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	33 (50-120)	40 (50-120)	-	J- (all detects) UJ (all non-detects)	P
	1,4-Dioxane	45 (50-120)	44 (50-120)	-	J- (all detects) UJ (all non-detects)	
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)	P
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)	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	Finding	Flag	A or P
All samples in SDG R0904290	All compounds reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

XIII. Tentatively Identified Compounds (TICs)

Raw data were not reviewed for this SDG.

XIV. System Performance

Raw data were not reviewed for this SDG.

XV. Overall Assessment

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

XVI. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 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)	A	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)	P	Laboratory control samples (%R) (l)
R0904290	M-21B FB080409-GW	Pyridine	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)(RPD) (l,ld)
R0904290	M-21B FB080409-GW	1,4-Dioxane	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0904290	M-31AB M-50B M-21B FB080409-GW	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 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
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 21991A2a
SDG #: R0904290
Laboratory: Columbia Analytical Services

Date: 11/18/09
Page: 1 of 1
Reviewer: JVG
2nd Reviewer: [illegible]

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: 8/03-04/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	%RSD r✓
IV.	Continuing calibration/ICV	SW	CCV/ICV ≤25%
V.	Blanks	A	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	Client Spec
VIII.	Laboratory control samples	SW	LCS/D
IX.	Regional Quality Assurance and Quality Control	N	
X.	Internal standards	A	
XI.	Target compound identification	N	
XII.	Compound quantitation/CRQLs	N	
XIII.	Tentatively identified compounds (TICs)	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	
XVI.	Field duplicates	N	
XVII.	Field blanks	SW	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: Water

1	M-31AB	11	92830-MB	21 (6740)		31	
2	M-50B	12	93316-↓	22 (7003)		32	
3	M-21B	13		23		33	
4	FB080409-GW	14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

VALIDATION FINDINGS WORKSHEET

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

A. Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene**	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene**	T. 4-Chloroaniline	II. 4-Nitrophenol*	XX. Di-n-butylphthalate	MMM. Bis(2-Chloroisopropyl)ether
F. 1,2-Dichlorobenzene	U. Hexachlorobutadiene**	JJ. Dibenzofuran	YY. Fluoranthene**	NNN. Aniline
G. 2-Methylphenol	V. 4-Chloro-3-methylphenol**	KK. 2,4-Dinitrotoluene	ZZ. Pyrene	OOO. N-Nitrosodimethylamine
H. 2,2'-Oxybis(1-chloropropane)	W. 2-Methylnaphthalene	LL. Diethylphthalate	AAA. 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	TTT. 1,4- Dioxane
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	UUU Octachloro styrene
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	VVV.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	WWW.

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

LDC #: 21991 A2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

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

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

#	Date	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	8/03/09	AU435 (IW)	FFF (-)	25.2		1, 2, 92830-MB	J- (NJ/A) (c)

LDC #: 21994A29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JVG
2nd Reviewer: [illegible]

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

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

Blank units: ug/L **Associated sample units:** ug/L
Sampling date: 8/04/09
Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: 3 (ND)

Compound	Blank ID	Sample Identification								
	4									
LL	0.22									
CRQL										

Blank units: _____ **Associated sample units:** _____
Sampling date: _____
Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								
CRQL										

LDC #: 21991A2a
SDG #: Sa Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: JVG
2nd Reviewer: [illegible]

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?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		92830-LCS/D	RRK	33 (50-120)	40 (50-120)	( )	1, 2, 92830-MB	J-/UJ/P (L)
			TTT	45 (↓)	44 (↓)	( )	↓	↓ ↓
				( )	( )	( )		
				( )	( )	( )		
		93316-LCS/D	RRR	23 ( )	49 ( )	73 (30)	3, 4, 93316-MB	J+/UJ/P (L ld)
			TTT	44 ( )	46 ( )	( )	↓	J-/UJ (L)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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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	73U 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 SDG R0905115)	Pyridine	18 (50-120)	19 (50-120)	48 (≤30)	J (all detects) UJ (all non-detects)	P
	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)	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 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:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA50-12B	SA50009-12B				
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)	A
Benzo(a)pyrene	21	12	-	9 (≤7.0)	J (all detects)	A
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)	A

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA50-12B	SA50009-12B				
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)	-	-	-

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA135-10B	SA135009-10B				
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)	A	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) (l,ld)
R0905115	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	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)	A	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	A	bl
R0905115	SA50-12B	Di-n-butylphthalate	44U ug/Kg	A	bl
R0905115	SA50009-12B	Di-n-butylphthalate	62U ug/Kg	A	bl

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905115	SA50-25B	Di-n-butylphthalate	44U ug/Kg	A	bl
R0905115	SA50-36B	Di-n-butylphthalate	45U ug/Kg	A	bl
R0905115	SA135-37B	Di-n-butylphthalate	77U ug/Kg	A	bl
R0905115	EB090809-SO1	Butylbenzylphthalate	0.30U ug/L	A	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
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 21991B2a
SDG #: R0905115
Laboratory: Columbia Analytical Services

Date: 11/18/09
Page: 1 of 1
Reviewer: JVC
2nd Reviewer: A

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 9/08/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	2 RSD rr
IV.	Continuing calibration/ICV	SW	CCV/ICV ≤ 25 %
V.	Blanks	SW	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	SW	LCS/D
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 = 5, 6 D_2 = 10, 11
XVII.	Field blanks	SW	EB = 1 FB = FB072909-SO (from R0904296) ↓ = FB080301-SO (from R0904279)

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

Validated Samples: Water + Soil

1	EB090809-SO1	W	11	SA135009-10B	D, S	21	95624-MB	31	
2	SA54-10B	S	12	SA135-25B		22	95854-↓	32	
3	SA54-20B		13	SA135-37B		23		33	
4	SA54-31B		14	SA54-31BMS		24		34	
5	SA50-12B	D_1	15	SA54-31BMSD	↓	25		35	
6	SA50009-12B	D_1	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	D, ↓	20			30		40	

VALIDATION FINDINGS WORKSHEET

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

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

LDC #: 21991B29 | SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: JVG
2nd Reviewer: [illegible]

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

#	Date	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	9/15/09	AV031	FFF (+)	28.2		1, 5-13, 14, 15, 95852-MB	J+ dets/A (c)

CONCAL 2S

LDC #: 21991 B2a
SDG #: Eu Cover

VALIDATION FINDINGS WORKSHEET
Blanks

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

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 method blank analyzed for each matrix?
Y N 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 Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 9/10/09 **Blank analysis date:** 9/14/09
Conc. units: ug/kg Associated Samples: All soils (b1)

Compound	Blank ID	Sample Identification								
	95624-MB	2	4	5	6	7	8	13		
XX	39	49/U	73/U	44/U	62/U	44/U	45/U	77/U		

Blank extraction date: 9/14/09 **Blank analysis date:** 9/15/09
Conc. units: ug/L Associated Samples: 1 (b1)

Compound	Blank ID	Sample Identification								
	95854-MB	1								
AAA	0.35	0.30/U								
XX	0.89									

5x Phthalates
2x all others

LDC #: 21991 B2a
SDG #: Sc Conv

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JV6
2nd Reviewer: M

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

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

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

Blank units: ug/L **Associated sample units:** ug/kg

Sampling date: 9/08/09

Field blank type: (circle one) Field Blank / Rinsate / Other: EB Associated Samples: 2-8 (ND)

Compound	Blank ID	Sample Identification								
	1									
EEE	0.33									
AAA	0.30									
CRQL										

Blank units: ug/L **Associated sample units:** ug/kg

Sampling date: 7/29/09

Field blank type: (circle one) Field Blank / Rinsate / Other: Associated Samples: 2-8 (ND)

Compound	Blank ID	Sample Identification								
	FB072909-SO									
AAA	0.11									
CRQL										

LDC #: 21991B29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JVG
2nd Reviewer: A

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

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

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 8/03/05
Field blank type: (circle one) Field Blank / Rinsate / Other: Associated Samples: 9-13 (ND)

Compound	Blank ID	Sample Identification								
	FB080309-SO									
EEE	2.0									
AAA	0.14									
LL	0.36									
CRQL										

Blank units: _____ **Associated sample units:** _____
Sampling date: _____
Field blank type: (circle one) Field Blank / Rinsate / Other: Associated Samples:

Compound	Blank ID	Sample Identification								
CRQL										

LDC #: [illegible]

SDG #: Eq Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

Page: [illegible]

Reviewer: JV6

2nd Reviewer: A

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

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

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

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

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

#	Date	Sample ID	Surrogate	%R (Limits)	Qualifications
		3	NBZ	143 (45-135)	No qual (only 1 out)
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

* QC limits are advisory	QC Limits (Soil)	QC Limits (Water)		QC Limits (Soil)	QC Limits (Water)
S1 (NBZ) = Nitrobenzene-d5	23-120	35-114	S5 (2FP)= 2-Fluorophenol	25-121	21-100
S2 (FBP) = 2-Fluorobiphenyl	30-115	43-116	S6 (TBP) = 2,4,6-Tribromophenol	19-122	10-123
S3 (TPH) = Terphenyl-d14	18-137	33-141	S7 (2CP) = 2-Chlorophenol-d4	20-130*	33-110*
S4 (PHL) = Phenol-d5	24-113	10-94	S8 (DCB) = 1,2-Dichlorobenzene-d4	20-130*	16-110*

LDC #: 21991 B29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: SVL
2nd Reviewer: A

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

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

Y N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

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

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

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		14/15	RRR	( )	( )	39 (30)	4	No qual (MS/MSD)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC #: 21991B29
SDG #: Rec Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: VV
2nd Reviewer: [illegible]

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?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		95624-LCS/D	SS	125 (50-120)	125 (50-120)	( )	All soils, 95624-MB	No qual (MS/MSD
			UUU	125 (↓)	122 (↓)	( )	↓	↓ ↓
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		95854-LCS/D	EEE	( )	( )	31 (30)	1, 95854-MB	No qual (LCSD
			RRR	18 (50-120)	19 (50-120)	48 (30)	↓	J/NJ/P (1, 1d)
			TTT	31 (↓)	48 (↓)	42 (↓)	↓	↓ ↓
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC#: 21991B2a
SDG#:See cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: JVC
2nd Reviewer: R

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

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

Compound Name	Conc (ug/Kg)		RPD (≤ 50%)	Diff	Diff Limits	Quals (Parent Only)	
	5	6					
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	(fd)
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	(fd)
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				
Pyrene	72	43	50				
Octachlorostyrene	37	35	6				

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

VALIDATION FINDINGS WORKSHEET
Field Duplicates

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

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

Compound Name	Conc (ug/Kg)		RPD (≤ 50%)	Diff	Diff Limits	Quals (Parent Only)
	10	11				
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
SA58-10B
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
SA204-45B
EB090309-SO2

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.

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
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 RSAU7009-0.5B RSAU7-10B RSAU7-25B 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 TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
EB090309-SO2	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Di-n-butylphthalate	1.2 ug/L 0.37 ug/L 0.97 ug/L	1.2U ug/L 0.37U ug/L 0.97U ug/L
SA58-10B	Di-n-butylphthalate	58 ug/Kg	58U ug/Kg
SA58-28B	Di-n-butylphthalate Naphthalene	63 ug/Kg 1.1 ug/Kg	63U 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 RSAU7009-0.5B RSAU7-10B RSAU7-25B RSAU7-40B RSAU7-54B SA204-0.5B SA204-10B SA204009-10B SA204-30B SA204-45B

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 RSAU7009-0.5B RSAU7-10B RSAU7-25B RSAU7-40B RSAU7-54B SA204-0.5B SA204-10B SA204009-10B 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)	P
95520-LCS/D (SA58-0.5B SA58-10B 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 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)	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	Finding	Flag	A or P
All samples in SDG R0905072	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 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:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAU7-0.5B	RSAU7009-0.5B				
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)	-	-

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	RSAU7-0.5B	RSAU7009-0.5B				
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	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA204-10B	SA204009-10B				
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)	-	-
Benzo(g,h,i)perylene	36	42	-	6 (≤21)	-	-
Benzo(k)fluoranthene	35	31	-	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)	-	-

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

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA58009-28B	SA58-28B				
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

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0905072	EB090309-SO2	Pyridine	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)(RPD) (l,ld)
R0905072	EB090309-SO2	1,4-Dioxane	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
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 RSAU7009-0.5B RSAU7-10B RSAU7-25B RSAU7-40B RSAU7-54B SA204-0.5B SA204-10B SA204009-10B SA204-30B SA204-45B	Hexachlorobenzene Octachlorostyrene	J+ (all detects) J+ (all detects)	P	Laboratory control samples (%R) (l)
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 RSAU7009-0.5B RSAU7-10B RSAU7-25B RSAU7-40B RSAU7-54B SA204-0.5B SA204-10B SA204009-10B 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	bl
R0905072	SA58-10B	Di-n-butylphthalate	58U ug/Kg	A	bl
R0905072	SA58-28B	Di-n-butylphthalate Naphthalene	63U ug/Kg 1.1U ug/Kg	A	bl
R0905072	SA53-10B	Di-n-butylphthalate	47U ug/Kg	A	bl
R0905072	SA53-25B	Di-n-butylphthalate	58U ug/Kg	A	bl
R0905072	SA53-32B	Di-n-butylphthalate	60U ug/Kg	A	bl
R0905072	SA106-12B	Di-n-butylphthalate	77U ug/Kg	A	bl
R0905072	SA106-35B	Naphthalene	1.6U ug/Kg	A	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	A	bl
R0905072	RSAU7-40B	Di-n-butylphthalate	59U ug/Kg	A	bl
R0905072	RSAU7-54B	Naphthalene	1.4U ug/Kg	A	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	A	bl
R0905072	SA204-30B	Di-n-butylphthalate	75U ug/Kg	A	bl
R0905072	SA204-45B	Di-n-butylphthalate	53U ug/Kg	A	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
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 21991C2a
SDG #: R0905072
Laboratory: Columbia Analytical Services

Date: 11/18/09
Page: 1 of)
Reviewer: JVC
2nd Reviewer: M

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: 9/03/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	%RSD r²
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 25%
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	Client Spec
VIII.	Laboratory control samples	SW	LCS/D
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 = 11, 12 D_3 = 18, 19
XVII.	Field blanks	SW	EB = 22 FB = FB072909-SO (from R0904226) FB080309-SO (from R0904274)

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 + Water

1	1	SA58-0.5B	S	11	1	RSAU7-0.5B	D2 S	21	2	SA204-45B	S	31	1	95520 - MB
2	1	SA58-10B		12	1	RSAU7009-0.5B	D2	22	3	EB090309-SO2	W	32	2	95624 -
3	1	SA58009-28B	D1	13	1	RSAU7-10B		23				33	3	95517 -
4	1	SA58-28B	D1	14	1	RSAU7-25B		24				34		
5	1	SA53-10B		15	1	RSAU7-40B		25				35		
6	1	SA53-25B		16	1	RSAU7-54B		26				36		
7	1	SA53-32B		17	1	SA204-0.5B		27				37		
8	1	SA106-12B		18	1	SA204-10B	D3	28				38		
9	1	SA106-20B		19	2	SA204009-10B	D3	29				39		
10	1	SA106-35B	✓	20	2	SA204-30B	✓	30				40		

VALIDATION FINDINGS WORKSHEET

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

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

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

LDC #: 21991C2q
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: JVG
2nd Reviewer: V

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 method blank analyzed for each matrix?
Y N 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 Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 9/09/09 **Blank analysis date:** 9/10/09
Conc. units: ug/L Associated Samples: 22 (bl)

Compound	Blank ID	Sample Identification								
	95517-MB	22								
EEE	0.26	1.2/U								
AAA	0.41	0.37/U								
XX	1.5	0.97/U								

Blank extraction date: 9/09/09 **Blank analysis date:** 9/11/09
Conc. units: ug/Kg Associated Samples: 1-18 (bl)

Compound	Blank ID	Sample Identification								
	95520-MB	2	4	5	6	7	8	10	11	12
XX	88	58/U	63/U	47/U	58/U	60/U	77/U		40/U	46/U
S	1.0		1.1/U					1.6/U	1.0/U	

5x Phthalates
2x all others

LDC #: 21991C2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: JVG
2nd Reviewer: N

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 method blank analyzed for each matrix?
Y N 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 Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 9/09/09 **Blank analysis date:** 9/11/09
Conc. units: ug/kg Associated Samples: 1-18 (bl)

Compound	Blank ID	Sample Identification								
	95520-MB	15	16	17	18					
XX	88	59/U		91/U	52/U					
S	1.0		1.4/U		1.1/U					

Blank extraction date: 9/10/09 **Blank analysis date:** 9/14/09
Conc. units: ug/kg Associated Samples: 19-21 (bl)

Compound	Blank ID	Sample Identification								
	95624-MB	20	21							
XX	39	75/U	53/U							

5x Phthalates
2x all others

LDC #: 21991 C2a
SDG #: Sea Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JVE
2nd Reviewer: N

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

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

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 9/03/89
Field blank type: (circle one) Field Blank / Rinsate / Other: EB Associated Samples: 11 - 21

Compound	Blank ID	Sample Identification								
	22									
EEE	1.2	(All results either ND or > EB)								
AAA	0.37									
XX	0.97									
CRQL										

Blank units: _____ **Associated sample units:** _____
Sampling date: _____
Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								
CRQL										

LDC #: 21991C2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JVG
2nd Reviewer: N

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

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

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 7/29/09
Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: 1 - 10 (ND)

Compound	Blank ID	Sample Identification								
	FB072909-SO									
AAA	0.11									
CRQL										

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 8/03/09
Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: 11 - 21

Compound	Blank ID	Sample Identification								
	FB080309-SO									
EEE	2.0		(All results either ND or > FB)							
AAA	0.14									
LL	0.36									
CRQL										

LDC #: 21991C29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

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

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?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		95517-LCS/D	RRR	16 (50-120)	26 (50-120)	44 (30)	22, 95517-MB	J/NJ/P (l, ll)
			TTT	46 ( )	46 ( )	( )		J-/NJ/P (l)
				( )	( )	( )		
				( )	( )	( )		
		95520-LCS/D	XX	134 ( )	( )	40 (30)	1-18, 95520-MB	No qual (LCSD im)
			SS	129 ( )	128 ( )	( )		J+ dets/P (l)
			UUU	132 ( )	126 ( )	( )	↓	↓ ↓
				( )	( )	( )		
				( )	( )	( )		
		95624-LCS/D	~~125~~ SS	125 ( )	125 ( )	( )	19-21, 95624-MB	J+ dets/P (l)
			UUU	125 (✓)	122 (✓)	( )	↓	↓ ↓
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC#: 21991C2a
SDG#: See cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: JV
2nd Reviewer: M

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

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

Compound Name	Conc (ug/Kg)		RPD (≤ 50%)	Diff	Diff Limits	Quals (Parent Only)
	11	12				
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	-
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 (≤ 50%)	Diff	Diff Limits	Quals (Parent Only)
	18	19				
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	-
Benzo(g,h,i)perylene	36	42		6	≤21	-
Benzo(k)fluoranthene	35	31		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	-

LDC#: 21991C2a
SDG#:See cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: JV6
2nd Reviewer: [illegible]

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

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

Compound Name	Conc (ug/Kg)		RPD (≤ 50%)	Diff	Diff Limits	Quals (Parent Only)
	18	19				
Fluoranthene	71	69		2	≤21	-
Hexachlrobenzene	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	-
Pyrene	76	70		6	≤21	-
Octachlorostyrene	20	22		2	≤21	

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

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
EB091009-SO2
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
SA126-40BMS
SA126-40BMSD

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)	A
9/22/09	Fluoranthene	29.2	SA102-10B SA102-30B SA109-10B SA109-34B SA125-25B SA125-39B SA125009-39B SA125-0.5B SA125-10B SA126-40B SA126-40BMS SA126-40BMSD 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
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 TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
EB091009-SO1	Butylbenzylphthalate	0.30 ug/L	0.30U ug/L
EB091009-SO2	Butylbenzylphthalate Di-n-butylphthalate	0.42 ug/L 1.0 ug/L	0.42U 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 SDG R0905177)	Pyridine	18 (50-120)	29 (50-120)	48 (≤30)	J (all detects) UJ (all non-detects)	P
	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)	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 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:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA124009-10B	SA124-10B				
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)	A	Continuing calibration (%D) (c)
R0905177	SA102-10B SA102-30B SA109-10B SA109-34B SA125-25B SA125-39B SA125009-39B SA125-0.5B SA125-10B SA126-40B	Fluoranthene	J+ (all detects)	A	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)	P	Laboratory control samples (%R)(RPD) (l,ld)
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 SA125009-39B SA125-0.5B SA125-10B SA126-0.5B SA126-10B SA126-18B SA126-25B SA126-40B	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 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	A	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
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 21991D2a
SDG #: R0905177
Laboratory: Columbia Analytical Services

Date: 11/19/09
Page: 1 of 1
Reviewer: SV6
2nd Reviewer: A

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 9/10/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	%RSD ≤ 20
IV.	Continuing calibration/ICV	SW	CCV/ICV ≤ 25%
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	
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 = 8, 10 *D_2 = 12, 13
XVII.	Field blanks	SW	EB = 1, 2 FB = FB072909-SO (from R0904

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

Validated Samples: Water

1	EB091009-SO1	W	11	SA125-25B	S	21	SA126-40BMS	S	31 + 1	95852-MB
2	EB091009-SO2	↓	12	SA125-39B	D_2	22	SA126-40BMSD	↓	32 − 2	95859-↓
3	SA102-10B	S	13	SA125009-39B	D_2	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		17	SA126-10B		27			37	
8	SA124009-10B	D_1	18	SA126-18B		28			38	
9	SA124-0.5B		19	SA126-25B		29			39	
10	SA124-10B	D_1 ↓	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	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-octylphthalate**	UUU 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.

LDC #: 21991D29

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1

Reviewer: SVG

2nd Reviewer: AV

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

(Y) N N/A Were percent differences (%D) and relative response factors (RRF) within method criteria for all CCC's and SPCC's ?

Y (N) N/A Were all %D and RRFs within the validation criteria of ≤25 %D and ≥0.05 RRF ?

#	Date	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	9/15/09	AV031	FFF (+)	28.2		1, 95854-MB	J+ dets A (C)
	9/22/09	AV068	YY (+)	29.2		3-5, 7, 11-15, 20-22, 95859-MB	J+ dets A

CONCAL.2S

LDC #: 21991D2g
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: MB
2nd Reviewer: AV

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 method blank analyzed for each matrix?
Y N 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 Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 9/14/09 **Blank analysis date:** 9/15/09
Conc. units: ug/L Associated Samples: 1, 2 (b f)

Compound	Blank ID	Sample Identification								
	95854-MB	1	2							
AAA	0.35	0.30/4	0.42/4							
XX	0.89		1.0/4							

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

Compound	Blank ID	Sample Identification								

5x Phthalates
2x all others

LDC #: 21991 D2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JM
2nd Reviewer: JM

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

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

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 9/10/09
Field blank type: (circle one) Field Blank / Rinsate / Other: EB Associated Samples: All soils

Compound	Blank ID	Blank ID	Sample Identification							
	1	2								
EEE	0.98	0.89	(All results either ND or > EB)							
AAA	0.30	0.42								
XX		1.0								
CRQL										

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 7/29/09
Field blank type: (circle one) Field Blank / Rinsate / Other: Associated Samples: All soils

Compound	Blank ID	Sample Identification							
	FB072909-SO								
AAA	0.11	(All results either ND or > FB)							
CRQL									

5

LDC #: 21991D2A
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: DVG
2nd Reviewer: N

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

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

Y N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

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

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

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		21/22	EEE	165 (50-150)	( )	( )	20	No qual (MSD in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG.	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC #: 21991 D2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: JVG
2nd Reviewer: A

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 circled)

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

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		95854-LCS/D	EEE	( )	( )	31 (30)	1, 2, 95854-MB	No qual (LCS/LCSD in)
			RRR	18 (50-120)	29 (50-120)	48 ( )	↓	J/UJ/P (d, ld)
			TTT	31 (↓)	48 (↓)	42 (↓)	↓	↓ ↓
				( )	( )	( )		
				( )	( )	( )		
		95859-LCS/D	EEE	147 (50-120)	( )	( )	All soils, 95859-MB	No qual (LCSD in)
			XX	128 ( )	( )	( )	↓	↓
			RRR	16 (↓)	5 (50-120)	106 (30)	↓	↓ (MS/MSD in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC#: 21991D2a
SDG#: See cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: JV6
2nd Reviewer: JV

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

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

Compound Name	Conc (ug/Kg)		RPD (≤ 50%)	Diff	Diff Limits	Quals (Parent Only)
	8	10				
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	-

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	
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 RSAQ5-25B RSAQ5-41B SA31-20B SA31-32B SA31-0.5B

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
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 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)	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

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)	A

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable.

XV. Overall Assessment

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

XVI. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 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)	P	Laboratory control samples (%R)(RPD) (l,ld)
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 RSAQ5-10B RSAQ5-25B RSAQ5-41B SA31-20B 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	A	bl
R0905138	SA187-25B	Di-n-butylphthalate	45U ug/Kg	A	bl
R0905138	SA187-39B	Di-n-butylphthalate	130U ug/Kg	A	bl
R0905138	SA45-10B	Di-n-butylphthalate	62U ug/Kg	A	bl
R0905138	SA45-25B	Di-n-butylphthalate	80U ug/Kg	A	bl
R0905138	SA45-36B	Di-n-butylphthalate	67U ug/Kg	A	bl
R0905138	SA186-37B	Di-n-butylphthalate	74U ug/Kg	A	bl

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905138	SA188-10B	Di-n-butylphthalate	52U ug/Kg	A	bl
R0905138	SA188-37B	Di-n-butylphthalate	69U ug/Kg	A	bl
R0905138	RSAQ5-10B	Di-n-butylphthalate	47U ug/Kg	A	bl
R0905138	SA31-20B	Di-n-butylphthalate	47U ug/Kg	A	bl
R0905138	SA31-32B	Di-n-butylphthalate	77U ug/Kg	A	bl
R0905138	SA31-0.5B	Di-n-butylphthalate	83U ug/Kg	A	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
VALIDATION COMPLETENESS WORKSHEET
Stage 4

LDC #: 21991E2a
SDG #: R0905138
Laboratory: Columbia Analytical Services

Date: 11/19/09
Page: 1 of 1
Reviewer: SVG
2nd Reviewer: AV

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: 9/09/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	2 RSD 1x
IV.	Continuing calibration/ICV	SW	CCV/ICV ≤ 25%
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	
X.	Internal standards	A	
XI.	Target compound identification	A	
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 = FB072909-SO (from R0904226)

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

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	
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	

DC #: 21991 E2A
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Reviewer: JVG
2nd Reviewer: N

Method: Semivolatiles (EPA SW 846 Method 8270C)

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

.DC #: 21994 E29
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Reviewer: JVG
2nd Reviewer: M

Validation Area	Yes	No	NA	Findings/Comments
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?		✓		
X. Performance Evaluation Samples				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	
XI. Internal Standards				
Were internal standard area counts within -50% or +100% of the associated calibration standard?	✓			
Were retention times within ± 30 seconds from the associated calibration standard?	✓			
XII. Target Compound Identification				
Were relative retention times (RRT's) within ± 0.06 RRT units of the standard?	✓			
Did compound spectra meet specified EPA "Functional Guidelines" criteria?	✓			
Were chromatogram peaks verified and accounted for?		✓		
XIII. Compound Quantitation and CRQLs				
Were the correct internal standard (IS), quantitation ion and relative response factor (RRF) used to quantitate the compound?	✓			
Were compound quantitation and CRQLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
XIV. Tentatively Identified Compounds (TICs)				
Were the major ions (> 10 percent relative intensity) in the reference spectrum evaluated in sample spectrum?			✓	
Were relative intensities of the major ions within ± 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)?		✓		
XV. System Performance				
System performance was found to be acceptable.	✓			
XVI. Overall Assessment				
Overall assessment of data was found to be acceptable.	✓			
XVII. Field Duplicates				
Field duplicate pairs were identified in this SDG.		✓		
Target compounds were detected in the field duplicates.			✓	
XVIII. Field Blanks				
Field blanks were identified in this SDG.	✓			
Target compounds were detected in the field blanks.	✓			

VALIDATION FINDINGS WORKSHEET

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

A. Phenol**	P. Bis(2-chloroethoxy)methane	EE. 2,6-Dinitrotoluene	TT. Pentachlorophenol**	III. Benzo(a)pyrene**
B. Bis (2-chloroethyl) ether	Q. 2,4-Dichlorophenol**	FF. 3-Nitroaniline	UU. Phenanthrene	JJJ. Indeno(1,2,3-cd)pyrene
C. 2-Chlorophenol	R. 1,2,4-Trichlorobenzene	GG. Acenaphthene**	VV. Anthracene	KKK. Dibenz(a,h)anthracene
D. 1,3-Dichlorobenzene	S. Naphthalene	HH. 2,4-Dinitrophenol*	WW. Carbazole	LLL. Benzo(g,h,i)perylene
E. 1,4-Dichlorobenzene**	T. 4-Chloroaniline	II. 4-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	OO. 4-Nitroaniline	DDD. Chrysene	SSS. Benzidine
L. Nitrobenzene	AA. 2-Chloronaphthalene	PP. 4,6-Dinitro-2-methylphenol	EEE. Bis(2-ethylhexyl)phthalate	TTT.
M. Isophorone	BB. 2-Nitroaniline	QQ. N-Nitrosodiphenylamine (1)**	FFF. Di-n-octylphthalate**	UUU
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	VVV.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	WWW.

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

LDC #: 21991 E29
SDG #: See Cover
METHOD: GC/MS BNA (EPA SW 846 Method 8270C)

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Reviewer: JVG
2nd Reviewer: [signature]

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

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

#	Date	Standard ID	Compound	Finding %D (Limit: <25.0%)	Finding RRF (Limit: >0.05)	Associated Samples	Qualifications
	9/22/09	AV168	YY (+)	29.2		12, 20, 95859-MB	J+ dets /A (c)

LDC #: 21991 E29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of ___
Reviewer: JR
2nd Reviewer: A

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 method blank analyzed for each matrix?
Y N 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 Was the blank contaminated? If yes, please see qualification below.

(b2)

Blank extraction date: 9/11/09 **Blank analysis date:** 9/16/09
Conc. units: ug/kg Associated Samples: 1 - 19

Compound	Blank ID	Sample Identification								
	95732-MB	1	2	3	4	5	6	9	10	12
XX	41	82/U	45/U	130/U	62/U	80/U	67/U	74/U	52/U	69/U

Blank extraction date: ___ **Blank analysis date:** same as above
Conc. units: ___ Associated Samples: 1-19

(b2)

Compound	Blank ID	Sample Identification								
	95732-MB	14	17	18	19					
XX	41	47/U	47/U	77/U	83/U					

5x Phthalates
2x all others

LDC #: 21991 E2a
SDG #: Sea Cliff

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JVG
2nd Reviewer: K

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

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

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

Blank units: ug/L **Associated sample units:** ug/kg

Sampling date: 7/29/09

Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: All

Compound	Blank ID	Sample Identification								
	FB072909-SO									
AAA	0.11	(All results either ND or > FB)								
CRQL										

Blank units: _____ **Associated sample units:** _____

Sampling date: _____

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

Compound	Blank ID	Sample Identification								
CRQL										

LDC #: 21991 E2A
SDG #: Cu Cmy

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: JVK
2nd Reviewer: IR

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

(Y) N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

(Y) N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

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

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		21/22	EEE	( )	157 (50-150)	( )	16	No qual (MS in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG.	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC #: 21991 E2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

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

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?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		95732-LCS/D	EEE	123 (50-120)	121 (50-120)	( )	1-19, 95732-MB	No qual (MS in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		95859-LCS/D	EEE	147 (50-120)	( )	( )	20, 95859-MB	No qual (LCSD)
			XX	128 ( )	( )	( )		
			RRR	16 ( )	5 (50-120)	106 (30)		J/R/P (1, 1)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 19491E2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: JV6
2nd Reviewer:

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

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

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

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported RRF (1.0 std)	Recalculated RRF (1.0 std)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported %RSD	Recalculated %RSD
1	ICAL	9/10/09	~~Phenol~~ RRR (1st internal standard)	1.567	1.567	1.626	1.626	3.75	3.76
			Naphthalene (2nd internal standard)	1.091	1.091	1.084	1.084	5.09	5.11
			Fluorene (3rd internal standard)	1.197	1.197	1.214	1.214	3.19	3.18
			~~Pentachlorophenol~~ UU (4th internal standard)	1.219	1.219	1.235	1.235	3.74	3.74
			~~Bis(2-ethylhexyl)~~phthalate DDD (5th internal standard)	1.133	1.133	1.102	1.102	3.94	3.94
			Benzo(a)pyrene (6th internal standard)	1.237	1.237	1.278	1.278	12.48	12.49
2	ICAL	9/18/09	~~Phenol~~ RRR (1st internal standard)	1.705	1.705	1.839	1.838	7.49	7.48
			Naphthalene (2nd internal standard)	1.095	1.095	1.075	1.075	6.69	6.68
			Fluorene (3rd internal standard)	1.053	1.053	1.070	1.070	4.63	4.63
			~~Pentachlorophenol~~ UU (4th internal standard)	1.196	1.196	1.217	1.217	4.78	4.78
			Bis(2-ethylhexyl)phthalate (5th internal standard)	1.058	1.058	1.105	1.105	4.03	4.63
			Benzo(a)pyrene (6th internal standard)	1.254	1.254	1.319	1.319	6.05	6.04
3			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)						

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

	4.0	9/10 ICAL 5.0	10.0	4.0	9/18 ICAL 5.0	10.0
RRR	1.587	1.578	1.594	1.897	1.939	1.691
S	1.100	1.089	0.955	1.082	1.057	0.893
NN	1.218	1.226	1.179	1.105	1.033	1.126
UU	1.264	1.267	1.170	1.231	1.239	1.123
DDD	1.107	1.142	1.131	1.126	1.122	1.155
III	1.337	1.403	1.457	1.355	1.381	1.427

LDC #: 21191E2A
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Page: 1 of 1
Reviewer: JM
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
$RRF = (A_x)(C_{is})/(A_{is})(C_x)$

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	AV063	9/16/09	~~Phenol~~ RRR (1st internal standard)	1.626	1.944	1.944	19.6	19.6
			Naphthalene (2nd internal standard)	1.084	1.115	1.115	2.9	2.9
			Fluorene (3rd internal standard)	1.214	1.154	1.154	4.9	4.9
			~~Pentachlorophenol~~ UU (4th internal standard)	1.235	1.243	1.243	0.6	0.6
			~~Bis(2-ethylhexyl)phthalate~~ DDD (5th internal standard)	1.102	1.107	1.107	0.5	0.5
			Benzo(a)pyrene (6th internal standard)	1.278	1.298	1.298	1.6	1.6
2	AV136	9/21/09	~~Phenol~~ RRR (1st internal standard)	1.839	1.747	1.747	5.0	5.0
			Naphthalene (2nd internal standard)	1.075	1.097	1.097	2.0	2.0
			Fluorene (3rd internal standard)	1.070	1.084	1.084	1.3	1.3
			~~Pentachlorophenol~~ UU (4th internal standard)	1.217	1.227	1.227	0.8	0.8
			~~Bis(2-ethylhexyl)phthalate~~ DDD (5th internal standard)	1.105	1.100	1.100	0.5	0.5
			Benzo(a)pyrene (6th internal standard)	1.319	1.334	1.334	1.1	1.1
3	AV168	9/22/09	~~Phenol~~ RRR (1st internal standard)		1.820	1.820	1.0	1.0
			Naphthalene (2nd internal standard)		1.116	1.116	3.8	3.8
			Fluorene (3rd internal standard)		1.024	1.024	4.3	4.3
			~~Pentachlorophenol~~ UU (4th internal standard)		1.232	1.233	1.3	1.3
			~~Bis(2-ethylhexyl)phthalate~~ DDD (5th internal standard)		1.116	1.116	1.0	1.0
			Benzo(a)pyrene (6th internal standard)	↓	1.326	1.326	0.5	0.5

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 #: 21991E29
SDG #: Sre Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

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

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: # 1

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	2.00	1.88	94	94	0
2-Fluorobiphenyl	↓	1.65	83	83	↓
Terphenyl-d14	↓	1.99	100	100	↓
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID: _____

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

Sample ID: _____

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

LDC #: 21991 E2A
SDG #: Sa Cruz

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates Results Verification

Reviewer: JW
2nd Reviewer: K

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

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

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

Where: SSC = Spiked sample concentration; SA = Spike added; SC = Sample concentation

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

MS = Matrix spike percent recovery; MSD = Matrix spike duplicate percent recovery

MS/MSD samples: 21/22

Compound	Spike Added (ug/kg)		Sample Concentration (ug/kg)	Spiked Sample Concentration (ug/kg)		Matrix Spike Percent Recovery		Matrix Spike Duplicate Percent Recovery		MS/MSD RPD	
	MS	MSD	.....	MS	MSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol											
N-Nitroso-di-n-propylamine											
4-Chloro-3-methylphenol											
Acenaphthene	145	145	0	142	146	98	98	101	101	3	3
Pentachlorophenol											
Pyrene	145	145	0	173	177	119	119	122	122	2	2

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 #: 21791E29
SDG #: See Cover

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

Reviewer: JVC
2nd Reviewer: [illegible]

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

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

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

RPD = I LCSC - LCSDC I * 2/(LCSC + LCSDC) LCSC = Laboraotry control sample concentration LCSDC = Laboratory control sample duplicate concentration

LCS/LCSD samples: 95859-LCS/D

Compound	Spike Added (ug/kg)		Spike Concentration (ug/kg)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene	133	133	125	133	94	94	110	100	6	6
Pentachlorophenol										
Pyrene	133	13	151	158	114	114	119	119	4	4

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

LDC #: 21991 E 2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

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

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

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

Concentration = $\frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$

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

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

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

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

V_i = Volume of extract injected in microliters (ul)

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

Df = Dilution Factor.

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

2.0 = Factor of 2 to account for GPC cleanup

Example:

Sample I.D. #1 , XX :

Conc. = $\frac{(184506)(1.0)(1.0\text{ml})(1000)(\quad)}{(453283)(1.782)(30\text{g})(0.932)(\quad)}$

= 81.69

≈ 82 ng/kg

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

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

Samples in this SDG underwent SPLP extraction

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 TIC (RT in minutes)	Reported Concentration	Modified Final Concentration
SA128-10BSPLP3	Butylbenzylphthalate Di-n-butylphthalate Diethylphthalate	0.37 ug/L 2.6 ug/L 0.25 ug/L	0.37U ug/L 2.6U ug/L 0.25U ug/L
SA128-29BSPLP3	Bis(2-ethylhexyl)phthalate Butylbenzylphthalate Di-n-butylphthalate Diethylphthalate	0.42 ug/L 0.60 ug/L 4.0 ug/L 0.35 ug/L	0.42U ug/L 0.60U ug/L 4.0U 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	34 (50-120)	30 (50-120)	-	J- (all detects) UJ (all non-detects)	P
	1,4-Dioxane	45 (50-120)	49 (50-120)	-	J- (all detects) UJ (all non-detects)	
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)	P
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	38 (50-120)	38 (50-120)	-	J- (all detects) UJ (all non-detects)	P
	1,4-Dioxane	48 (50-120)	47 (50-120)	-	J- (all detects) UJ (all non-detects)	
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)	P
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)	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

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)	A

XIII. Tentatively Identified Compounds (TICs)

Tentatively identified compounds were not reported by the laboratory.

XIV. System Performance

The system performance was acceptable.

XV. Overall Assessment

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

XVI. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 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)	P	Laboratory control samples (%R) (l)
R0905192	SA102-10BSPLP2 SA102-30BSPLP2 SA30-9BSPLP2	Pyridine	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0905192	SA128-10BSPLP3 SA128-29BSPLP3	Di-n-butylphthalate	J+ (all detects)	P	Laboratory control samples (%R) (l)
R0905192	SA128-10BSPLP2 SA128-29BSPLP2	Pyridine	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)(RPD) (l,ld)
R0905192	SA128-10BSPLP2 SA128-29BSPLP2	1,4-Dioxane	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0905192	SA102-10BSPLP2 SA102-10BSPLP3 SA102-30BSPLP2 SA102-30BSPLP3 SA30-9BSPLP2 SA30-9BSPLP3 SA128-10BSPLP2 SA128-10BSPLP3 SA128-29BSPLP2 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	A	bl

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905192	SA128-29BSPLP2	Butylbenzylphthalate	0.14U ug/L	A	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
VALIDATION COMPLETENESS WORKSHEET
Stage 4

LDC #: 21991F2a
SDG #: R0905192
Laboratory: Columbia Analytical Services

Date: 11/19/09
Page: 1 of 1
Reviewer: VG
2nd Reviewer: N

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: 9/10 - 16/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	% RSD r
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 25 %
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	Client Spec
VIII.	Laboratory control samples	SW	LCS/D
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	A	
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

1	SA102-10BSPLP2	11	96618-MB	21		31	
2	SA102-10BSPLP3	12	96519-MB	22		32	
3	SA102-30BSPLP2	13	97226-MB	23		33	
4	SA102-30BSPLP3	14	96999-MB	24		34	
5	SA30-9BSPLP2	15	SPLP2-Blk1	25		35	
6	SA30-9BSPLP3	16	SPLP3-Blk1	26		36	
7	SA128-10BSPLP2	17	SPLP2-Blk2	27		37	
8	SA128-10BSPLP3	18	SPLP3-Blk2	28		38	
9	SA128-29BSPLP2	19		29		39	
10	SA128-29BSPLP3	20		30		40	

DC #: 21991F2A
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Reviewer: JV6
2nd Reviewer: MV

Method: Semivolatiles (EPA SW 846 Method 8270C)

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

LDC #: 21991 F29
SDG #: See Cover

VALIDATION FINDINGS CHECKLIST

Reviewer: JVG
2nd Reviewer: M

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

VALIDATION FINDINGS WORKSHEET

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

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

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

LDC #: 21991 F2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: JVG
2nd Reviewer: [illegible]

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 method blank analyzed for each matrix?
Y N 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 Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 9/28/09 **Blank analysis date:** 9/30/09
Conc. units: ug/L Associated Samples: 8, 10 (bl)

Compound	Blank ID	Sample Identification								
	96999-BLK	8	9[illegible]0							
EEE	0.30		0.42/U							
AAA	0.48	0.37/U	0.60/U							
XX	3.6	2.6/U	4.0/U							
LL	0.27	0.25/U	0.35/U							

Blank extraction date: 9/17/09 **Blank analysis date:** 9/29/09
Conc. units: ug/L Associated Samples: 2, 4, 6 (bl)

Compound	Blank ID	Sample Identification								
	SPLP3-BLK1	6								
EEE	0.27									
AAA	0.14	0.16/U								

5x Phthalates
2x all others

LDC #: 21991 F2g
SDG #: Lg Carrier

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: JVC
2nd Reviewer: M

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 method blank analyzed for each matrix?
Y N 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 Was the blank contaminated? If yes, please see qualification below.

SLP **Blank extraction date:** 9/28/09 **Blank analysis date:** 10/02/09 (6 l)
Conc. units: ug/L Associated Samples: 7, 9

Compound	Blank ID	Sample Identification								
	SPLP2-Blk2	9								
AAA	0.22	0.14/U								

LP **Blank extraction date:** 9/24/09 **Blank analysis date:** 9/30/09
Conc. units: ug/L Associated Samples: 8, 10 (6 l)

Compound	Blank ID	Sample Identification								
	SPLP3-Blk2	8	10							
EEE	0.36		0.42/U							
AAA	0.47	0.37/U	0.60/U							
XY	3.9	2.6/U	4.0/U							

5x Phthalates
2x all others

LDC #: 21991F29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: JVG
2nd Reviewer: [illegible]

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?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		96519-LCS/D	RRR	34 (50-120)	30 (50-120)	( )	2 4 6 96519-MB,	J-/NJ/P (l)
			TTT	45 ( )	49 ( )	( )	SPLP3-Blk1	
				( )	( )	( )		
				( )	( )	( )		
		96618-LCS/D	RRR	31 ( )	24 ( )	( )	1,3,5, 96618-MB,	J-/NJ/P (l)
			TTT	( )	48 ( )	( )	SPLP2-Blk1	No qual (LCS in
				( )	( )	( )		
		96999-LCS/D	XX	137 ( )	129 ( )	( )	8, 10, 96999-MB,	~~J+ detect~~
			RRR	38 ( )	38 ( )	( )	SPLP3-Blk2	~~J-/NJ/P~~ (l)
			TTT	48 ( )	47 ( )	( )		J-/UJ
				( )	( )	( )		
				( )	( )	( )		
		97226-LCS/D	RRR	24 ( )	41 ( )	53 (30)	7, 9, 97226-MB,	J/NJ/P (l, l
			TTT	45 (✓)	45 (✓)	( )	SPLP2-Blk2	J-/NJ/P (l)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: [illegible]
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Initial Calibration Calculation Verification

Page: 1 of 1
Reviewer: JVB
2nd Reviewer: [illegible]

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

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

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

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Reported RRF (10.0 std)	Recalculated RRF (10.0 std)	Reported Average RRF (initial)	Recalculated Average RRF (initial)	Reported %RSD	Recalculated %RSD
1		9/28/09	~~Phenol~~ RRR (1st internal standard)	NR	1.389	1.325	1.325	9.25	9.24
	ICAL		Naphthalene (2nd internal standard)		0.943	1.049	1.049	5.03	5.02
			Fluorene (3rd internal standard)		1.192	1.192	1.192	11.04	11.04
			~~Pentachlorophenol~~ 4,4' (4th internal standard)		0.940	1.161	1.161	8.15	8.15
			Bis(2-ethylhexyl)phthalate (5th internal standard)		0.690	0.840	0.840	9.03	9.05
			Benzo(a)pyrene (6th internal standard)		1.387	1.274	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			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)						

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

	4.0	5.0	10.0
Pyridine	1.333	1.427	1.389
Naphthalene	1.063	1.018	0.943
Fluorene	1.364	1.355	1.192
Phenanthrene	1.198	1.127	0.940
Bis(2-eh) phthalate	1.725/2 = 0.863	1.737/2 = 0.869	1.380/2 = 0.690
Benzo(a) pyrene	1.338	1.402	1.387

LDC #: 21991F2g
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration Results Verification

Reviewer: JVG
2nd Reviewer: M

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

Where: ave. RRF = initial calibration average RRF
RRF = continuing calibration RRF
A_x = Area of compound, A_{is} = Area of associated internal standard
C_x = Concentration of compound, C_{is} = Concentration of internal standard

#	Standard ID	Calibration Date	Compound (Reference Internal Standard)	Average RRF (Initial)	Reported RRF (CC)	Recalculated RRF (CC)	Reported %D	Recalculated %D
1	DB729	9/29/09	Phenol (1st internal standard)	1.325	1.410	1.410	6.4	6.4
			Naphthalene (2nd internal standard)	1.049	1.008	1.008	3.9	3.9
			Fluorene (3rd internal standard)	1.192	1.362	1.362	14.3	14.3
			Pentachlorophenol (4th internal standard)	1.161	1.206	1.206	3.9	3.9
			Bis(2-ethylhexyl)phthalate (5th internal standard)	0.840	0.893	0.893	6.3	6.3
			Benzo(a)pyrene (6th internal standard)	1.274	1.334	1.334	4.7	4.7
2	DB752	9/30/09	Phenol (1st internal standard)		1.370	1.370	3.4	3.4
			Naphthalene (2nd internal standard)		1.106	1.106	5.4	5.4
			Fluorene (3rd internal standard)		1.381	1.381	15.9	15.9
			Pentachlorophenol (4th internal standard)		1.135	1.135	2.2	2.2
			Bis(2-ethylhexyl)phthalate (5th internal standard)		0.898	0.898	6.9	6.9
			Benzo(a)pyrene (6th internal standard)		1.353	1.353	6.2	6.2
3	DB799	10/02/09	Phenol (1st internal standard)		1.410	1.410	6.4	6.4
			Naphthalene (2nd internal standard)		1.070	1.070	2.0	2.0
			Fluorene (3rd internal standard)		1.357	1.357	13.8	13.8
			Pentachlorophenol (4th internal standard)		1.159	1.159	0.2	0.2
			Bis(2-ethylhexyl)phthalate (5th internal standard)		0.963	0.963	14.6	14.6
			Benzo(a)pyrene (6th internal standard)	✓	1.288	1.288	1.1	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.

LDC #: 49491F29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Results Verification

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

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: #1

	Surrogate Spiked	Surrogate Found	Percent Recovery Reported	Percent Recovery Recalculated	Percent Difference
Nitrobenzene-d5	2.00	1.76	88	88	0
2-Fluorobiphenyl	↓	1.60	80	80	↓
Terphenyl-d14	↓	2.04	102	102	
Phenol-d5					
2-Fluorophenol					
2,4,6-Tribromophenol					
2-Chlorophenol-d4					
1,2-Dichlorobenzene-d4					

Sample ID: _____

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

Sample ID: _____

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

LDC #: 21991 F2a
SDG #: Eq Canyon

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

Page: 1 of 1
Reviewer: SVG
2nd Reviewer: VS

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

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

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

RPD = I LCS - LCSD I * 2/(LCS + LCSD) LCS = Laboratory control sample percent recovery LCSD = Laboratory control sample duplicate percent recovery

LCS/LCSD samples: 96618 - LCS/D

Compound	Spike Added (ug/L)		Spike Concentration (ug/L)		LCS Percent Recovery		LCSD Percent Recovery		LCS/LCSD RPD	
	LCS	LCSD	LCS	LCSD	Reported	Recalc	Reported	Recalc	Reported	Recalculated
Phenol										
N-Nitroso-di-n-propylamine										
4-Chloro-3-methylphenol										
Acenaphthene	4.00	4.00	3.91	3.63	98	98	91	91	7	7
Pentachlorophenol										
Pyrene	4.00	4.00	3.74	4.02	94	94	101	101	7	7

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

LDC #: 21991 F2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Sample Calculation Verification

Page: 1 of 1
Reviewer: SM
2nd reviewer: [illegible]

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

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

Concentration = $\frac{(A_x)(I_s)(V_t)(DF)(2.0)}{(A_{is})(RRF)(V_o)(V_i)(\%S)}$

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

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

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

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

V_i = Volume of extract injected in microliters (ul)

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

Df = Dilution Factor.

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

2.0 = Factor of 2 to account for GPC cleanup

Example:

Sample I.D. 5, XX:

Conc. = $\frac{(643610)(1.00)(1\ ml)(1000)(\quad)}{(426286)(1.535)(1000\ ml)(\quad)(\quad)}$

= 0.928

≈ 0.93 ng/L

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

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
SA114-30B
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)	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 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 SA124-25B 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	A	bl
R0905198	SA40-25B	Di-n-butylphthalate	36U ug/Kg	A	bl
R0905198	SA114-10B	Di-n-butylphthalate	41U ug/Kg	A	bl
R0905198	SA114-30B	Di-n-butylphthalate	71U ug/Kg	A	bl
R0905198	SA124-25B	Di-n-butylphthalate	41U ug/Kg	A	bl
R0905198	SA124-42B	Di-n-butylphthalate	65U ug/Kg	A	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 Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 21991G2a
SDG #: R0905198
Laboratory: Columbia Analytical Services

Date: 11/19/09
Page: 1 of 1
Reviewer: JVG
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: 9/11/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	%RSD ≤ 20
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 25%
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	
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	ND	D = 4, 5
XVII.	Field blanks	SW	FB = FB07290 9-SO (from R0904226)

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

1	RSAQ6-0.5B	11	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	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	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-octylphthalate**	UUU 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.

LDC #: 21991 G 2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: JVG
2nd Reviewer: [illegible]

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 method blank analyzed for each matrix?
Y N 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 Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 9/16/09 **Blank analysis date:** 9/23/09 (b1)
Conc. units: ug/kg Associated Samples: All

Compound	Blank ID	Sample Identification								
	96105-MB	6	7	10	12	13	14	15		
XX	70	47/4	44/4	36/4	41/4	71/4	41/4	65/4		

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

Compound	Blank ID	Sample Identification								

5x Phthalates
2x all others

LDC #: 21991 G2a
SDG #: Sa Cmr

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JMC
2nd Reviewer: [illegible]

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

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

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

Blank units: ug/L **Associated sample units:** ug/kg

Sampling date: 7/29/09

Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: All ~~(ND)~~

Compound	Blank ID	Sample Identification								
	FB072909-SD									
AAA	0.11	(All results either ND or > FB)								
CRQL										

Blank units: _____ **Associated sample units:** _____

Sampling date: _____

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

Compound	Blank ID	Sample Identification								
CRQL										

LDC #: 21991 G2a
SDG #: Sq Grv

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: JV6
2nd Reviewer: Q

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

Y N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

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

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

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		16/17	W	( )	( )	48 (30)	11	No qual (MS/MSD
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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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)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG.	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC #: 21991G2S
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: JVG
2nd Reviewer: [illegible]

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?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		96105-LCS/D	ZZ	122 (50-120)	124 (50-120)	( )	All + Blk	No qual
				( )	( )	( )		(MS/MSD in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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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 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
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)	P
96313-LCS/D (All water samples in SDG R0905218)	Pyridine	29 (50-120)	31 (50-120)	-	J- (all detects) UJ (all non-detects)	P
	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 R0905218	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 SA42-10B and SA42009-10B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

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

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA42-10B	SA42009-10B				
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)	P	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)	P	Laboratory control samples (%R) (l)
R0905218	EB091409-SO1 SA42-10B SA42009-10B SA42-25B SA42-38B SA43-10B SA43-25B SA43-43B SA44-10B SA44-25B SA44-42B RSAR6-37B RSAR6-25B RSAR6-0.5B 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	A	bl
R0905218	SA44-42B	Di-n-butylphthalate	46U ug/Kg	A	bl
R0905218	RSAR6-0.5B	Di-n-butylphthalate	40U ug/Kg	A	bl
R0905218	RSAR6-9B	Di-n-butylphthalate	44U ug/Kg	A	bl

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
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 21991H2a
SDG #: R0905218
Laboratory: Columbia Analytical Services

Date: 11/10/09
Page: 1 of 1
Reviewer: SVG
2nd Reviewer: [illegible]

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: 9/14/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	2 RSD rr
IV.	Continuing calibration/ICV	A	CCV/ICV < 25%
V.	Blanks	SW	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	SW	LCS/D
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 = 2,3
XVII.	Field blanks	SW	EB = 1 FB = FB072909-SO (from RO904296)

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

Validated Samples: water + Soil

+ 1	1	EB091409-SO1	W	+ 11	3	SA44-42B	S	+ 21	1	96313-MB	31
2	2	SA42-10B	D S	+ 12	3	RSAR6-37B		+ 22	2	96105-	32
3	2	SA42009-10B	D	- 13	3	RSAR6-25B		+ 23	3	96211-	33
4	2	SA42-25B		14	3	RSAR6-0.5B		24			34
5	2	SA42-38B		15	3	RSAR6-9B		25			35
- 6	3	SA43-10B		16	3	RSAR6-37BMS		26			36
- 7	3	SA43-25B		17	3	RSAR6-37BMSD		27			37
- 8	3	SA43-43B		18				28			38
- 9	3	SA44-10B		19				29			39
+ 10	3	SA44-25B		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	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	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-octylphthalate**	UUU Octachloro styrene
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	VVV.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	WWW.

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

LDC #: 21991 #29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: JV6
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".

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?
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.

Blank extraction date: 9/18/09 **Blank analysis date:** 9/29/09
Conc. units: ug/L Associated Samples: 1 (ND)

Compound	Blank ID	Sample Identification								
	96313-MB									
AAA	0.14									

Blank extraction date: 9/16/09 **Blank analysis date:** 9/23/09
Conc. units: ug/kg Associated Samples: 2 - 5 (ND)

Compound	Blank ID	Sample Identification								
	96105-MB									
XX	70									

5x Phthalates
2x all others

LDC #: 21991 H 2a
SDG #: Sq Grav

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 2 of 3
Reviewer: JVG
2nd Reviewer: [signature]

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 method blank analyzed for each matrix?
Y N 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 Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 9/17/09 **Blank analysis date:** 9/25/09
Conc. units: ug/kg Associated Samples: 6-15 (bl)

Compound	Blank ID	Sample Identification								
	96211-MB3	10	11	14	15					
XX	52	38/4	46/4	40/4	44/4					

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

Compound	Blank ID	Sample Identification								

5x Phthalates
2x all others

LDC #: 21991 H2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JV6
2nd 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 Were target compounds detected in the field blanks?

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 9/14/09
Field blank type: (circle one) Field Blank / Rinsate / Other: EB Associated Samples: All soils

Compound	Blank ID	Sample Identification								
	1									
EEE	2.0	(	All results either ND or > EB)							
CRQL										

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 7/28/09
Field blank type: (circle one) Field Blank / Rinsate / Other: Associated Samples: All soils (ND)

Compound	Blank ID	Sample Identification								
	FB072809-SO									
AAA	0.11									
CRQL										

LDC #: [illegible] H 26
SDG #: Su Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

Reviewer: JVG
2nd Reviewer: Q

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

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

Y (N) N/A Were percent recoveries (%R) for surrogates within QC limits?
Y (N) N/A If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?
Y (N) N/A If any %R was less than 10 percent, was a reanalysis performed to confirm %R?

#	Date	Sample ID	Surrogate	%R (Limits)	Qualifications
		2 (15X)	All	DO (various)	No qual
			↓	( ) ↓	↓
		3 (15X)		( )	
				( )	
		4 (15X)		( )	
				( )	
		5 (15X)	✓	( )	✓
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
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				( )	

* QC limits are advisory	QC Limits (Soil)	QC Limits (Water)
S1 (NBZ) = Nitrobenzene-d5	23-120	35-114
S2 (FBP) = 2-Fluorobiphenyl	30-115	43-116
S3 (TPH) = Terphenyl-d14	18-137	33-141
S4 (PHL) = Phenol-d5	24-113	10-94
S5 (2FP)= 2-Fluorophenol	25-121	21-100
S6 (TBP) = 2,4,6-Tribromophenol	19-122	10-123
S7 (2CP) = 2-Chlorophenol-d4	20-130*	33-110*
S8 (DCB) = 1,2-Dichlorobenzene-d4	20-130*	16-110*

LDC #: 21991 H2a
SDG #: Sea Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: JVG
2nd Reviewer: [illegible]

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?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		96105-LCS/D	ZZ	122 (50-120)	124 (50-120)	( )	2-5, 96105-MB	J+ dets/P (l)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		96313-LCS/D	RRR	29 (50-120)	31 (50-120)	( )	1, 96313-MB	J-/UJ/P (l)
			TTT	47 (↓)	46 (↓)	( )	↓	↓ ↓
				( )	( )	( )		
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LDC #: 21991 H2a
SDG #: Sa Gong

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: JVG
2nd reviewer: [illegible]

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

Y N N/A Were field duplicate pairs identified in this SDG?
Y N N/A Were target compounds identified in the field duplicate pairs?

Compound	Concentration (ug/kg)		RPD	Parent only
	2	3		
DDD	38	78	40 (⇐110 D)	–
UU	110 U	1000	890	J/UJ/A (fo
ZZ	↓	140	30 ↓	–

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Compound	Concentration ( )		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
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
SA172-25B
SA172-40B
EB091609-SO1
SA128-0.5B
SA128-10B
SA128-29B
SA65-0.5B
SA65009-0.5B
SA153-25BMS
SA153-25BMSD

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 SA30-38B 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 SA172-25B 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 SDG R0905260)	Pyridine	29 (50-120)	31 (50-120)	-	J- (all detects) UJ (all non-detects)	P
	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:

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

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)	P	Laboratory control samples (%R) (l)
R0905260	EB091509-SO1 SA136-0.5B SA136-10B SA136-25B SA136-40B SA30-5B SA30-9B SA30-25B SA30-38B SA153-10B SA153-25B SA153-38B SA172-10B SA172-25B SA172-40B EB091609-SO1 SA128-0.5B SA128-10B 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)	A	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	bl
R0905260	SA172-10B	Di-n-butylphthalate	46U ug/Kg	A	bl
R0905260	SA172-25B	Di-n-butylphthalate	70U ug/Kg	A	bl
R0905260	SA128-10B	Di-n-butylphthalate	52U ug/Kg	A	bl
R0905260	SA65-0.5B	Di-n-butylphthalate	48U ug/Kg	A	bl
R0905260	SA65009-0.5B	Di-n-butylphthalate	50U ug/Kg	A	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	A	bl
R0905260	SA136-10B	Di-n-butylphthalate	51U ug/Kg	A	bl
R0905260	SA136-25B	Di-n-butylphthalate	39U ug/Kg	A	bl
R0905260	SA136-40B	Di-n-butylphthalate	49U ug/Kg	A	bl
R0905260	SA30-5B	Di-n-butylphthalate	48U ug/Kg	A	bl
R0905260	SA30-25B	Di-n-butylphthalate	76U ug/Kg	A	bl
R0905260	SA30-38B	Di-n-butylphthalate	59U ug/Kg	A	bl
R0905260	SA153-10B	Di-n-butylphthalate	40U ug/Kg	A	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
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 21991I2a
SDG #: R0905260
Laboratory: Columbia Analytical Services

Date: 11/19/09
Page: 1 of 1
Reviewer: JV6
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: 9/15-16/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	%RSD ≤20
IV.	Continuing calibration/ICV	A	CCV/ICV ≤25%
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	
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 = 20 21
XVII.	Field blanks	SW	EB = 1 16* FB = FB072909-S8 (from R0904226)

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

Validated Samples: water + soil

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

VALIDATION FINDINGS WORKSHEET

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

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

LDC #: 21991 I 2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

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

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 method blank analyzed for each matrix?
Y N 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 Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 9/18/09 **Blank analysis date:** 9/29/09
Conc. units: ug/L Associated Samples: 1, 16 (ND)

Compound	Blank ID	Sample Identification								
	96313-MB									
AAA	0.14									

Blank extraction date: 9/21/09 **Blank analysis date:** 9/30/09
Conc. units: ug/Kg Associated Samples: 11 - 15, 17 - 21 (bl)

Compound	Blank ID	Sample Identification								
	96405-MB	11	13	14	18	20	21			
XX	44	45/4	46/4	70/4	52/4	48/4	50			

5x Phthalates
2x all others

LDC #: 21991I2a
SDG #: Cu Conv

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: JV6
2nd Reviewer: M

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 method blank analyzed for each matrix?
Y N 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 Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 9/17/09 **Blank analysis date:** 9/25/09 (b1)
Conc. units: ug/kg Associated Samples: 2-10

Compound	Blank ID	Sample Identification								
	96211-MB	2	3	4	5	6	8	9	10	
XX	52	90/U	51/U	39/U	49/U	48/U	76/U	59/U	40/U	

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

Compound	Blank ID	Sample Identification								

5x Phthalates
2x all others

LDC #: 21991 I2a
SDG #: Tu Cross

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JVG
2nd Reviewer: [illegible]

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

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

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 7/29/09
Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: All soils

Compound	Blank ID	Sample Identification								
	FB072909-SD									
55 AAA	0.11	(All results either ND or > FB)								
CRQL										

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 9/15/09
Field blank type: (circle one) Field Blank / Rinsate / Other: EB Associated Samples: 2-15 (ND)

Compound	Blank ID	Sample Identification								
	1									
45 EEE	0.49									
CRQL										

LDC #: [illegible] SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: JVG
2nd Reviewer: [illegible]

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

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

(Y) N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

(Y) N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

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

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		22/23	RKR	( )	36 (50-150)	64 (30)	11	No qual (MS in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG.	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC #: 21991 I2a
SDG #: Su Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

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

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?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		96313 LCS/D	RRR	29 (50-120)	31 (50-120)	( )	1, 16, 96313-MB	J-/UJ/P (R)
			TTT	47 (↓)	46 (↓)	( )	↓	↓

LCSLCSD.2S

LDC #: 21991 I29
SDG #: Sq Cmer

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: JVL
2nd reviewer: A

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

(Y) N N/A Were field duplicate pairs identified in this SDG?
(Y) N N/A Were target compounds identified in the field duplicate pairs?

Compound	Concentration (ug/Kg)		RPD (Parent only)
	20	21	
XX	48	50	2 (≤ 180 D) -
SS	12	20	8 (≤ 7.2D) J dets/A (fa

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Compound	Concentration ( )		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)	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 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:

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

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA51-10B	SA51009-10B				
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 SA51009-10B SA51-25B SA51-36B	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	A	bl
R0905331	SA151-10B	Di-n-butylphthalate	37U ug/Kg	A	bl
R0905331	SA151-25B	Di-n-butylphthalate	44U ug/Kg	A	bl
R0905331	SA151-39B	Di-n-butylphthalate	47U ug/Kg	A	bl
R0905331	SA151009-39B	Di-n-butylphthalate	86U ug/Kg	A	bl
R0905331	SA51-10B	Di-n-butylphthalate	78U ug/Kg	A	bl
R0905331	SA51009-10B	Di-n-butylphthalate	41U ug/Kg	A	bl

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
Stage 2B

LDC #: 21991J2a
SDG #: R0905331
Laboratory: Columbia Analytical Services

Date: 11/19/09
Page: 1 of 1
Reviewer: JVC
2nd Reviewer: M

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: 9/17/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	2 RSD r²
IV.	Continuing calibration/ICV	A	CCV/ICV ≤25 %
V.	Blanks	SW	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	JVC SW A	LCS/D
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 = 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; D = Duplicate; TB = Trip blank; EB = Equipment blank

Validated Samples: Soil

1	SA165-0.5B	11	SA51-25B	21	96405-MB	31	
2	SA165-10B	12	SA51-36B	22	96626-	32	
3	SA165-28B	13	SA165-10BMS	23		33	
4	SA151-0.5B	14	SA165-10BMSD	24		34	
5	SA151-10B	15		25		35	
6	SA151-25B	16		26		36	
7	SA151-39B D_1	17		27		37	
8	SA151009-39B D_1	18		28		38	
9	SA51-10B D_2	19		29		39	
10	SA51009-10B D_2	20		30		40	

LDC #: 21991 J2q
SDG #: Eq Corr

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: SW
2nd Reviewer: [illegible]

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 method blank analyzed for each matrix?
Y N 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 Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 9/21/09 **Blank analysis date:** 9/30/09
Conc. units: ug/kg Associated Samples: 1, 3-10 (6L)

Compound	Blank ID	Sample Identification								
	96405-MB	3	4	5	6	7	8	9	10	
XX	44	68/4	(240)	37/4	44/4	47/4	86/4	78/4	41/4	

Blank extraction date: 9/23/09 **Blank analysis date:** 9/30/09
Conc. units: ug/kg Associated Samples: 2, 11, 12 (ND)

Compound	Blank ID	Sample Identification								
	96626-MB3									
XX	68									

5x Phthalates
2x all others

LDC #: 21991J2a
SDG #: Sa Cmw

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 1 of 1
Reviewer: SVG
2nd Reviewer: [illegible]

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

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

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 7/29/09
Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: All (ND)

Compound	Blank ID	Sample Identification								
	FB072909-SO									
AAA	0.11									
CRQL										

Blank units: _____ **Associated sample units:** _____
Sampling date: _____
Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								
CRQL										

LDC #: 21991 U2C
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

Page: 1 of 1
Reviewer: JV6
2nd Reviewer: M

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

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

Y (N) N/A Were percent recoveries (%R) for surrogates within QC limits?
Y (N) N/A If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?
Y (N) N/A If any %R was less than 10 percent, was a reanalysis performed to confirm %R?

#	Date	Sample ID	Surrogate	%R (Limits)	Qualifications
		1 (2ex)	All	DO (various)	No qual
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

* QC limits are advisory	QC Limits (Soil)	QC Limits (Water)		QC Limits (Soil)	QC Limits (Water)
S1 (NBZ) = Nitrobenzene-d5	23-120	35-114	S5 (2FP)= 2-Fluorophenol	25-121	21-100
S2 (FBP) = 2-Fluorobiphenyl	30-115	43-116	S6 (TBP) = 2,4,6-Tribromophenol	19-122	10-123
S3 (TPH) = Terphenyl-d14	18-137	33-141	S7 (2CP) = 2-Chlorophenol-d4	20-130*	33-110*
S4 (PHL) = Phenol-d5	24-113	10-94	S8 (DCB) = 1,2-Dichlorobenzene-d4	20-130*	16-110*

LDC #: 21991 J2a
SDG #: Subset

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: JVG
2nd Reviewer: [illegible]

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

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

Y N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

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

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

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		13/14	RRR	35 (50-150)	43 (50-150)	( )	2	No qual
				( )	( )	( )		(LCS/LCSD in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG.	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC #: 21991 J29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: VV
2nd reviewer: A

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

Y N N/A Were field duplicate pairs identified in this SDG?
Y N N/A Were target compounds identified in the field duplicate pairs?

Compound	Concentration (ug/kg)		RPD (≤50)	Parent only
	7	8		
EEE	400	400	0 (≤190 D)	-
XX	47	86	39	-

Compound	Concentration (ug/kg)		RPD	Parent only
	9	10		
XX	78	41	37 (≤180 D)	-

Compound	Concentration ( )		RPD

Compound	Concentration ( )		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)	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	Finding	Flag	A or P
All samples in SDG R0905348	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 SA161-25B and SA161009-25B were identified as field duplicates. No semivolatiles were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA161-25B	SA161009-25B				
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)	P	Laboratory control samples (%R) (l)
R0905348	EB091809-SO1 SA117-0.5B SA117-9B SA117-25B SA117-41B SA161-0.5B SA161-10B SA161-25B SA161009-25B SA161-37B	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 R0905348

SDG	Sample	Compound TIC (RT in minutes)	Modified Final Concentration	A or P	Code
R0905348	SA117-9B	Di-n-butylphthalate	49U ug/Kg	A	bl
R0905348	SA117-41B	Di-n-butylphthalate	42U ug/Kg	A	bl
R0905348	SA161-0.5B	Di-n-butylphthalate	43U ug/Kg	A	bl
R0905348	SA161-10B	Di-n-butylphthalate	64U ug/Kg	A	bl
R0905348	SA161009-25B	Di-n-butylphthalate	50U ug/Kg	A	bl
R0905348	SA161-37B	Di-n-butylphthalate	87U ug/Kg	A	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
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 21991K2a
SDG #: R0905348
Laboratory: Columbia Analytical Services

Date: 11/19/09
Page: 1 of 1
Reviewer: JVC
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: 9/18/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	2 RSD r²
IV.	Continuing calibration/ICV	A	CCV/ICV ∈ 25 2
V.	Blanks	SW	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	SW	LCS/D
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 = 8, 9
XVII.	Field blanks	SW	*EB = 1 FB = FB072909-SO (from R0904326)

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

Validated Samples: Water + Soil

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

VALIDATION FINDINGS WORKSHEET

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

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

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

LDC #: 21991 k2a
SDG #: Sw Cmw

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: JV6
2nd Reviewer: [illegible]

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 method blank analyzed for each matrix?
Y N 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 Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 9/23/09 **Blank analysis date:** 9/30/09
Conc. units: ug/kg Associated Samples: 2 - 10 (LL)

Compound	Blank ID	Sample Identification								
	96626-MB	3	5	6	7	9	10			
XX	68	49/U	42/U	43/U	64/U	50/U	87/U			

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

Compound	Blank ID	Sample Identification								

5x Phthalates
2x all others

LDC #: 21991k29
SDG #: Sa Cmv

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 1 of 1
Reviewer: JV6
2nd Reviewer: A

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

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

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

Blank units: ug/L **Associated sample units:** ug/kg

Sampling date: 7/29 &9

Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: All soils (ND)

Compound	Blank ID	Sample Identification								
	FB072905-SO									
AAA	0.11									
CRQL										

Blank units: _____ **Associated sample units:** _____

Sampling date: _____

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

Compound	Blank ID	Sample Identification								
CRQL										

LDC #: 21991K2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Reviewer: JVG
2nd Reviewer: [illegible]

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?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		96517-LCS/D	RRR	34 (50-120)	30 (50-120)	( )	1. 96517-MB	J-/UJ/P (l)
				( )	( )	( )	↓	↓ ↓
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 21991K29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: NV6
2nd reviewer: K

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

Y N N/A Were field duplicate pairs identified in this SDG?
Y N N/A Were target compounds identified in the field duplicate pairs?

Compound	Concentration (ug/kg)		RPD (Parent only)
	8	9	
XX	220 U	50	170 (≤ 220 D) —

Compound	Concentration ( )		RPD

Compound	Concentration ( )		RPD

Compound	Concentration ( )		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 SA66-28B 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)	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 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:

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA32-25B	SA32009-25B				
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)	A

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA66-0.5B	SA66009-0.5B				
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 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	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)	A	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	A	bl
R0905387	RSAT4-53B	Di-n-butylphthalate	48U ug/Kg	A	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
Stage 2B

LDC #: 21991L2a
SDG #: R0905387
Laboratory: Columbia Analytical Services

Date: 11/25/09
Page: 1 of 1
Reviewer: JVG
2nd Reviewer: V

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 9/21/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	%D RSD r ✓
IV.	Continuing calibration/ICV	A	CCV/ICV ≤ 25%
V.	Blanks	SW	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	LCS/D
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
XVII.	Field blanks	SW	FB = FB072909-SO (from R0904226) ↓ = FB080309-SO (from R0904279)

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

1	SA32-0.5B	11	SA129-29B	21	96746-MB	31	
2	SA32-9B	12	RSAT4-0.5B	22		32	
3	SA32-25B D1	13	RSAT4-10B	23		33	
4	SA32009-25B D1	14	RSAT4-25B	24		34	
5	SA32-37B	15	RSAT4-40B	25		35	
6	SA66-0.5B D✓	16	RSAT4-53B	26		36	
7	SA66009-0.5B D✓	17	SA32-0.5BMS	27		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)

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	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-octylphthalate**	UUU Octachloro styrene
N. 2-Nitrophenol**	CC. Dimethylphthalate	RR. 4-Bromophenyl-phenylether	GGG. Benzo(b)fluoranthene	VVV.
O. 2,4-Dimethylphenol	DD. Acenaphthylene	SS. Hexachlorobenzene	HHH. Benzo(k)fluoranthene	WWW.

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

LDC #: 21991 L2a
SDG #: Sw Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: JV6
2nd Reviewer: [illegible]

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 method blank analyzed for each matrix?
Y N 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 Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 9/24/09 **Blank analysis date:** 10/6/09
Conc. units: ug/kg Associated Samples: All (b1)

Compound	Blank ID	Sample Identification								
	96746-MB 1	16								
XX	66	46/4	48/4							

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

Compound	Blank ID	Sample Identification								

5x Phthalates
2x all others

LDC #: 21991 L2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: JV6
2nd 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 Were target compounds detected in the field blanks?

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 7/29/09
Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: 1-11 (ND)

Compound	Blank ID	Sample Identification								
	FB072909-SO									
AAA	0.11									
CRQL										

Blank units: ug/L **Associated sample units:** ug/kg
Sampling date: 8/03/09
Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: 12-16

Compound	Blank ID	Sample Identification								
	FB080309-SO									
EEE	2.0		(All results either ND or > FB)							
AAA	0.14									
LL	0.36									
CRQL										

LDC #: [illegible]

SDG #: Sa Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

Page: 1 of 1

Reviewer: SV6

2nd Reviewer: L

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

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

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

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

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

#	Date	Sample ID	Surrogate	%R (Limits)	Qualifications
		6 (20x)	All	DO (Varies)	No qual
				( )	
		7 (20x)		( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

* QC limits are advisory	QC Limits (Soil)	QC Limits (Water)		QC Limits (Soil)	QC Limits (Water)
S1 (NBZ) = Nitrobenzene-d5	23-120	35-114	S5 (2FP)= 2-Fluorophenol	25-121	21-100
S2 (FBP) = 2-Fluorobiphenyl	30-115	43-116	S6 (TBP) = 2,4,6-Tribromophenol	19-122	10-123
S3 (TPH) = Terphenyl-d14	18-137	33-141	S7 (2CP) = 2-Chlorophenol-d4	20-130*	33-110*
S4 (PHL) = Phenol-d5	24-113	10-94	S8 (DCB) = 1,2-Dichlorobenzene-d4	20-130*	16-110*

LDC #: 21991L2a
SDG #: See Cover

Reviewer: JVG
2nd Reviewer: [illegible]

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

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

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

Y N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

(Y) N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

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

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		17/18	EEE	197 (50-150)	170 (50-150)	( )	↓	No qual (LCS/D ok) ↓
			SS	480 (↓)	1137 (↓)	( )		
			UU	190 ( )	340 ( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

	Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)		Compound	QC Limits (Soil)	RPD (Soil)	QC Limits (Water)	RPD (Water)
A.	Phenol	26-90%	≤ 35%	12-110%	≤ 42%	GG.	Acenaphthene	31-137%	≤ 19%	46-118%	≤ 31%
C.	2-Chlorophenol	25-102%	≤ 50%	27-123%	≤ 40%	II.	4-Nitrophenol	11-114%	≤ 50%	10-80%	≤ 50%
E.	1,4-Dichlorobenzene	28-104%	≤ 27%	36-97%	≤ 28%	KK.	2,4-Dinitrotoluene	28-89%	≤ 47%	24-96%	≤ 38%
J.	N-Nitroso-di-n-propylamine	41-126%	≤ 38%	41-116%	≤ 38%	TT.	Pentachlorophenol	17-109%	≤ 47%	9-103%	≤ 50%
R.	1,2,4-Trichlorobenzene	38-107%	≤ 23%	39-98%	≤ 28%	ZZ.	Pyrene	35-142%	≤ 36%	26-127%	≤ 31%
V.	4-Chloro-3-methylphenol	26-103%	≤ 33%	23-97%	≤ 42%						

LDC #: 21991L26
SDG #: Sediment

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: JV6
2nd reviewer:

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

(Y) N N/A Were field duplicate pairs identified in this SDG?
(Y) N N/A Were target compounds identified in the field duplicate pairs?

Compound	Concentration (ug/kg)		RPD
	3	4	RPD (parent only)
EEE	190	190	0 (≤190 D)
SS	27	35	8 (≤7.4 D)
UUU	7.4 U	20	12.6 J/UJ (f

Compound	Concentration (ug/kg)		RPD
	6	7	
SS	4200	4300	2 (≤502 RPD)

Compound	Concentration ( )		RPD

Compound	Concentration ( )		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
SA205-10B
SA205-25B
SA205-41B
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
SA208-0.5B
SA208-7B
SA101-0.5BMS
SA101-0.5BMSD

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)	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
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 SA84-43B SA101-0.5B SA101-10B SA101-25B SA101-42B SA121-0.5B SA121009-0.5B SA121-10B SA121-25B SA121-44B SA208-0.5B

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 SA84-43B SA101-0.5B SA101-10B SA101-25B SA101-42B SA121-0.5B SA121009-0.5B SA121-10B SA121-25B SA121-44B

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)	P

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	Finding	Flag	A or P
All samples in SDG R0905464	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 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:

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

Compound	Concentration (ug/Kg)		RPD (Limits)	Difference (Limits)	Flags	A or P
	SA121-0.5B	SA121009-0.5B				
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)	P	Laboratory control samples (%R)(RPD) (l,ld)
R0905464	EB092509-SO1A2 EB092509-SO2A4	1,4-Dioxane	J- (all detects) UJ (all non-detects)	P	Laboratory control samples (%R) (l)
R0905464	SA205-0.5B SA205-10B SA205-25B SA205-41B 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 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	A	bl
R0905464	SA205-41B	Di-n-butylphthalate	60U ug/Kg	A	bl
R0905464	SA84-10B	Di-n-butylphthalate	46U ug/Kg	A	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	bl
R0905464	SA84-25B	Di-n-butylphthalate	49U ug/Kg	A	bl
R0905464	SA84-43B	Di-n-butylphthalate	88U ug/Kg	A	bl
R0905464	SA101-0.5B	Di-n-butylphthalate	53U ug/Kg	A	bl
R0905464	SA101-42B	Di-n-butylphthalate	55U ug/Kg	A	bl
R0905464	SA121-0.5B	Di-n-butylphthalate	51U ug/Kg	A	bl
R0905464	SA121009-0.5B	Di-n-butylphthalate	46U ug/Kg	A	bl
R0905464	SA121-10B	Di-n-butylphthalate	77U ug/Kg	A	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 Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 21991N2a
SDG #: R0905464
Laboratory: Columbia Analytical Services

Date: 11/19/09
Page: 1 of 1
Reviewer: SW
2nd Reviewer: A

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

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 9/24-25/09
II.	GC/MS Instrument performance check	A	
III.	Initial calibration	A	% RSD r
IV.	Continuing calibration/ICV	SW	CCV/ICV ≤ 25%
V.	Blanks	SW	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	A	
VIII.	Laboratory control samples	SW	LCS/D
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 = 6, 7 D_2 = 16, 17
XVII.	Field blanks	SW	*EB = 10, 11 FB = FB072909-SO (from R0904236) ↓ = FB080309-SO (from R0904279)

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 + Water

1	SA205-0.5B	S	11	EB092509-SO2A4	W	21	SA208-0.5B	S	31	97129-MB
2	SA205-10B		12	SA101-0.5B	S	22	SA208-7B		32	97225-
3	SA205-25B		13	SA101-10B		23	SA101-0.5BMS		33	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_1	16	SA121-0.5B	D_2	26			36	
7	SA84009-10B	D_1	17	SA121009-0.5B	D_2	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-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	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-octylphthalate**	UUU 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.

LDC #: 21991N29
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: JVG
2nd Reviewer: [illegible]

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

#	Date	Standard ID	Compound	Finding %D (Limit: ≤25.0%)	Finding RRF (Limit: ≥0.05)	Associated Samples	Qualifications
	10/09/09	AV513	TTT (+)	25.1		13, 16, 19-22, 97330-MB	J+ dets/A (c)

LDC #: 21991N2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: SV6
2nd Reviewer: N

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 method blank analyzed for each matrix?
Y N 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 Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 9/29/09 **Blank analysis date:** 10/02/09 (bl)
Conc. units: ug/kg Associated Samples: 1-9, 12-21

Compound	Blank ID	Sample Identification								
	97129-MB	3	4	6	7	8	9	12	13	15
XX	35	524/U	60/U	46/U	78/U	49/U	88/U	53/U	(600)	55/U

Blank extraction date: _____ **Blank analysis date:** Same as above bl
Conc. units: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								
	97129-MB	16	17	18						
XX	35	51/U	46/U	77/U						

5x Phthalates
2x all others

LDC #: 21991N2a
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Page: 1 of
Reviewer: JV
2nd Reviewer: n

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

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

Blank units: ng/L **Associated sample units:** ug/Kg
Sampling date: 7/29/09
Field blank type: (circle one) Field Blank / Rinsate / Other: Associated Samples: 21, 22 (ND)

Compound	Blank ID	Sample Identification								
	FB072909-SO									
AAA	0.11									
CRQL										

Blank units: ug/L **Associated sample units:** ug/Kg
Sampling date: 8/03/09
Field blank type: (circle one) Field Blank / Rinsate / Other: Associated Samples: 1-9, 12-20

Compound	Blank ID	Sample Identification								
	FB080309-SO									
EEE	2.0	(All results either ND or > FB)								
AAA	0.14									
LL	0.36									
CRQL										

LDC #: [illegible]

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

Reviewer: SVG

2nd Reviewer: [illegible]

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

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

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

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

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

#	Date	Sample ID	Surrogate	%R (Limits)	Qualifications
		5 (40x)	All	DO (various)	No qual
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

* QC limits are advisory	QC Limits (Soil)	QC Limits (Water)
S1 (NBZ) = Nitrobenzene-d5	23-120	35-114
S2 (FBP) = 2-Fluorobiphenyl	30-115	43-116
S3 (TPH) = Terphenyl-d14	18-137	33-141
S4 (PHL) = Phenol-d5	24-113	10-94

	QC Limits (Soil)	QC Limits (Water)
S5 (2FP)= 2-Fluorophenol	25-121	21-100
S6 (TBP) = 2,4,6-Tribromophenol	19-122	10-123
S7 (2CP) = 2-Chlorophenol-d4	20-130*	33-110*
S8 (DCB) = 1,2-Dichlorobenzene-d4	20-130*	16-110*

LDC #: 21991 N2a
SDG #: Su Cover

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

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

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?

#	Date	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		97225- LCS/D	RRR	24 (50-120)	41 (50-120)	53 (30)	10, 11, 97225-MB	J/UJ/P (1 bd)
			TTT	45 (↓)	45 (↓)	( )	↓	J-/UJ/P (1)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC#: 21991N2a
SDG#:See cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: JV6
2nd Reviewer: [illegible]

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

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

Compound Name	Conc (ug/Kg)		RPD (≤ 50%)	Diff	Diff Limits	Quals (Parent Only)
	6	7				
Di-n-butyl phthalate	46	78		32	≤ 180	-

Compound Name	Conc (ug/Kg)		RPD (≤ 50%)	Diff	Diff Limits	Quals (Parent Only)
	16	17				
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	-
Hexachlrobenzene	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	-