29BSPLP2
SPLP3-BLK2	9/24/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Di-n-butylphthalate	0.36 ug/L 0.42 ug/L 3.9 ug/L	SA128-10BSPLP3 SA128-29BSPLP3

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

Sample	Compound	Reported	Modified Final
	TIC (RT in minutes)	Concentration	Concentration
SA128-10BSPLP3	Butylbenzylphthalate	0.37 ug/L	0.37U ug/L
	Di-n-butylphthalate	2.6 ug/L	2.6U ug/L
	Diethylphthalate	0.25 ug/L	0.25U ug/L
SA128-29BSPLP3	Bis(2-ethylhexyl)phthalate	0.42 ug/L	0.42U ug/L
	Butylbenzylphthalate	0.60 ug/L	0.60U ug/L
	Di-n-butylphthalate	4.0 ug/L	4.0U ug/L
	Diethylphthalate	0.35 ug/L	0.35U ug/L
SA30-9BSPLP3	Butylbenzylphthalate	0.16 ug/L	0.16U ug/L
SA128-29BSPLP2	Butylbenzylphthalate	0.14 ug/L	0.14U ug/L

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 with the following exceptions:

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
96519-LCS/D (SA102-10BSPLP3 SA102-30BSPLP3 SA30-9BSPLP3 96519-MB SPLP3-BLK1)	Pyridine 1,4-Dioxane	34 (50-120) 45 (50-120)	30 (50-120) 49 (50-120)	-	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	Р
96618-LCS/D (SA102-10BSPLP2 SA102-30BSPLP2 SA30-9BSPLP2 96618-MB SPLP2-BLK1)	Pyridine	31 (50-120)	24 (50-120)	-	J- (all detects) UJ (all non-detects)	Р
96999-LCS/D (SA128-10BSPLP3 SA128-29BSPLP3 96999-MB SPLP3-BLK2)	Di-n-butylphthalate	137 (50-120)	129 (50-120)	-	J+ (all detects)	P
96999-LCS/D (SA128-10BSPLP3 SA128-29BSPLP3 96999-MB SPLP3-BLK2)	Pyridine 1,4-Dioxane	38 (50-120) 48 (50-120)	38 (50-120) 47 (50-120)	-	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	Р
97226-LCS/D (SA128-10BSPLP2 SA128-29BSPLP2 97226-MB SPLP2-BLK2)	Pyridine	24 (50-120)	41 (50-120)	53 (≤30)	J (all detects) UJ (all non-detects)	Р
97226-LCS/D (SA128-10BSPLP2 SA128-29BSPLP2 97226-MB SPLP2-BLK2)	1,4-Dioxane	45 (50-120)	45 (50-120)	-	J- (all detects) UJ (all non-detects)	Р

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

All target compound identifications were within validation criteria.

XII. Project Quantitation Limit

All project quantitation limits were within validation criteria

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0905192	All compounds reported below the PQL.	J (all detects)	Α

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable.

XV. Overall Assessment

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

XVI. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0905192

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905192	SA102-10BSPLP3 SA102-30BSPLP3 SA30-9BSPLP3 SA128-10BSPLP3 SA128-29BSPLP3	Pyridine 1,4-Dioxane	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0905192	SA102-10BSPLP2 SA102-30BSPLP2 SA30-9BSPLP2	Pyridine	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0905192	SA128-10BSPLP3 SA128-29BSPLP3	Di-n-butylphthalate	J+ (all detects)	Р	Laboratory control samples (%R) (I)
R0905192	SA128-10BSPLP2 SA128-29BSPLP2	Pyridine	J (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R)(RPD) (I,Id)
R0905192	SA128-10BSPLP2 SA128-29BSPLP2	1,4-Dioxane	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0905192	SA102-10BSPLP2 SA102-10BSPLP3 SA102-30BSPLP2 SA102-30BSPLP3 SA30-9BSPLP2 SA30-9BSPLP3 SA128-10BSPLP2 SA128-10BSPLP3 SA128-29BSPLP3 SA128-29BSPLP3	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0905192

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905192	SA128-10BSPLP3	Butylbenzylphthalate Di-n-butylphthalate Diethylphthalate	0.37U ug/L 2.6U ug/L 0.25U ug/L	A	bl
R0905192	SA128-29BSPLP3	Bis(2-ethylhexyl) phthalate Butylbenzylphthalate Di-n-butylphthalate Diethylphthalate	0.42U ug/L 0.60U ug/L 4.0U ug/L 0.35U ug/L	A	bl
R0905192	SA30-9BSPLP3	Butylbenzylphthalate	0.16U ug/L	А	bl

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905192	\$A128-29BSPLP2	Butyibenzylphthalate	0.14U ug/L	Α	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0905192

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

LDC #:	21991F2a	VALIDATION	COMPLETENESS WORKSHEE	T
SDG #:	R0905192		Stage 4	
Laborator	y: <u>Columbia A</u>	nalytical Services		

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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	A	Sampling dates: 9/10 - 16/69
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	7. RED IT
IV.	Continuing calibration/ICV	A	7. RID 17 CON/101 € 25 }
V.	Blanks	ŚW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	Client Spec
VIII.	Laboratory control samples	SW	Client Spec Les 10
IX.	Regional Quality Assurance and Quality Control	N	
_ X.	Internal standards	A	
XI.	Target compound identification	A	
XII.	Compound quantitation/CRQLs	A	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	*	
XV.	Overall assessment of data	A	
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:

Soil

	<u> </u>	611			
1 1	SA102-10BSPLP2	11)	96618-MB	21	31
2 7	SA102-10BSPLP3	12 >	96519-MB	22	32
3	SA102-30BSPLP2	13 3	97226 - MB	23	33
- ×	SA102-30BSPLP3	14 4	96999 - MB	24	34
+ 1	SA30-9BSPLP2	15 1	SPLP2-BIKI	25	35
+ 2 6	SA30-9BSPLP3	+ ₁₆ >	SPIP3-BK1	26	36
7 3	SA128-10BSPLP2	17 3	SPLPZ-BIKZ	27	37
+ 4	SA128-10BSPLP3	18 4	SPLP3- BIKY	28	38
g 3	SA128-29BSPLP2	19		29	39
10 4	SA128-29BSPLP3	20		30	40

VALIDATION FINDINGS CHECKLIST

Page: 1 of 2 Reviewer: 3/6 2nd Reviewer: 1/5

Method: Semivolatiles (EPA SW 846 Method 8270C)

Method: Semivolatiles (EPA SVV 646 Method 6270C)	Yes	No	NA	Findings/Comments
Validation Area	165	NO	NA	1 manga comments
All Associated halding times were met				
All technical holding times were met.				
Cooler temperature criteria was met.	J. 143			
Were the DFTPP performance results reviewed and found to be within the specified				
criteria?				
Were all samples analyzed within the 12 hour clock criteria?		·	nani i ka	
				A CONTRACTOR OF THE SAME AND A CONTRACTOR OF
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?	/			
Karing III ke 2 (1884) berakan kembahan salam di kalum da kan	an and	la di sala		
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?				
				ELECTION SHOWS IN
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.				
	+ 12			and the second s
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?			/	
			X.1	
Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.	K	}		
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?				
Was an LCS analyzed for this SDG?				

_DC #: 21991 F29 SDG #: Sce Cover

VALIDATION FINDINGS CHECKLIST

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

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?				
Were performance evaluation (PE) samples performed?		/		
Were the performance evaluation (PE) samples within the acceptance limits?				
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 a high of several constraints
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?		/		
				10000000000000000000000000000000000000
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?				
XIIISTarrabery sequiled compared (150°c)				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?			/	
Were relative intensities of the major ions within <u>+</u> 20% between the sample and the reference spectra?				
Did the raw data indicate that the laboratory performed a library search for all required peaks in the chromatograms (samples and blanks)?		_		
System performance was found to be acceptable.				
			and a final section of the section o	
Overall assessment of data was found to be acceptable.	/		İ	
Field duplicate pairs were identified in this SDG.		/		
Target compounds were detected in the field duplicates.				
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-butyiphthalate	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. Butylbenzyiphthalate	PPP. Benzoic Acid
1. 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-Trichlorophenoi**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	111.
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	ບບບ
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 #:	SDG #:

VALIDATION FINDINGS WORKSHEET

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

Rease 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? Y N N/A

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

Associated Samples: N N/A Was the blank contaminated? If yes, please see qualification below. Slank extraction date: 9/26/64 Blank analysis date: 9/26/64 Conc. units: 25/4

Q **∞** 1

	1		3.0000	recognized Campion.					
Compound	Blank ID		(Ø	Sample Identification	tion		
	96 999. BU	8	1 de (0)						
EFE	0.30		0, 42/y						
AAA	0.48	0.37 /U							
XX	3.6	2.6/4	4.0/4						
17	75.0	10.25/4	N/ 26.0						
		,							
Blank extraction date: 9/17/64 Blank analysis date: 9/29/69	Blank analy	/sis date: 4	129,69		!			(07)	
Conc. units: 14 /L			Associat	Associated Samples:		2, 4, 6		(7 0)	
Compound	Blank ID				1	Sample Identification	tion		
	SPLP3-BIK1	141 6							
233	0.27								
A MA	0.14	0.16/4							
	-								

5x Phthalates 2x all others

LDC# 2991 F29

VALIDATION FINDINGS WORKSHEET

Page: Y of Y

2nd Reviewer: Reviewer:_

Blanks

Please 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)

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

Was a method blank associated with every sample?

(79) Sample Identification Associated Samples: <u>0</u>.4 SPLP2-8/47 Blank ID 0, 22 Compound Conc. units:

	Associated Samples: $\begin{pmatrix} b \\ l \end{pmatrix}$		Sample Identification		
120/69	Associat			01	,
date: 9				8	
llysis		L		BLKZ	i
Blank ans			Blank ID	SPLP3-842	,,
LP Blank extraction date: $9/24/64$ Blank analysis date:	Conc. units: 42 1		Compound		171

LP Blank extraction date: 9/24/64 Blank analysis date: 9/30/69

ation						
Sample Identification						
S						
						••
	01	n/24.0	W 09.0	4.0/4		
	8 zn		0.47 0.37/4 0.	2.6/4 4.		
Blank ID	SPLP3-842 8	0.3%	0.47	6,€		
Compound		EEF	AAA	XX		

5x Phthalates 2x all others

LDC # 21991 F29 SDG #: Lee Gray

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page:

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

•				rcs	CSD	:		
	Date	LCS/LCSD ID	Compound	%R (Limits)	%R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		91519-10519	RRR	21-05) 48	(20) 30 (50-120)	()	24 6 96519-MB.	(1) d/M/-5
			TTT	45 () 49 ()	()	SPLP3-BIKI	
)) ())	(
)	()	()		
		96618-1151	RKR	3) () 24 ()	()	1,3,5 96618-MB.	5-15/4 (L)
			777	J) 48 ()	()	Γ,	No grad (LICE
				J	()	()		-
		90999 - 456	λχ	137 (1 129 (()	8 10 916 99 - MB	J. C. W. W. C. J.
			RRR	38	1 38 ()	()	145	1-1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1
			##) 84) 47 ()	()		
) (()		
) ())	()		
		97226 - 45 h	RRR	24 () 4) ()	52 (30)	7,9,97226-118	5/NJ /P (1 2)
			+11	154	1 45 (()	SPLP2 - BIKZ	
))	()		
)	()	()		
				J)	()		
)) (()		
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					()	()		
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		_)		()		

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VALIDATION FINDINGS WORKSHEET Initial Calibration Calculation Verification

Reviewer: 101

METHOD: GC/MS BNA (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,)(C,)/(A,)(C,)
average RRF = sum of the RRFs/number of standards
%RSD = 100 * (S/X)

A_x = Area of compound,
C_x = Concentration of compound,
C_x = Concentration of the RRFs,
X = Mean

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

				Reported	Receimisted	Reported	Receiculated	Reported	Receiculated
*	Standard ID	Calibration Date	Compound (Reference Internal Standard)	RRF (16,0 std)	RRF (10.0 std)	Average RRF (initial)	Average RRF (initial)	%RSD	%RSD
-		1-70	KKK PhenoL(1st internal standard)	NR	1.389	1.325	1.325	9.25	9.24
	1541	4/35/64	Naphthalene (2nd internal standard)		6.943	1.041	1.049	5.63	5,02
		·	Fluorene (3rd internal standard)		1.192	1.192	1,192	11.04	11,04
			Pantachlorophenol (4th internal standard)		0.940	1.16]	1.161	8.15	8.15
			Bis(2-ethylhexyl)phthalate (5th internal standard)		0,640	0.840	0,840	4.03	9.05
			Renzo(a)wrene (6th internal etandard)	^	1.387	426.	1.274	10.74	10.74
2			Phenol (1st internal standard)		,				
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Pentachlorophenol (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						
3			Phenoi (1st internal standard)						
			Naphthalene (2nd internal standard)						
			Fluorene (3rd internal standard)						
			Pentachlorophenol (4th internal standard)						
			Bis(2-ethylhexyl)phthalate (5th internal standard)						
			Benzo(a)pyrene (6th internal standard)						

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 Q = 0.690 1.380/ 0.943 0.900 . 38 4 1.192 1.387 9.0 1.737/2= 0.869 1.355 1.127 1.427 810.1 1.725/2=0.863 1.369 861:1 1.333 £90' Bis(2-ch) phthe late Benzo (a) pyrne Phenomethrane Naphthalene Fhirmen Purdine INICLC.2S results.

LDC#: 24401 F 29 SDG#: See Cover

Continuing Calibration Results Verification VALIDATION FINDINGS WORKSHEET

Page: of 1 Reviewer: NC 2nd Reviewer:

METHOD: GC/MS BNA (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 $^{\circ}$ (ave. RRF - RRF)/ave. RRF RRF = $(A_{x})(C_{x})/(A_{x})(C_{x})$

ave. RRF = initial calibration average RRF RRF = continuing calibration RRF
A_x = Area of compound,
C_x = Concentration of compound, Where:

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

					Reported	Recalculated	Reported	Recalculated
*	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (initial)	RRF (CC)	RRF (CC)	G %	σ %
-	DB729	1 /2a /0a	본 본 R Phenoi (1st internal standard)	1. 225	1.410	1.470	6. ¢	p. 4
	-	,	Naphthalene (2nd internal standard)	1.049	1.008	1.008	5.9	3.9
			Fluorene (3rd internal standard)	1.192	1.362	₹%:1	14.3	14.3
			Pentachorophenol (4th internal standard)	1.16.1	90€.1	1. 20C	≥.9	3.9
			Bis(2-ethylhexyl)phthalate (5th internal standard)	0,840	6,893	6680	6.3	€'9
			Renzo(a)pyrene (6th internal standard)	1.274	1.334	1.334	4.7	4.7
7	25/80	9/30/08	RR R Phenol (1st internal standard)		1.370	1.370	3.4	3.4
		, , , ,	Naphthalene (2nd internal standard)		1.106	201.1	<i>5.4</i>	メン
			Fluorene (3rd internal standard)		1.38/	186.1	6.51	6'51
			Pentachlorophenol (4th internal standard)		1, 135	1.135	۷.۲	1,'C
			Bis(2-ethylhexyl)phthalate (5th internal standard)		0.898	868 0	6.9	6.9
			Renzo(a)pyrene (6th internal standard)		1.353	1.253	6.7	4.7
3	PB 799	10/07/01	10/02/64 Repended to internal standard)		1.410	1. 410	4.7	6.9
	-	/	Naphthalene (2nd internal standard)		1.070	1.070	2.0	2,0
			Fluorene (3rd internal standard)		1.357	1.357	8. € (13.8
			Rentachidrophenol (4th internal standard)		1.159	1.159	٥. ٢	۵.٦
			Bis(2-ethylhexyl)phthalate (5th internal standard)		€96.0	€ 95 0	14.6	7.41
			Benzo(a)pyrene (6th internal standard)	Α.	8821	88€1	-;	1. /

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

VALIDATION FINDINGS WORKSHEET Surrogate Results Verification

Page:	<u>tott_</u>
Reviewer:_	3VC_
2nd reviewer:	N/

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	2.00	1.76	8 8	88	0
2-Fluorobiphenyl		1.60	80	80	
Terphenyl-d14	1	2,04	10 7	102	
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
		1	1		

Sample ID:

2-Chlorophenol-d4

1,2-Dichlorobenzene-d4

	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					

Se Comment LDC # 21991 F2A

VALIDATION FINDINGS WORKSHEET

Reviewer: 5/2 Page: 1 of 1 2nd Reviewer: &

Laboratory Control Sample/Laboratory Control Sample Duplicates Results Verification

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

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

% Recovery = 100 * (SC/SA

Where: SSC = Spike concentration SA = Spike added

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

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

96618-LCS/LCSD samples:

427

	aS	ke	as	ike	JI	SO	01	CSD	I CS/I CSD	csn
Compound	Added (45/L	led (7)	Concer (MC	Concentration $(W_{\mathcal{S}}/\mathcal{L})$	Percent	Percent Recovery	Percent Recovery	Recovery	RPD	O,
	SOI	I CSD	SOI	1 CSD	Renorted	Recalc	Renorted	Recalc.	Reported	Recalculated
Phenol										
N-Nitroso-di-n-propylamine										
4-Chioro-3-methylphenol										
Acenaphthene	4.00	4.00	16.8	3.63	86	48	91	ط)	7	7
Pentachlorophenol									`	
Pyrene	4.00	4.00	3.74	4.67	94	46	194	191	7	7
						•	<u>, </u>			,

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 #:_	21	991	F 2a
SDG #:		Corre	·/

VALIDATION FINDINGS WORKSHEET Sample Calculation Verification

Page:_	lof1_
Reviewer:	M
2nd reviewer:	1/

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

<u>/</u>	N	N/A
y	N	N/A

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

Conce	entratio	n = <u>(A_)(I_)(V,)(DF)(2.0)</u> (A _p)(RRF)(V _o)(V _i)(%S)	Example:
A _x	=	Area of the characteristic ion (EICP) for the compound to be measured	Sample I.D. S
A _{is}	=	Area of the characteristic ion (EICP) for the specific internal standard	
l,	=	Amount of internal standard added in nanograms (ng)	Conc. = $(C436/0)(1.00)(1.00)(1.00)($
V _o	=	Volume or weight of sample extract in milliliters (ml) or grams (g).	
V_{i}	=	Volume of extract injected in microliters (ul)	= 0.928
V.	=	Volume of the concentrated extract in microliters (ul)	,

Percent solids, applicable to soil and solid matrices only.

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

\vdash					

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date: September 11, 2009

LDC Report Date: November 20, 2009

Matrix: Soil

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905198

Sample Identification

RSAQ6-0.5B

RSAQ6-10B

RSAQ6-25B

RSAQ6-38B

RSAQ6009-38B

SA41-12B

SA41-25B

SA41-38B

SA40-10B

SA40-25B

SA40-41B

SA114-10B

SA114-10B

SA124-25B

SA124-42B

SA40-41BMS

SA40-41BMSD

Introduction

This data review covers 17 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) as there are no current guidelines for the method stated above.

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

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 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990.

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were greater than or equal to 0.05 as required.

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).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

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 RRF values were greater than or equal to 0.05.

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
96105-MB	9/16/09	Di-n-butylphthalate	70 ug/Kg	All samples in SDG R0905198

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
SA41-12B	Di-n-butylphthalate	47 ug/Kg	47U ug/Kg
SA41-25B	Di-n-butylphthalate	44 ug/Kg	44U ug/Kg
SA40-25B	Di-n-butylphthalate	36 ug/Kg	36U ug/Kg
SA114-10B	Di-n-butylphthalate	41 ug/Kg	41U ug/Kg
SA114-30B	Di-n-butylphthalate	71 ug/Kg	71U ug/Kg
SA124-25B	Di-n-butylphthalate	41 ug/Kg	41U ug/Kg
SA124-42B	Di-n-butylphthalate	65 ug/Kg	65U ug/Kg

Sample FB072909-SO (from SDG R0904226) was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072909-SO	7/29/09	Butylbenzylphthalate	0.11 ug/L	All samples in SDG R0905198

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Although the LCS and LCSD percent recoveries (%R) were not within QC limits for one compound, the MS and MSD percent recoveries (%R) were within QC limits and no data were qualified.

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 R0905198	All compounds reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

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

XVI. Field Duplicates

Samples RSAQ6-38B and RSAQ6009-38B were identified as field duplicates. No semivolatiles were detected in any of the samples.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0905198

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905198	RSAQ6-0.5B RSAQ6-10B RSAQ6-25B RSAQ6-38B RSAQ6009-38B SA41-12B SA41-25B SA41-38B SA40-10B SA40-25B SA40-41B SA114-10B SA114-30B SA1124-25B SA124-42B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0905198

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905198	SA41-12B	Di-n-butylphthalate	47U ug/Kg	A	bl
R0905198	SA41-25B	Di-n-butylphthalate	44U ug/Kg	А	bl
R0905198	SA40-25B	Di-n-butylphthalate	36U ug/Kg	А	bl
R0905198	SA114-10B	Di-n-butylphthalate	41U ug/Kg	Α	bl
R0905198	SA114-30B	Di-n-butylphthalate	71U ug/Kg	А	bl
R0905198	SA124-25B	Di-n-butylphthalate	41U ug/Kg	Α	bl
R0905198	SA124-42B	Di-n-butylphthalate	65U ug/Kg	Α	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0905198

No Sample Data Qualified in this SDG

Tronox Northqate Henderson

LDC #:	21991G2a	VALIDATION COMPLETENESS WORKSHEET
SDG #:_	R0905198	Stage 2B
Laborato	ry: Columbia	lytical Services

Reviewer: 1/4 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: 9/11/6 9
1 1.	GC/MS Instrument performance check	A	,
III.	Initial calibration	A	2 RSD r7
IV.	Continuing calibration/ICV	A	ca/101 = 25 }
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	LGC/D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	/	
XI.	Target compound identification	Ņ	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	ND	D = 4, 6
XVII.	Field blanks	SW	FB = FB07 2909 - So (from R0964226)

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:

100

	۷	01					
1_	RSAQ6-0.5B	71	SA40-41B	† 21	96105-MB	31	
2	RSAQ6-10B	12	SA114-10B	22		32	
3	RSAQ6-25B	13	SA114-30B	23		33	
4	RSAQ6-38B D	14	SA124-25B	24		34	
5	RSAQ6009-38B D	15	SA124-42B	25		35	
6	SA41-12B	16	SA40-41BMS	26		36	
7	SA41-25B	17	SA40-41BMSD	27		37	
8	SA41-38B	18		28		38	
9	SA40-10B	19		29		39	
10	SA40-25B	20		30		40	

VALIDATION FINDINGS WORKSHEET

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

A. Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene"	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene**	T. 4-Chloroaniline	II. 4-Nitrophenol*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY, Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	000. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethyiphthalate	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. 2,4,8-Trichlorophenoi**	NN. Fluorene	CCC. Benzo(a)anthracene	RRR. Pyridine
K. Hexachloroethane	Z. 2,4,5-Trichlorophenol	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TTT. 1,4. DIOXANE
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octy/phthalate**	unu octachlorostyrene
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	VVV.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	WWW.

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

620	3
166 12	See
LDC#:	SDG #:_

VALIDATION FINDINGS WORKSHEET Blanks

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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?

Was a method blank analyzed for each concentration preparation level? Was a method blank associated with every sample? Y N N/A N/N N/A

Y/N N/A

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

Blank extraction date: 9/16/69 Blank analysis date: 1/22/69

(p) Ŧ Sample Identification 7 4 Associated Samples: 9 36 4 e 96105-M Blank iD 70 Compound Conc. units:

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

Associated Samples:

ion			
Sample Identification			
S			
Blank ID			
Compound			
			···

5x Phthalates 2x all others

4
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VALIDATION FINDINGS WORKSHEET

Field Blanks

	3775	
Page:	Reviewer:	2nd Reviewer:

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

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

Were target compounds detected in the field blanks?

Blank units: $\frac{1}{2}$ Associated sample units: $\frac{1}{2}$ Associated

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

五四五 Sample Identification Associated Samples: 5 N r. \$41+5 F8 67 29 09-50 Blank ID =; o A TA Compound

Associated sample units: Blank units:

Sampling date:_

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

rein Dialin type. (circle Offe) rielu Dialik / Killsale / Offler.	e) riela biari	Associated Samples:
Compound	Blank ID	Sample Identification
CROL		

24991624 .DC #:__ SDG#:

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

Page: of Reviewer:_ 2nd Reviewer:

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

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

MS/MSD. Soil / Water.

Was a MS/MSD analyzed every 20 samples of each matrix?

overies (%R) and the relative percent differences (RPD) within the QC limits?

Y N/A		Wele life MS/MSD percent recoveries (7017) and the relative percent emocracy (1.5.7) memory and the most percent a	1001111000		Signal allocated SAII			
-	Date	QI QSW/SW	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
-		16/17	Ą		()	48 (30)		No greel (MS/MS)
				()	•	()		
+-					(()		
-				()	()	()		
-)	()	()		
+)		
-				()	()	()		
						()		
\vdash					()	()		
				()	()	()		
ig						()		
-					()			
				()	()	()		
-				(()	()		
+				()	()	()		
-				()	()	()		
\vdash				()	()	()		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soll)	RPD (Soil)	QC Limits (Water)	RPD (Water)
Ą	Phenol	26-90%	≥ 35%	12-110%	<u>< 42%</u>	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%
u	1.4-Dichlorobenzene	28-104%	< 27%	36-97%	< 28%	Ϋ́	2,4-Dinitrotoluene	28-89%	< 47%	24-96%	< 38%
	N-Nitroso-di-n-propylamine	41-126%	< 38%	41-116%	≪38%	Т.	Pentachlorophenol	17-109%	< 47%	9-103%	< 50%
ح	1.2.4-Trichlorobenzene	38-107%	< 23%	39-98%	< 28%	.22.	Pyrene	35-142%	< 36%	26-127%	< 31%
>	4-Chloro-3-methylphenol	26-103%	< 33%	23-97%	< 42%						

LDC # 21991 625 SDG #:

VALIDATION FINDINGS WORKSHEET **Laboratory Control Samples (LCS)**

Reviewer: 2002 2nd Reviewer: Page:

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

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

Was a LCS required?

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

Compound %R (Limits)
001-05) 221
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Н

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date:

September 14, 2009

LDC Report Date:

November 20, 2009

Matrix:

Soil/Water

Parameters:

Semivolatiles

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905218

Sample Identification

EB091409-SO1

SA42-10B

SA42009-10B

SA42-25B

SA42-38B

SA43-10B

SA43-25B

SA43-43B

SA44-10B

SA44-25B

SA44-42B

3A44-42D

RSAR6-37B RSAR6-25B

RSAR6-0.5B

RSAR6-9B

RSAR6-37BMS

RSAR6-37BMSD

Introduction

This data review covers 16 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) as there are no current guidelines for the method stated above.

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

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 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990.

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were greater than or equal to 0.05 as required.

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).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

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 RRF values were greater than or equal to 0.05.

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
96313-MB	9/18/09	Butylbenzylphthalate	0.14 ug/L	EB091409-SO1
96105-MB	9/16/09	Di-n-butylphthalate	70 ug/Kg	SA42-10B SA42009-10B SA42-25B SA42-38B
96211-MB	9/17/09	Di-n-butylphthalate	52 ug/Kg	SA43-10B SA43-25B SA43-43B SA44-10B SA44-25B SA44-42B RSAR6-37B RSAR6-25B RSAR6-0.5B RSAR6-9B

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
SA44-25B	Di-n-butylphthalate	38 ug/Kg	38U ug/Kg
SA44-42B	Di-n-butylphthalate	46 ug/Kg	46U ug/Kg
RSAR6-0.5B	Di-n-butylphthalate	40 ug/Kg	40U ug/Kg
RSAR6-9B	Di-n-butylphthalate	44 ug/Kg	44U ug/Kg

Sample EB091409-SO1 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
EB091409-SO1	9/14/09	Bis(2-ethylhexyl)phthalate	2.0 ug/L	All soil samples in SDG R0905218

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

Sample FB072909-SO (from SDG R0904226) was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072909-SO	7/29/09	Butylbenzylphthalate	0.11 ug/L	All soil samples in SDG R0905218

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

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for several samples. 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. 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 with the following exceptions:

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
96105-LCS/D (SA42-10B SA42009-10B SA42-25B SA42-38B 96105-MB)	Pyrene	122 (50-120)	124 (50-120)	-	J+ (all detects)	Р
96313-LCS/D (All water samples in SDG R0905218)	Pyridine 1,4-Dioxane	29 (50-120) 47 (50-120)	31 (50-120) 46 (50-120)	-	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	Р

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 R0905218	All compounds reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

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

XVI. Field Duplicates

Samples SA42-10B and SA42009-10B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentration (ug/Kg)			Diff.		
Compound	SA42-10B	SA42009-10B	RPD (Limits)	Difference (Limits)	Flags	A or P
Chrysene	38	78	-	40 (≤110)	-	-

	Concentration (ug/Kg)		DDD	Difference			
Compound	SA42-10B	SA42009-10B	RPD (Limits)	Difference (Limits)	Flags	A or P	
Phenanthrene	110U	1000	-	890 (≤110)	J (all detects) UJ (all non-detects)	A	
Pyrene	110U	140	-	30 (≤110)	-	-	

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0905218

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905218	SA42-10B SA42009-10B SA42-25B SA42-38B	Pyrene	J+ (all detects)	Р	Laboratory control samples (%R) (l)
R0905218	EB091409-SO1	Pyridine 1,4-Dioxane	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0905218	EB091409-SO1 SA42-10B SA42009-10B SA42-25B SA42-38B SA43-10B SA43-25B SA43-43B SA44-10B SA44-25B SA44-25B SA44-25B RSAR6-37B RSAR6-25B RSAR6-9B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0905218	SA42-10B SA42009-10B	Phenanthrene	J (all detects) UJ (all non-detects)	A	Field duplicates (Difference) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0905218

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905218	SA44-25B	Di-n-butylphthalate	38U ug/Kg	А	bl
R0905218	SA44-42B	Di-n-butylphthalate	46U ug/Kg	Α	bl
R0905218	RSAR6-0.5B	Di-n-butylphthalate	40U ug/Kg	А	bl
R0905218	RSAR6-9B	Di-n-butylphthalate	44U ug/Kg	Α	Ы

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Equipment Blank Data Qualification Summary - SDG R0905218

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0905218

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

LDC #:	21991H2a	VALIDATION COMPLETENESS WORKSHEET
SDG #:_	R0905218	Stage 2B
Laborato	ry: Columbia Ana	vtical Services

Date: 11/19 /69 Page: Of I Reviewer: 504 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: 9/14/09
II.	GC/MS Instrument performance check	A	
111.	Initial calibration	A	2 RSD PY
IV.	Continuing calibration/ICV	A	COV/101 & 25?
V.	Blanks	_M	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	SW	1 Cs /b
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	b = 2,3
XVII.	Field blanks	SM	EP = 1 FB = FD072909-S0 (from R09042)

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:

valida	ted Samples:	wate	r .	+ 5	[0]					
+ 1	EB091409-SO1		W	113	SA44-42B	ح	† 1	96313-MB	31	
2 2	SA42-10B	D	S	12 3	RSAR6-37B		1 22	96105-	32	4
3 2	SA42009-10B	b		ī3 ³	RSAR6-25B		⁺ ₂₃ 3	96211-	33	
4 2	SA42-25B			14 3	RSAR6-0.5B		24	·	34	
5 3 6 3	SA42-38B			15 ³	RSAR6-9B		25		35	
6 3	SA43-10B			16 3	RSAR6-37BMS		26		36	
- 3	SA43-25B			17 3	RSAR6-37BMSD		27		37	
8 3	SA43-43B			18		<u></u>	28		38	
9 3	SA44-10B			19		4	29		39	
9 3 10 3	SA44-25B		<i></i>	20		<i>y</i>	30		40	

VALIDATION FINDINGS WORKSHEET

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

A. Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitratoluene	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	2. 2,4,5-Trichlorophenol	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TT. 1,4- Dioxane
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	unu octachlarostyrene
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 Blanks

of	316	$\frac{1}{2}$
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? N/A

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

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

Associated Samples: Was the blank contaminated? If yes, please see qualification below. Blank extraction date: 9/18/61 Blank analysis date: 9/29/61 MS /1 Conc. units:

ation						7	(QN)
Sample Identification						i	
Ø						,	8
							Associated Samples:
						9/22/69	Associate
						'sis date:	
Blank ID	gW-816 96	0.14				Blank analy	
Compound		AAA				Blank extraction date: $9 / 69$ Blank analysis date:	Conc. units: MG / Ke

			\vdash				L
					-		
96105-MB	76	V::					
	ΧX						
	96.05-MB	2	000000000	000000000	000000000	000000000	Restorated

5x Phthalates 2x all others

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+ 2a	1
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LDC #	# 9OS

VALIDATION FINDINGS WORKSHEET Blanks

ی o Page: Reviewer: 2nd Reviewer:

> Rease 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)

Was a method blank analyzed for each matrix? 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 qualification below. In date: 9/15/64 Blank analysis date: 9/25/6417/09 Blank analysis date: 9 Blank extraction date: 9 AN N

61-15 Associated Samples: 46 /KG Conc. units:

ıtion					
Sample Identification					
S	JS	44 /u			
	14	N 04			
	11	h/ 9t7			
	10	n/ 82			
Blank ID	96211-1119				
0		×			
Compound					

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

5x Phthalates 2x all others

SDG #: Su Gar LDC#: 21991 HZ

VALIDATION FINDINGS WORKSHEET Field Blanks

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

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

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

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

Blank units: "5 /L Associated sample units: "5 /ks/

巨克 Sampling date: 9/4 /s Field Blank / Rinsate / Other:

Field blank type: (circle one) Field Blank / Rinsate / Other:	⊥ ∋) Field Blank	ank / Rinsate / Other: EB Associated Samples: A1/ S01/5	
Compound	Blank ID	Sample Identificat	
	-		
193	2.0	(All results wither ND or > EB)	
CRal			

Blank units: 49 1 Associated sample units: 45 1/5

Field blank type: (circle one) Kield Blank) Rinsate / Other. Sampling date: $7/2\kappa/6$

Associated Samples:

All Soils

(MD)

Sample Identification FB672906-50 Blank ID 0 サヤヤ Compound CROL

VALIDATION FINDINGS WORKSHEET

rage: Reviewer: 2nd Reviewer:

Surrogate Recovery

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

SDG#: LDC #:

Were percent recoveries (%R) for surrogates within QC limits? Y/A

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?

M M/A

LDC #: 21 991 H29 SDG #:

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: 1 of 1 2nd Reviewer: Reviewer: __

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

Compound %R (Limits)
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LDC #:_	21991	H24
SDG #:_	Sa G	na

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	<u>l</u> of
Reviewer:_	JVC
2nd reviewer:	<u> </u>

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

YN	N/A
YN	N/A

	Concentration	nug/tes	Paren
Compound	2	3	RPD ONLY
שמע	38	78	40 (£110 D) -
иу	110 И	1000	890 J/UJ/
ZZ	/	140	30 / -
	Concentratio	n ()	
Compound			RPD
			1000
		J	
<u> </u>	Concentratio	on ()	
Compound			RPD
	Concentration	on ()	
Compound			RPD

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date: September 15 through September 16, 2009

LDC Report Date: November 19, 2009

Matrix: Soil/Water

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905260

Sample Identification

EB091509-SO1 SA65009-0.5B SA136-0.5B SA153-25BMS SA136-10B SA153-25BMSD

SA136-25B

SA136-40B

SA30-5B

SA30-9B

SA30-25B

SA30-38B

SA153-10B

SA153-25B

SA153-38B

SA172-10B SA172-25B

SA172-40B

EB091609-SO1

SA128-0.5B

SA128-10B

SA128-29B

SA65-0.5B

Introduction

This data review covers 21 soil samples and 2 water 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) as there are no current guidelines for the method stated above.

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

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 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990.

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were greater than or equal to 0.05 as required.

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).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

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 RRF values were greater than or equal to 0.05.

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
96313-MB	9/18/09	Butylbenzylphthalate	0.14 ug/L	All water samples in SDG R0905260
96405-MB	9/21/09	Di-n-butylphthalate	44 ug/Kg	SA153-25B SA153-38B SA172-10B SA172-25B SA172-40B SA128-0.5B SA128-10B SA128-29B SA65-0.5B SA65009-0.5B
96211-MB	9/17/09	Di-n-butylphthalate	52 ug/Kg	SA136-0.5B SA136-10B SA136-25B SA136-40B SA30-5B SA30-9B SA30-25B SA30-25B SA30-38B SA153-10B

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
SA153-25B	Di-n-butylphthalate	45 ug/Kg	45U ug/Kg
SA172-10B	Di-n-butylphthalate	46 ug/Kg	46U ug/Kg
SA172-25B	Di-n-butylphthalate	70 ug/Kg	70U ug/Kg
SA128-10B	Di-n-butylphthalate	52 ug/Kg	52U ug/Kg
SA65-0.5B	Di-n-butylphthalate	48 ug/Kg	48U ug/Kg
SA65009-0.5B	Di-n-butylphthalate	50 ug/Kg	50U ug/Kg
SA136-0.5B	Di-n-butylphthalate	90 ug/Kg	90U ug/Kg

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
SA136-10B	Di-n-butylphthalate	51 ug/Kg	51U ug/Kg
SA136-25B	Di-n-butylphthalate	39 ug/Kg	39U ug/Kg
SA136-40B	Di-n-butylphthalate	49 ug/Kg	49U ug/Kg
SA30-5B	Di-n-butylphthalate	48 ug/Kg	48U ug/Kg
SA30-25B	Di-n-butylphthalate	76 ug/Kg	76U ug/Kg
SA30-38B	Di-n-butylphthalate	59 ug/Kg	59U ug/Kg
SA153-10B	Di-n-butylphthalate	40 ug/Kg	40U ug/Kg

Samples EB091509-SO1 and EB091609-SO1 were identified as equipment blanks. No semivolatile contaminants were found in these blanks with the following exceptions:

Equipment Blank ID	Sampling Date	Compound	Concentration	Associated Samples
EB091509-SO1	9/15/09	Bis (2-ethylhexyl) phthalate	0.49 ug/L	SA136-0.5B SA136-10B SA136-25B SA136-40B SA30-5B SA30-9B SA30-25B SA30-38B SA153-10B SA153-25B SA153-38B SA172-10B SA172-40B

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

Sample FB072909-SO (from SDG R0904226) was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072909-SO	7/29/09	Butylbenzylphthalate	0.11 ug/L	All soil samples in SDG R0905260

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
96313-LCS/D (All water samples in	Pyridine	29 (50-120)	31 (50-120)	-	J- (all detects) UJ (all non-detects)	Р
SDG R0905260)	1,4-Dioxane	47 (50-120)	46 (50-120)	-	J- (all detects) UJ (all non-detects)	

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 R0905260	All compounds reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

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

XVI. Field Duplicates

Samples SA65-0.5B and SA65009-0.5B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentration (ug/Kg)		222	D!#		
Compound	SA65-0.5B	SA65009-0.5B	RPD (Limits)	Difference (Limits)	Flags	A or P
Di-n-butylphthalate	78	50	-	2 (≤180)	-	-
Hexachlorobenzene	12	20	-	8 (≤7.2)	J (all detects)	А

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0905260

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905260	EB091509-SO1 EB091609-SO1	Pyridine 1,4-Dioxane	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0905260	EB091509-SO1 SA136-0.5B SA136-10B SA136-25B SA136-40B SA30-5B SA30-9B SA30-25B SA30-38B SA153-10B SA153-25B SA153-25B SA172-10B SA172-10B SA172-25B SA172-40B EB091609-SO1 SA128-0.5B SA128-10B SA128-0.5B SA128-29B SA65-0.5B SA65009-0.5B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0905260	SA65-0.5B SA65009-0.5B	Hexachlorobenzene	J (all detects)	Α	Field duplicates (Difference) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0905260

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905260	SA153-25B	Di-n-butylphthalate	45U ug/Kg	A	ы
R0905260	SA172-10B	Di-n-butylphthalate	46U ug/Kg	А	bl
R0905260	SA172-25B	Di-n-butylphthalate	70U ug/Kg	А	ы
R0905260	SA128-10B	Di-n-butylphthalate	52U ug/Kg	А	bl
R0905260	SA65-0.5B	Di-n-butylphthalate	48U ug/Kg	Α	bl
R0905260	SA65009-0.5B	Di-n-butylphthalate	50U ug/Kg	Α	bl

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905260	SA136-0.5B	Di-n-butylphthalate	90U ug/Kg	Α	bl
R0905260	SA136-10B	Di-n-butylphthalate	51U ug/Kg	Α	bl
R0905260	SA136-25B	Di-n-butylphthalate	39U ug/Kg	Α	bl
R0905260	SA136-40B	Di-n-butylphthalate	49U ug/Kg	Α	þl
R0905260	SA30-5B	Di-n-butylphthalate	48U ug/Kg	Α	bl
R0905260	SA30-25B	Di-n-butylphthalate	76U ug/Kg	Α	bl
R0905260	SA30-38B	Di-n-butylphthalate	59U ug/Kg	Α	bl
R0905260	SA153-10B	Di-n-butylphthalate	40U ug/Kg	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Equipment Blank Data Qualification Summary - SDG R0905260

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0905260

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

LDC #: 21991l2a VALIDATION COMPLETENESS WORKSHEET
SDG #: R0905260 Stage 2B
Laboratory: Columbia Analytical Services

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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	A	Sampling dates: 9/15-16/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	7. RSp rr ca/101 ≤ 25 3
IV.	Continuing calibration/ICV	A	ca/101 = 25 3
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	w2	
VIII.	Laboratory control samples	SW	us /p
IX.	Regional Quality Assurance and Quality Control	N	
Χ.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW)	D = 20 21
XVII.	Field blanks	SN	EB = 1 16 FB = FB 6729 69-50 (from R0904)

Note: A = Acceptable

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

R = Rinsate

D = Duplicate

TB = Trip blank

FB = Field blank EB =

riola Dialik

EB = Equipment blank

Validated Samples:

Water + soi)

								
+ 1 1	EB091509-SO1 W	11 3	SA153-25B	5	21	SA65009-0.5B D S	∔ 31	96313-MB
2 7	SA136-0.5B S	12 3	SA153-38B		22	SA153-25BMS	32	96211-
3 7	SA136-10B	13	SA172-10B		23	SA153-25BMSD	33	3 96405 - V
4 7	SA136-25B	14	SA172-25B	L	24		34	
5 ν	SA136-40B	15	SA172-40B	<u>\</u>	25		35	
6	SA30-5B	16	EB091609-SO1	N	26		36	
7	SA30-9B	17	SA128-0.5B	ς	27		37	
8 7	SA30-25B	18	SA128-10B		28		38	
9	SA30-38B	19	SA128-29B	l	29		39	
10	SA153-10B	20	SA65-0.5B D	V	30		40	

VALIDATION FINDINGS WORKSHEET

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

A. Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenoi	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	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TT. 1,4. Dioxane
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	unu octachlorostyrane
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	۷۸۷.
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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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".

A/N/Z/

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

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

N/A Was the blank contaminated? If yes, please see qualification below. Blank extraction date: 9 /29 /69

Sample Identification Associated Samples: 60/06/6 Blank extraction date: 9 /21 /69 Blank analysis date:_ #W-8/296 Blank ID AAA Compound Ž Conc. units:

(P L) 11-15 17-21 Associated Samples: Conc. units:

ation	2/	25						
ample idelinite	20	48/11						
2	18	1725						
	14	h/ o2						
	13	n/ 2+						
	11	45/4						
	96405-M	44						
_		XX						
		96405-MB 11 13 14 18 20	XX 44 45/4 46/4 70/4 52/4 48/4	XX 44 45/4 46/4 70/4 52/4 48/4	XX 44 45/4 46/4 70/4 52/4 48/4	XX 44 46/4 70/4 52/4 48/4	XX 44 45/4 46/4 70/4 52/4 48/4	76405-MB 11 13 14 18 20 XX 44 45/4 46/4 70/4 52/4 48/4

5x Phthalates 2x all others

LDC #: 2 | 94 | 1 24 SDG #: Ca Cury

VALIDATION FINDINGS WORKSHEET Blanks

Reviewer: 316 2nd Reviewer: 1

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

alifications 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?
Please see qu	Y N N/A	√ N/A

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

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

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

Elank extraction date: 9/25/69

(79) Associated Samples: Conc. units: Wo /ka

		10	40/1				
		6	M/ 65				
	tion	∞	h/2L				
Contract of the Contract of th	Sample Identification	e	48/U				
	Š	5	49/4	,			
coldina callibra.		4	11/5%				
		3	h/15				
		ح	'n	,			
	Blank ID	9(211-MB) 2	52				
	Compound		XX				

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

Sample Identification Associated Samples: Blank ID Compound

5x Phthalates 2x all others

LDC #: 21991 I 28	SDG #: Try Con-

VALIDATION FINDINGS WORKSHEET Field Blanks

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 Reviewer:_	2nd Reviewer:

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

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

Were target compounds detected in the field blanks?

Associated sample units: "5/L Associated sample units: "5/K 3

Sampling date: 7/29/69 Y N N/A

Sampling date:

21,60,114

	Field blank type: (circle one) Rield Blan / Rinsate / Other:) Freld Blank	3/ Rinsate / Other:		,	Associated Samples:	amples:	7/01 24	7	ſ
	Compound	Blank ID				Ñ	Sample Identification	ation		1
		FB672909-50	8							
H	AAA	0.11	(AN re	result	es the	ND M	7 FB	2)		T
										Т
										T
										T
										Ţ
										T
	CROL									\neg
	units: 49 /L	ociated sam	Associated sample units: 45					(
	Sampling date: 9/15/69 Field blank type: (circle one) Field Blank / Rinsate / Other:	9 Field Blank	(/ Rinsate / Other:	FB	1	Associated Samples:	amples:	2-15	(QN)	ſ
	Compound	Blank ID				Ø	Sample Identification	ation		1
										7
A	3-3-3	65.0								T
										_
										T
										Ī
										T
	CROL									

11-1-1 8DG #: LUC#:_

VALIDATION FINDINGS WORKSHEET Matrix Spike/Matrix Spike Duplicates

3% Page: 1 of 1 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. Y N/A

											<u> </u>	Γ						Γ
	Qualifications	No gual (MSm)																
) limits?	Associated Samples	//											-					
matrix? relative percent differences (RPD) within the QC limits?	RPD (Limits)	64 (30)	()	()	()	()	()	· ·	()	()	()	()	()	()	()	()	()	
rix? tive percent difference	MSD %R (Limits)	36 (50-150)	()	()	()	()	,	()	()	()	()	()		()	()	()	()	, ,
samples of each matrix? es (%R) and the relative	MS %R (Limits)	()	()	()	()	()	()	()	()	()	()	()	(()	()	()	()	
zed every 20 rcent recoveri	Compound	RKR																
Was a MS/MSD analyzed every 20 samples of each Were the MS/MSD percent recoveries (%R) and the	MS/MSD ID	22/23	,													-		
V N N/A	Date																	
K(C)	#	Ш																

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
ď	Phenol	%06-92	35%	12-110%	< 42%	99 .	Acenaphthene	31-137%	<u>< 19%</u>	46-118%	<u><</u> 31%
ن	C. 2-Chlorophenol	25-102%	< 50%	27-123%	< 40%	=	4-Nitrophenol	11-114%	< 50%	10-80%	≥ 50%
ш	1,4-Dichlorobenzene	28-104%	< 27%	36-97%	< 28%	<u> </u>	2,4-Dinitrotoluene	28-89%	< 47%	24-96%	< 38%
-j	N-Nitroso-di-n-propylamine	41-126%	< 38%	41-116%	< 38%	Ë.	Pentachlorophenol	17-109%	< 47%	9-103%	< 50%
حز	1,2,4-Trichlorobenzene	38-107%	< 23%	39-98%	< 28%	22.	Pyrene	35-142%	× 36%	26-127%	< 31%
>	4-Chloro-3-methylphenol	26-103%	< 33%	23-97%	< 42%	1					

LDC#: 21941 122 SDG#:

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

2nd Reviewer: A Page: Reviewer:

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

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

Y N N/A

Was a LCS required?

Y N N/A

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

	1													Ī											
Qualifications	J-1/11/2	1																							
Associated Samples	1, 16 96313-MB		Y																						
RPD (Limits)	()			()	()	^ `	()	,	()	()	()	()	()	()	()	()		()	()	()	(()	()	()	()
LCSD %R (Limits)	(001-05) (8	46 ()	()	()	()	()	()	()		()	()	()	()	()	(()	((()	()	()	-	()	()	()
LCS %R (Limits)	29 (50-120)	() 24	()		()	()	()	()	,	()	((()	()	()	()	()	()	()	()	()	
Compound	RRR	777																							
TCS/TCSD ID	9/821 61896																								3
Date																									
*																									

LDC #: 21991 Iza SDG #: Sy Comer

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:	_of
Reviewer:	JV6
2nd reviewer:	A /

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

Y	N	N/A
叉	N	N/A

Were field duplicate pairs identified in this SDG?
Were target compounds identified in the field duplicate pairs?

	Concentration	on (us/Es)	Pa rend
Compound	20	2]	RPD only
ΧΧ	48	50	2 (= 180 D) -
22	12	20	8 (= 7.2D) Jdots/A
	Concentrati	on (

	Concentration ()	
Compound		RPD

	Concentration ()	
Compound		RPD

	Concentration ()	
Compound		RPD

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date: September 17, 2009

LDC Report Date: November 19, 2009

Matrix: Soil

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905331

Sample Identification

SA165-0.5B

SA165-10B

SA165-28B

SA151-0.5B

SA151-10B

SA151-25B

SA151-39B

SA151009-39B

SA51-10B

SA51009-10B

SA51-25B

SA51-36B

SA165-10BMS

SA165-10BMSD

Introduction

This data review covers 14 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 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) as there are no current guidelines for the method stated above.

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

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 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990.

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were greater than or equal to 0.05 as required.

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).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

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 RRF values were greater than or equal to 0.05.

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
96405-MB	9/21/09	Di-n-butylphthalate	44 ug/Kg	SA165-0.5B SA165-28B SA151-0.5B SA151-10B SA151-25B SA151-39B SA151009-39B SA51-10B SA51009-10B
96626-MB	9/23/09	Di-n-butylphthalate	68 ug/Kg	SA165-10B SA51-25B SA51-36B

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
SA165-28B	Di-n-butylphthalate	68 ug/Kg	68U ug/Kg
SA151-10B	Di-n-butylphthalate	37 ug/Kg	37U ug/Kg
SA151-25B	Di-n-butylphthalate	44 ug/Kg	44U ug/Kg
SA151-39B	Di-n-butylphthalate	47 ug/Kg	47U ug/Kg
SA151009-39B	Di-n-butylphthalate	86 ug/Kg	86U ug/Kg
SA51-10B	Di-n-butylphthalate	78 ug/Kg	78U ug/Kg
SA51009-10B	Di-n-butylphthalate	41 ug/Kg	41U ug/Kg

Sample FB072909-SO (from SDG R0904226) was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072909-SO	7/29/09	Butylbenzylphthalate	0.11 ug/L	All samples in SDG R0905331

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

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for SA165-0.5B. Since the sample was 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 one compound, the LCS/LCSD 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

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 R0905331	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

Samples SA151-39B and SA151009-39B and samples SA51-10B and SA51009-10B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentrat	Concentration (ug/Kg)		D!#		
Compound	SA151-39B	SA151009-39B	RPD (Limits)	Difference (Limits)	Flags	A or P
Bis(2-ethylhexyl)phthalate	400	400	-	0 (≤190)	-	-
Di-n-butylphthalate	47	86	•	39 (≤190)	-	-

	Concentration (ug/Kg)					
Compound	SA51-10B	SA51009-10B	RPD (Limits)	Difference (Limits)	Flags	A or P
Di-n-butylphthalate	78	41	-	37 (≤180)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0905331

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905331	SA165-0.5B SA165-10B SA165-28B SA151-0.5B SA151-10B SA151-25B SA151-39B SA151009-39B SA51-10B SA51-10B SA51-25B SA51-25B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0905331

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905331	SA165-28B	Di-n-butylphthalate	68U ug/Kg	А	bl
R0905331	SA151-10B	Di-n-butylphthalate	37U ug/Kg	А	bl
R0905331	SA151-25B	Di-n-butylphthalate	44U ug/Kg	А	bl
R0905331	SA151-39B	Di-n-butylphthalate	47U ug/Kg	А	bi
R0905331	SA151009-39B	Di-n-butylphthalate	86U ug/Kg	А	Ы
R0905331	SA51-10B	Di-n-butylphthalate	78U ug/Kg	А	bl
R0905331	SA51009-10B	Di-n-butylphthalate	41U ug/Kg	Α	bi

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0905331

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #:	21991J2a	VALIDATION COMPLETENESS WORKS
SDG #:	R0905331	Stage 2B
Laborato	rv: Columbia Analytical	Services

Date: 1/14 /60
Page: 1 of /
Reviewer: 3/1
2nd Reviewer: ______

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

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

	Validation Area		Comments
l.	Technical holding times	A	Sampling dates: 9/17/09
II.	GC/MS Instrument performance check	Ä	
III.	Initial calibration	A	2 RSD r7
IV.	Continuing calibration/ICV	A	ca/10 = 25 2
V.	Blanks	SW	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	JVGW A	us/p
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SN)	$D_1 = 7.8$ $D_2 = 9.10$
XVII.	Field blanks	SW	FB = FB072909-SO (from R0904226)

Note: A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate FB = Field blank

R = Rinsate

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

Soil

	30	1 1						
1 1	SA165-0.5B		11	SA51-25B	21	96405 - MB	31	
2 *	SA165-10B		12	SA51-36B	22 7	96626-	32	
3	SA165-28B		13	SA165-10BMS	23		33	
4	SA151-0.5B		14	SA165-10BMSD	24		34	
5 1	SA151-10B		15		25		35	
6 1	SA151-25B	- 4-18-1	16		26		36	
7 1	SA151-39B D,		17		27		37	
ا 8	SA151009-39B b		18		28		38	
9	SA51-10B	Dx	19		29		39	
10	SA51009-10B	D√	20		30		40	

21961226 SDG #: LDC #:

VALIDATION FINDINGS WORKSHEET Blanks

3 Page: \ of \ 2nd Reviewer:___ Reviewer:__

(79)

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? 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 qualification below.

Blank extraction date: 9 /51/64 Blank analysis date: 9/30/69

0 7 R a ∞ 8 Sample Identification 3-10 4 44 Associated Samples: 7 240 3 e e 96405-MB Blank ID 4 X Conc. units: Mg /kg Compound

(DN) Associated Samples: Conc. units:

120109

Blank extraction date: $\frac{^{4}/^{2}\gamma/61}{}$ Blank analysis date:_

	_
Ication	
Sample Identification	
Š	
Blank ID 96 に 26 - A/16	
XX	
Compound	
3	

5x Phthalates 2x all others

28	}
اح	5
16612	ž
LDC #:	SDG #:

VALIDATION FINDINGS WORKSHEET Field Blanks

Jot J	36	*
Page:	Reviewer:	2nd Reviewer:

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

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

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

Blank units: Way A Associated sample units: Way A Sampling date: 7/29 61

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

(PA) Sample Identification Associated Samples: FB072907-150 Blank ID 0 AHA Compound CROL

units:	'
sample	
Associated	
k units:	
	6

Associated Samples:_

Compound	Blank ID		s S	Sample Identification	on		
CROL							

VALIDATION FINDINGS WORKSHEET Surrogate Recovery

Page: 1 of Reviewer: 176

2nd Reviewer:

SDG #: S. Constant (EPA SW 846 Method 8270C)

11441 UZE

LDC #:

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

Were percent recoveries (%R) for surrogates within QC limits?

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

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

N/N/A

Date Sample ID Surrogate "R (Limits) Qualifications 1 (24×) 4/1 DO ((ωπ ο ' ο ν S)) No συνίποτε το ν S ((ν S)) () (((() (((() (() (() (() () () () () () () () () ()) (ī					Γ'n					<u> </u>				$\overline{}$						
Sample ID Surrogate %R (Limit	Qualifications	gual																				
Sample ID Surrogate	ts)	(various)	()	()	()	()		()	()	()	()	(()	()	()	()) (()	()	()	()) (
Sample ID	%R (Limi	8,			-																	
Sample ID	Surrogate	An																				
	le ID	(21×)																				
Date	Samp																					
	Date																					
42	#																					

QC Limits (Water) 21-100 10-123 33-110* 16-110*

QC Limits (Soil) 25-121 19-122 20-130* 20-130*

S5 (2FP)= 2-Fiuorophenoi S6 (TBP) = 2,4 6-Tribromophenoi S7 (2CP) = 2-Chlorophenoi-44 S8 (DCB) = 1,2-Dichlorobenzene-44

OC Limits (Water) 35-114 43-116 33-141

QC Limits (Soil)

* QC limits are advisory

23-120 30-115 18-137 24-113

\$1 (NBZ) = Nitrobenzene-45 \(\text{S2} \) \$2 (FBP) = 2-Fluorobiphenyl 3 \(\text{S3} \) \$3 (TPH) = Terphenyl-414 \\ \$4 (PHL) = Phenol-45 \\ \$2 \)

10-94

LDC#: 21991 J7x SDG #: Culary

Matrix Spike/Matrix Spike Duplicates VALIDATION FINDINGS WORKSHEET

Page: 1 of / 36 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".

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 XN N/A

MS/MSD. Soil / Water.

Y(N)N/A		THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NAMED IN COLUMN TW	CONTRACTOR OF CASE OF CONTRACTOR OF CONTRACT					
*	Date	QI QSW/SW	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		13/14	RRR	(051-05) 58	(37-62) 64	()	٨	No guel
				()	()	()		(m asm/son)
Г				()	()	()		
-				()	()	()		
\vdash				()	()	()		
П				()	,			
				()	()	()		
П				()	()	()		
Н				()	()	()		
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П				()	()	()		
Н				()	()			
				()	()	()		
				()	()	()		
				()	()	()		
				()	()	()		
				1	,	,		

	Compound	QC Limits (Soll)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Umits (Soil)	RPD (Soll)	QC Limits (Water)	RPD (Water)
ď	Phenol	26-90%	~35% ≥ 35%	12-110%	< 42%	99	Acenaphthene	31-137%	<u><</u> 19%	46-118%	< 31%
ن	C. 2-Chlorophenol	25-102%	< 50%	27-123%	< 40%	=	4-Nitrophenol	11-114%	< 50%	10-80%	×05 >
wi	1,4-Dichlorobenzene	28-104%	< 27%	36-97%	< 28%	ξ.	2,4-Dinitrotoluene	28-89%	< 47%	24-96%	< 38%
٦j	N-Nitroso-di-n-propylamine	41-126%	< 38%	41-116%	< 38%	Ë	Pentachlorophenol	17-109%	< 47%	9-103%	< 50%
ď	1,2,4-Trichlorobenzene	38-107%	< 23%	39-98%	< 28%	Ŋ	Pyrene	35-142%	< 36%	26-127%	< 31%
>	4-Chloro-3-methylphenol	26-103%	< 33%	23-97%	< 42%						

DC #: 21991 J29 SDG #: See Com

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

Page:_	lof
Reviewer:	JV.
2nd reviewer:	X

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

Y	N	N/A
$\sqrt{2}$	Ń	N/A

Were field duplicate pairs identified in this SDG?

Were target compounds identified in the field duplicate pairs?

	Concentratio	n ug/kg		Parent
Compound	7	8	(250 2) RPD	mly
EEE	400	4-00	0 (£ 190 D)	-
XX	47	86	39	-

	Concentration	1 45/Es	Parent
Compound	9	10	RPD ny
XX	78	41	37 (=180D) -

	Concentration ()	
Compound		RPD

	Concentration ()	
Compound		RPD

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date: September 18, 2009

LDC Report Date: November 19, 2009

Matrix: Soil/Water

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905348

Sample Identification

EB091809-SO1

SA117-0.5B

SA117-9B

SA117-25B

SA117-41B

SA161-0.5B

SA161-10B

SA161-25B

SA161009-25B

SA161-37B

SA117-9BMS

SA117-9BMSD

Introduction

This data review covers 13 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) as there are no current guidelines for the method stated above.

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

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 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990.

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were greater than or equal to 0.05 as required.

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).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

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 RRF values were greater than or equal to 0.05.

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
96626-MB	9/23/09	Di-n-butylphthalate	68 ug/Kg	All soil samples in SDG R0905348

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
SA117-9B	Di-n-butylphthalate	49 ug/Kg	49U ug/Kg
SA117-41B	Di-n-butylphthalate	42 ug/Kg	42U ug/Kg
SA161-0.5B	Di-n-butylphthalate	43 ug/Kg	43U ug/Kg
SA161-10B	Di-n-butylphthalate	64 ug/Kg	64U ug/Kg
SA161009-25B	Di-n-butylphthalate	50 ug/Kg	50U ug/Kg
SA161-37B	Di-n-butylphthalate	87 ug/Kg	87U ug/Kg

Sample EB091809-SO1 was identified as an equipment blank. No semivolatile contaminants were found in this blank.

Sample FB072909-SO (from SDG R0904226) was identified as a field blank. No semivolatile contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072909-SO	7/29/09	Butylbenzylphthalate	0.11 ug/L	All soil samples in SDG R0905348

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

VI. Surrogate Spikes

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

VII. Matrix Spike/Matrix Spike Duplicates

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

VIII. Laboratory Control Samples (LCS)

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

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
96517-LCS/D (All water samples in SDG R0905348)	Pyridine	34 (50-120)	30 (50-120)	•	J- (all detects) UJ (all non-detects)	Р

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 R0905348	All compounds reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

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

XVI. Field Duplicates

Samples SA161-25B and SA161009-25B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentrat	ion (ug/Kg)				
Compound	SA161-25B	SA161009-25B	RPD (Limits)	Difference (Limits)	Flags	A or P
Di-n-butylphthalate	220U	50	-	170 (≤220)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0905348

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905348	EB091809-SO1	Pyridine	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0905348	EB091809-SO1 SA117-0.5B SA117-9B SA117-25B SA117-41B SA161-0.5B SA161-10B SA161-25B SA161-25B SA161-25B SA161-37B	All compounds reported below the PQL.	J (all detects)	Α	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0905348

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905348	SA117-9B	Di-n-butylphthalate	49U ug/Kg	А	ы
R0905348	SA117-41B	Di-n-butylphthalate	42U ug/Kg	Α	bl
R0905348	SA161-0.5B	Di-n-butylphthalate	43U ug/Kg	Α	bl
R0905348	SA161-10B	Di-n-butylphthalate	64U ug/Kg	А	bl
R0905348	SA161009-25B	Di-n-butylphthalate	50U ug/Kg	А	bl
R0905348	SA161-37B	Di-n-butylphthalate	87U ug/Kg	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Equipment Blank Data Qualification Summary - SDG R0905348

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0905348

No Sample Data Qualified in this SDG

Tronox Northgate Henderson

LDC #:	21991K2a	VALIDATION COMPLETENESS WORKSHEET
SDG #:_	R0905348	_ Stage 2B

Reviewer: W 2nd Reviewer:

Laboratory: Columbia Analytical Services

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: 9/18/09
II.	GC/MS Instrument performance check	A	
Ш.	Initial calibration	Á	2 RSD r
IV.	Continuing calibration/ICV	A	con/101 € 25 }
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	WZ	us/p
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	Α	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	b = 8, q
XVII.	Field blanks	SW	FB=1 FB= FB072909-50 (from 80904)

Note:

A = Acceptable N = Not provided/applicable

SW = See worksheet

X/ND = No compounds detected

R = Rinsate FB = Field blank D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

Water +

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	74.H1			2 0 1	0,	
1 1	EB091809-SO1	W	11	SA117-9BMS	21 96517- M	B 31
2	SA117-0.5B	5	12	SA117-9BMSD	22 2 96626 - 1	32
3	SA117-9B		13		23	33
4	SA117-25B		14		24	34
5 6	SA117-41B		15		25	35
6	SA161-0.5B	\perp	16		26	36
7	SA161-10B		17		27	37
8	SA161-25B D		18		28	38
9	SA161009-25B b	\perp	19		29	39
10	SA161-37B	V	20		30	40

VALIDATION FINDINGS WORKSHEET

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

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

Blanks

Jol 	3/6	X
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/A

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

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

 $\sqrt{N N/A}$ Was the blank contaminated? If yes, please see qualification below. Blank extraction date: $\frac{9}{2} \frac{9}{2} \frac{3}{6} \frac{9}{9}$

Associated Samples:

2-10

Sample Identification 4 2 43 η 49 96626-MB Blank ID % 9 Compound Conc. units:

Blank analysis date:_ Blank extraction date:

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

5x Phthalates 2x all others

K29	7
1661	ž
DC #: 2	SDG #:
님	S

VALIDATION FINDINGS WORKSHEET Field Blanks

101	3/6	4
Page:	Reviewer:	2nd Reviewer:

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

Were target compounds detected in the field blanks? Bfank units:

Sampling date: 7/24 kg/Field Blank/ Rinsate / Other:

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((N	,			:			
. (1)4	(DN) 5/US !!!	ıtion						
	Samples:	Sample Identification						
	Associated Samples:							
۷	Other:							
	े/ Rinsate / C		6-50					
7	e)(Field Blank	Blank ID	FB 072904 50	0.11				
ampling date: 7 /29 /69	ield blank type: (circle one) Field Blank/ Rinsate / Othe	Compound		AAA 0.11				<u></u>
Пa	e							CROL

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Sampling date:_

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

Associated Samples:

Compound	Blank ID		Sar	Sample Identification	ion		
CROL							

LDC#: 21991 1/36 SDG#: Su Commy

VALIDATION FINDINGS WORKSHEET **Laboratory Control Samples (LCS)**

Page: of

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".

VN N/A

Was a LCS required?

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

							_		_		_	_		_			_		—			_	, i		_
Qualifications	(1) g-/us/p (1)	1																							
Associated Samples	1 96517-MB																								
RPD (Limits)	()	()	()	()	()	()	()	()	,	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()
LCSD %R (Limits)	30 (52-(20)	()	()	()	()	()	()	()	,	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()
LCS %R (Limits)	34 (50-120)	()	()	()	()	()	()	(()	()	()		()	()	()	()	()	()	()	()	()	()	()	(
Compound	RRR	•																							
TCS/TCSD ID	9531-21596																								
Date																									
#																									

DC #: 2/991 & 29 SDG #: Sr. Cr~

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	1_of	1
Reviewer:	1	6
2nd reviewer:		

	Concentration	n ug/ty		PAT
Compound	8	9	RPD	
ХХ	220 U	50	170 (£ 220 D)	
				<u> </u>
	Concentration	ın ()		
Compound			RPD	
Compound				
				<u></u>
	Concentration	on ()		
Commound			RPD	
Compound				
	Concentrati	<u>on () </u>		
Compound			RPD	

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date: September 21, 2009

LDC Report Date: November 25, 2009

Matrix: Soil

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905387

Sample Identification

SA32-0.5B

SA32-9B

SA32-25B

SA32009-25B

SA32-37B

SA66-0.5B

SA66009-0.5B

SA66-10B

SA66-28B

SA129-10B

SA129-29B

RSAT4-0.5B

RSAT4-10B

RSAT4-25B

RSAT4-10B

RSAT4-53B

SA32-0.5BMS

SA32-0.5BMSD

Introduction

This data review covers 18 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 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) as there are no current guidelines for the method stated above.

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

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 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990.

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were greater than or equal to 0.05 as required.

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).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

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 RRF values were greater than or equal to 0.05.

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
96746-MB	9/24/09	Di-n-butylphthalate	66 ug/Kg	All samples in SDG R0905387

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
SA129-29B	Di-n-butylphthalate	46 ug/Kg	46U ug/Kg
RSAT4-53B	Di-n-butylphthalate	48 ug/Kg	48U ug/Kg

Samples FB072909-SO (from SDG R0904226) and FB080309-SO (from SDG R0904279) were identified as field blanks. No semivolatile contaminants were found in these blanks with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072909-SO	7/29/09	Butylbenzylphthalate	0.11 ug/L	SA32-0.5B SA32-9B SA32-25B SA32009-25B SA32-37B SA66-0.5B SA66009-0.5B SA66-10B SA66-10B SA66-28B SA129-10B SA129-29B
FB080309-SO	8/3/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Diethylphthalate	2.0 ug/L 0.14 ug/L 0.36 ug/L	RSAT4-0.5B RSAT4-10B RSAT4-25B RSAT4-10B RSAT4-53B

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

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for SA66-0.5B and SA66009-0.5B. 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 some compounds, the LCS/LCSD 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

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 R0905387	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

Samples SA32-25B and SA32009-25B and samples SA66-0.5B and SA66009-0.5B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentrat	ion (ug/Kg)				
Compound	SA32-25B	SA32009-25B	RPD (Limits)	Difference (Limits)	Flags	A or P
Bis(2-ethylhexyl)phthalate	190	190	-	0 (≤190)	-	-
Hexachlorobenzene	27	35	-	8 (≤7.4)	-	-
Octachlorostyrene	7.4U	20	-	12.6 (≤7.4)	J (all detects) UJ (all non-detects)	А

	Concentrat	ion (ug/Kg)	RPD	D!#		
Compound	SA66-0.5B	SA66009-0.5B	(Limits)	Difference (Limits)	Flags	A or P
Hexachlorobenzene	4200	4300	2 (≤50)	-	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0905387

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905387	SA32-0.5B SA32-9B SA32-25B SA32-25B SA32-37B SA66-0.5B SA66-0.5B SA66-10B SA66-28B SA129-10B SA129-10B SA129-29B RSAT4-0.5B RSAT4-10B RSAT4-25B RSAT4-10B RSAT4-10B RSAT4-10B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0905387	SA32-25B SA32009-25B	Octachlorostyrene	J (all detects) UJ (all non-detects)	А	Field duplicates (Difference) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0905387

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905387	SA129-29B	Di-n-butylphthalate	46U ug/Kg	А	bl
R0905387	RSAT4-53B	Di-n-butylphthalate	48U ug/Kg	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0905387

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

SDG #: R0905387

Stage 2B

Reviewer: 576

2nd Reviewer: 1

Laboratory: Columbia Analytical Services

LDC #: 21991L2a

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.

	I The state of the		1
	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 9/21/89
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	2, RSD r
IV.	Continuing calibration/ICV	A	CW/1W 4252
V.	Blanks	SW	
VI.	Surrogate spikes	SH	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	_A	V3/p
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SW	$D_1 = 3.4$ $D_2 = 6.7$ FB = FB072969-S0 (from $R0904226$)
XVII.	Field blanks	SN	FB = FB072969-SO (from R0904226) 1 = FB080309-SO (from R0904299)

Note:

A = Acceptable

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

R = Rinsate FB = Field blank D = Duplicate

TB = Trip blank EB = Equipment blank

Validated Samples:

Soil

		3011						
1	SA32-0.5B		11	SA129-29B	21	96746-MB	31	
2	SA32-9B		12	RSAT4-0.5B	22		32	
3	SA32-25B	01	13	RSAT4-10B	23		33	
4	SA32009-25B	b	14	RSAT4-25B	24		34	
5	SA32-37B	<u>'</u>	15	RSAT4-10B	25		35	
6	SA66-0.5B	\mathcal{D}_{γ}	16	RSAT4-53B	26		36	
7	SA66009-0.5B	DV	17	SA32-0.5BMS	27	W	37	
8	SA66-10B	- 	18	SA32-0.5BMSD	28		38	
9	SA66-28B		19		29		39	
10	SA129-10B		20		30		40	

VALIDATION FINDINGS WORKSHEET

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

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

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LDC #:_	SDG #:

VALIDATION FINDINGS WORKSHEET Blanks

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Page:	Reviewer:	2nd Reviewer:

()	Please 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)	শিe্ase see qualifications below for all questions answe

\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Was a method blank analyzed for each matrix?	Was a method blank analyzed for each concentration pre
	A/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

Vas the blank contaminated? If yes, please see qualification below. Shank extraction date: 1/44/64 Blank analysis date: 1/64/64

(79)Sample Identification **Associated Samples:** 8 96746-10 Blank ID × Conc. units: My/kg Compound

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Blank analysis date:	
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Slank extraction date:	
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Conc. units:		Associated Samples:
Compound	Blank ID	Sample Identification

5x Phthalates 2x all others

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VALIDATION FINDINGS WORKSHEET

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METHOD: GC/MS BNA (EPA SW 846 Method 8270) SDG #: Sy Garay

Were field blanks identified in this SUG?

Were target compounds detected in the field blanks?

Blank units: W/L Associated sample u

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

(MD) = 1 Sample Identification Associated Samples: 48072909-50 Blank ID 0, 1 AAA Compound

Associated sample units: W5/ES Blank units: 49 /L

Sampling date:_

37-21

Compound Blank ID Sample Identification £EE 2.0 (Ar) rdsults of per Np or > ±b) AAAA 0.14 0.36 10.0 10.0	Field blank type: (circle one) Pield Blank/ Rinsate / Other:	e) Field Blank	S/ Rinsate / Other: Associated Samples:
#6080307-50 2.0 2.0 0.14 0.36	Compound	Blank ID	Sample Identification
2,0 0,14 0,36 0,36		FB080309-	
0,36	EEE.		Mounts either NA w >
77	AAA		
	77	0.36	

VALIDATION FINDINGS WORNSHEET

raye. Reviewer:_ 2nd Reviewer:

Surrogate Recovery

711:...

SDG#: LUC#:

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?

XIN N/A S N/A

∀/Z Z

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?

Qualifications	No small	7																					QC Limits (Water) 21-100 10-123 33-110*
%R (Limits)	Varing)		()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	5 (2FP)= 2-Fluorophenol 25-121 6 (TBP) = 2,4,6-Tribromophenol 19-122 7 (2CP) = 2-Chlorophenol-d4 20-130* 8 (DCB) = 1,2-Dichlorobenzene-d4 20-130*
Surrogate	Aıı	+																					w w w w
Sample ID	(×0×)	7 (20x)																					OC Limits (Soil) OC Limits (Water) 5 23-120 35-114 yl 30-115 43-116 18-137 33-141 24-113 10-94
# Date		`																					* QC limits are advisory S1 (NBZ) = Nitrobenzene-d5 S2 (FBP) = 2-Fluorobiphenyl S3 (TPH) = Terphenyl-d14 S4 (PHL) = Phenol-d5

21991626 JDG#: DC#:

VALIDATION FINDINGS WORKSHEET

Page:__

2nd Reviewer:_ Reviewer:

Matrix Spike/Matrix Spike Duplicates

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

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

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?

ઇ Qualifications **Associated Samples** Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits? RPD (Limits) (25/25) %R (Limits) 340 170 1137 (25-120) MS %R (Limits) 480 190 197 Compound 于行 SS 2 MS/MSD ID Date Y N N/A

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
∢	Phenol	26-90%	≤ 35%	12-110%	< 42%	99	Acenaphthene	31-137%	< 19%	46-118%	<u>≤</u> 31%
ر	2-Chlorophenol	25-102%	< 50%	27-123%	< 40%	=	4-Nitrophenol	11-114%	< 50%	10-80%	< 50%
j u	1 4-Dichlorohenzene	28-104%	< 27%	36-97%	< 28%	ξ.	2,4-Dinitrotoluene	28-89%	< 47%	24-96%	< 38%
- از		41-126%	< 38%	41-116%	< 38%	Ë	Pentachlorophenol	17-109%	< 47%	9-103%	> 50%
; œ	1.2.4-Trichlorobenzene	38-107%	< 23%	39-98%	< 28%	ZZ.	Pyrene	35-142%	< 36%	26-127%	< 31%
>	4-Chloro-3-methylphenol	26-103%	< 33%	23-97%	< 42%						

LDC #:_	21991	L24
	Su	

VALIDATION FINDINGS WORKSHEET Field Duplicates

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

YN	N/A
Y/N	N/A

Were field duplicate pairs identified in this SDG? Were target compounds identified in the field duplicate pairs?

		Concentration	n us/ks	Parent
Compound		3	4	RPD
	EEE	190	190	0 (=1900)
	22	27	35	8 (47.46)
	иии	7,4 U	20	12,6 J/N5A
		,	* ***	

	Concentratio	n us les	
Compound	4	7	RPD
2.2	4200	4300	2, (=502 KPD)
		_	

	Concentration ()	
Compound		RPD

	Concentration)()	
Compound			RPD

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name: Tronox LLC Facility, 2009 Phase B Investigation,

Henderson, Nevada

Collection Date: September 24 through September 25, 2009

LDC Report Date: November 19, 2009

Matrix: Soil/Water

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0905464

Sample Identification

SA205-0.5B SA208-0.5B SA205-10B SA208-7B

SA205-25B SA101-0.5BMS SA205-41B SA101-0.5BMSD

SA84-0.5B SA84-10B SA84009-10B SA84-25B SA84-43B

EB092509-SO1A2 EB092509-SO2A4

SA101-0.5B

SA101-10B

SA101-25B

SA101-42B

SA121-0.5B

SA121009-0.5B

SA121-10B

SA121-25B

SA121-44B

Introduction

This data review covers 22 soil samples and 2 water 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) as there are no current guidelines for the method stated above.

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

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 15.0% for each individual compound and less than or equal to 30.0% for calibration check compounds (CCCs).

In the case where %RSD was greater than 15.0%, the laboratory used a calibration curve to evaluate the compound. All coefficients of determination (r^2) were greater than or equal to 0.990.

For the purposes of technical evaluation, all compounds were evaluated against the 30.0% (%RSD) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria.

Average relative response factors (RRF) for all semivolatile target compounds and system performance check compounds (SPCCs) were greater than or equal to 0.05 as required.

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).

For the purposes of technical evaluation, all compounds were evaluated against the 25.0% (%D) National Functional Guideline criteria. Unless noted above, all compounds were within the validation criteria with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
10/9/09	1,4-Dioxane	25.1	SA101-10B SA121-0.5B SA121-25B SA121-44B SA208-0.5B SA208-7B 927730-MB	J+ (all detects)	А

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 RRF values were greater than or equal to 0.05.

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
97129-MB	9/29/09	Di-n-butylphthalate	35 ug/Kg	SA205-0.5B SA205-10B SA205-25B SA205-41B SA84-0.5B SA84-10B SA84009-10B SA84-25B SA84-25B SA101-0.5B SA101-10B SA101-25B SA101-25B SA121-0.5B SA121-0.5B SA121-0.5B SA121-0.5B SA121-0.5B SA121-0.5B SA121-0.5B SA121-0.5B

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
SA205-25B	Di-n-butylphthalate	54 ug/Kg	54U ug/Kg
SA205-41B	Di-n-butylphthalate	60 ug/Kg	60U ug/Kg

Sample	Compound TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
SA84-10B	Di-n-butylphthalate	46 ug/Kg	46U ug/Kg
SA84009-10B	Di-n-butylphthalate	78 ug/Kg	78U ug/Kg
SA84-25B	Di-n-butylphthalate	49 ug/Kg	49U ug/Kg
SA84-43B	Di-n-butylphthalate	88 ug/Kg	88U ug/Kg
SA101-0.5B	Di-n-butylphthalate	53 ug/Kg	53U ug/Kg
SA101-42B	Di-n-butylphthalate	55 ug/Kg	55U ug/Kg
SA121-0.5B	Di-n-butylphthalate	51 ug/Kg	51U ug/Kg
SA121009-0.5B	Di-n-butylphthalate	46 ug/Kg	46U ug/Kg
SA121-10B	Di-n-butylphthalate	77 ug/Kg	77U ug/Kg

Samples EB092509-SO1A2 and EB092509-SO2A4 were identified as equipment blanks. No semivolatile contaminants were found in these blanks.

Samples FB072909-SO (from SDG R0904226) and FB080309-SO (from SDG R0904279) were identified as field blanks. No semivolatile contaminants were found in these blanks with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072909-SO	7/29/09	Butylbenzylphthalate	0.11 ug/L	SA208-0.5B SA208-7B

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB080309-SO	8/3/09	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Diethylphthalate	2.0 ug/L 0.14 ug/L 0.36 ug/L	SA205-0.5B SA205-10B SA205-25B SA205-41B SA84-0.5B SA84-10B SA84009-10B SA84-25B SA84-23B SA101-0.5B SA101-10B SA101-25B SA101-25B SA101-42B SA121-0.5B SA121-0.5B SA121-0.5B SA121-0.5B SA121-0.5B

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

VI. Surrogate Spikes

Surrogates were added to all samples and blanks as required by the method. Surrogate recoveries (%R) were not within QC limits for SA84-0.5B. Since the sample was 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. 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 with the following exceptions:

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
97225-LCS/D (All water samples in SDG R0905464)	Pyridine	24 (50-120)	41 (50-120)	53 (≤30)	J (all detects) UJ (all non-detects)	Р

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Flag	A or P
97225-LCS/D (All water samples in SDG R0905464)	1,4-Dioxane	45 (50-120)	45 (50-120)	-	J- (all detects) UJ (all non-detects)	P

IX. Regional Quality Assurance and Quality Control

Not applicable.

X. Internal Standards

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

XI. Target Compound Identifications

Raw data were not reviewed for this SDG.

XII. Project Quantitation Limit

All compounds reported below the PQL were qualified as follows:

Sample	Sample Finding		A or P	
All samples in SDG R0905464	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

Samples SA84-10B and SA84009-10B and samples SA121-0.5B and SA121009-0.5B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

	Concentration (ug/Kg)		DDD	Difference			
Compound	SA84-10B	SA84009-10B	RPD (Limits)	Difference (Limits)	Flags	A or P	
Di-n-butylphthalate	46	78	-	32 (≤180)	-	-	

	Concentration (ug/Kg)		RPD	Difference		
Compound	SA121-0.5B	SA121-0.5B SA121009-0.5B		(Limits)	Flags	A or P
Benzo(a)anthracene	4.0	1.5	•	2.5 (≤7.2)	-	-
Benzo(a)pyrene	5.1	7.2U	-	2.1 (≤7.2)	-	-
Benzo(b)fluoranthene	7.3	7.2U	-	0.1 (≤7.2)	-	-
Benzo(g,h,i)perylene	6.2	2.5	-	3.7 (≤7.2)	-	-
Benzo(k)fluoranthene	5.8	7.2U	-	1.4 (≤7.2)	-	-
Chrysene	6.2	3.3	• •	2.9 (≤7.2)	-	-
Di-n-butylphthalate	51	46	-	5 (≤190)	-	-
Fluoranthene	7.6	5.5	-	2.1 (≤7.2)	-	-
Hexachlorobenzene	6.2	7.2U	-	1 (≤7.2)	-	-
Indeno(1,2,3-cd)pyrene	4.0	7.2U	-	3.2 (≤7.2)	-	-
Phenanthrene	2.5	7.2U	-	4.7 (≤7.2)	-	-
Pyrene	7.3	4.4	-	2.9 (≤7.2)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Data Qualification Summary - SDG R0905464

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905464	SA101-10B SA121-0.5B SA121-25B SA121-44B SA208-0.5B SA208-7B	1,4-Dioxane	J+ (all detects)	A	Continuing calibration (%D) (c)
R0905464	EB092509-SO1A2 EB092509-SO2A4	Pyridine	J (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R)(RPD) (I,Id)
R0905464	EB092509-SO1A2 EB092509-SO2A4	1,4-Dioxane	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R0905464	SA205-0.5B SA205-10B SA205-25B SA205-41B SA84-0.5B SA84-10B SA84-10B SA84-25B SA84-25B SA84-43B EB092509-SO1A2 EB092509-SO2A4 SA101-0.5B SA101-10B SA101-25B SA101-25B SA121-0.5B SA121-0.5B SA121-0.5B SA121-0.5B SA121-10B SA121-25B SA121-10B SA121-25B SA121-44B SA208-0.5B SA208-7B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles - Laboratory Blank Data Qualification Summary - SDG R0905464

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905464	SA205-25B	Di-n-butylphthalate	54U ug/Kg	А	bl
R0905464	SA205-41B	Di-n-butylphthalate	60U ug/Kg	А	bl
R0905464	SA84-10B	Di-n-butylphthalate	46U ug/Kg	А	bl

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905464	SA84009-10B	Di-n-butylphthalate	78U ug/Kg	A	bi
R0905464	SA84-25B	Di-n-butylphthalate	49U ug/Kg	А	bl
R0905464	SA84-43B	Di-n-butylphthalate	88U ug/Kg	Α	bl
R0905464	SA101-0.5B	Di-n-butylphthalate	53U ug/Kg	Α	bl
R0905464	SA101-42B	Di-n-butylphthalate	55U ug/Kg	Α	bl
R0905464	SA121-0.5B	Di-n-butylphthalate	51U ug/Kg	Α	bl
R0905464	SA121009-0.5B	Di-n-butylphthalate	46U ug/Kg	Α	bl
R0905464	SA121-10B	Di-n-butylphthalate	77U ug/Kg	Α	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Equipment Blank Data Qualification Summary - SDG R0905464

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Semivolatiles- Field Blank Data Qualification Summary - SDG R0905464

No Sample Data Qualified in this SDG

Tronox Northaate Henderson

LDC #:	21991N2a	VALIDATION COMPLETENESS WORKSHEET	
SDG #:	R0905464	Stage 2B	
Laborato	ry: <u>Columbia A</u>	nalytical Services	

Date: 11/19/09 Page: 1 of Reviewer: 577 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: 9/24 - 25/89
II.	GC/MS Instrument performance check	Á	
111.	Initial calibration	A	Z RSD rx
IV.	Continuing calibration/ICV	SN	CW/W = 253
V.	Blanks	SW	
VI.	Surrogate spikes	Sh	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	SW	us /p
IX.	Regional Quality Assurance and Quality Control	N	
Χ.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	SN)	$D_1 = 6,7$ $D_2 = 16,17$ **EB = 10,11 FB = FB072989-50 (from R09042) = FB080309-50 (from R0904)
XVII.	Field blanks	SW	XEB = 10 11 FB = FB072919-50 (from R09042

Note: A = Acceptable

N = Not provided/applicable

SW = See worksheet

*ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

Soil + Waser

1	SA205-0.5B S	11 m	EB092509-SO2A4 V	21	SA208-0.5B S	5 31 97129-NB
2	SA205-10B	12	SA101-0.5B S	22 3	SA208-7B	32 7 97225 -
3	SA205-25B	13	SA101-10B	23	SA101-0.5BMS	333 97330 -
4	SA205-41B	14	SA101-25B	24	SA101-0.5BMSD	34
5	SA84-0.5B	15	SA101-42B	25		35
6	SA84-10B D;	16	SA121-0.5B D >	26		36
7	SA84009-10B b,	17	SA121009-0.5B b ✓	27		37
8	SA84-25B	18	SA121-10B	28		38
9	SA84-43B	19	SA121-25B	29		39
10	EB092509-SO1A2 W	20	SA121-44B	30		40

VALIDATION FINDINGS WORKSHEET

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

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

VALIDATION FINDINGS WORKSHEET	Continuing Calibration
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2nd Reviewer:

Page: Reviewer:____

Communication Campration

Please 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)

See Con 21991 N 29

SDG# LDC#

Was a continuing calibration standard analyzed at least once every 12 hours of sample analysis 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?

N/A N/A N/A

		_			 	 		 		$\overline{}$	 	 					 	
Qualifications																		
Associated Samples	13 16 19-22 97330-MB																	
Finding RRF (Limit: >0.05)																		
Finding %D (Limit: <25.0%)	25.1																	
Compound	777 (f)																	
Standard ID	AVSIS																	
Date	<u> è</u>	10/10/																
#	<u></u>		_	<u>L</u>			<u></u>	<u></u>	<u> </u>			<u> </u>	<u>l</u>	<u> </u>	<u> </u>	<u></u>		

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LDC #:	SDG #:

VALIDATION FINDINGS WORKSHEET

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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". \overrightarrow{Y} N N/A was a method blank analyzed for each matrix?

Y N N/A

Was a method blank analyzed for each concentration preparation level?

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

V N N/A Was the blank contaminated? If yes, please see qualification below. Blank analysis date: 10 /02/61 Conc. units:

(p) 3 53/ 7 2 G Sample Identification 12-21 49 9 18 Associated Samples: 40 9 3 N 97129-MB Blank ID 38 Compound

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

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	uo								
	Sample Identification								
	Sar								
		8/	7/4						
		17	46/4						
		16	SI/4 46/4						
	Blank ID	97129-MB	35						
	g		λχ						
	Compound								

5x Phthalates 2x all others

NZA	1
10010	j
DC #: 2	# 50

VALIDATION FINDINGS WORKSHEET Field Blanks

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

Were target compounds detected in the field blanks?

| Associated sample units: US \= |

Sampling date:_ Blank units:

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

4

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(NB) Sample Identification Associated Samples: F8072909-50 Blank ID , --444 Compound CROL

Blank units: 49/4 Associated sample units: 49/kg

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

12-20 6-1

Associated Samples:

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Sample Identification		VΩ						
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Compound								
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VALIDATION FINDINGS WORNSHEET Surrogat

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Reviewer:__ 2nd Reviewer:

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

Sec 627 5 - 2 - 1 - 1

SDG#: LDC #:

Were percent recoveries (%R) for surrogates within QC limits?

If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R? If any %R was less than 10 percent, was a reanalysis performed to confirm %R? Y N N/A Y N N/A

	ГТ																		1					
Qualifications	No gual	2																						QC Limits (Water)
%R (Limits)	Do (various)	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	()	QC Limits (Soil)
Surrogate	4.1	-																						ter)
Sample ID	5 (40x)																							QC Limits (Soil) QC Limits (Water)
Date		-																						* QC limits are advisory
#																								* QC limits

QC Limits (Water) 21-100	10-123	33-110*	16-413*
QC Limits (Soil) 25-121	19-122	20-130*	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	10-94
* QC limits are advisory QC Limits (Soil) S1 (NB2) = Nitrobenzene-45 23-120	S2 (FBP) = 2-Fluorobiphenyl 30-115	S3 (TPH) = Terphenyl-d14 18-137	S4 (PHL) = Phenol-d5 24-113

SDG #: 24 Cons

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Page: 1 of 1 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".

| ANNA | Was a LCS required? | Y (N/N/A | Were the LCS/LCSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

RRR 24 (50-120) 41 (50-120) 777 45 ($\frac{1}{2}$) 1 (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1) (2) (1) (1) (2) (1) (1) (2) (1) (1) (2) (2) (2) (2) (2) (3) (2) (3) (4) (2) (3) (4) (2) (3) (4) (2) (3) (4) (2) (3) (4) (2) (3) (4) (2) (3) (4) (2)	Date				LCSD %R (Limits)	RPD (Limits)	Associated Samulas		
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LDC#: 21991N2a SDG#:See cover

VALIDATION FINDINGS WORKSHEET Field Duplicates

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Reviewer:	JV6
2nd Reviewer:	\sim

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? Y/N NA

Compound Name	Conc (ug/Kg)	RPD	Diff	Diff Limits	Quals
Compound Name	6	7	(≤50%)	""	Dill Ellins	(Parent Only)
Di-n-butyl phthalate	46	78		32	≤180	,

Compound Name	Conc (t	ıg/Kg)	RPD	Diff	Diff Limits	Quals	
Compound Name	16 17		(≤50%)	Dill	Dill Ellilles	(Parent Only)	
Benzo(a)anthracene	4.0	1.5		2.5	≤7.2		
Benzo(a)pyrene	5.1	7.2U		2.1	<7.2	-	
Benzo(b)fluoranthene	7.3	7.2U		0.1	≤7.2	-	
Benzo(g,h,i)perylene	6.2	2.5		3.7	<7.2		
Benzo(k)fluoranthene	5.8	7.2U		1.4	≤7.2	,	
Chrysene	6.2	3.3		2.9	≤7.2	ı	
Di-n-butylphthalate	51	46		5	≤ 190	,	
Fluoranthene	7.6	5.5		2.1	≤7.2	,	
Hexachirobenzene	6.2	7.2U		1	≤7.2	-	
Indeno(1,2,3-cd)-pyrene	4.0	7.2U		3.2	≤7.2	_	
Phenanthrene	2.5	7.2U		4.7	≤7.2	`	
Pyrene	7.3	4.4		2.9	≤7.2		