Tronox LLC Facility, 2009 Phase B Investigation, Henderson
Data Validation Reports
LDC #21495

Dioxins/Dibenzofurans

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: June 1 through June 4, 2009

LDC Report Date: September 27, 2009

Matrix: Soil

Parameters: Dioxins/Dibenzofurans

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903051

Sample Identification

RSA12-0.5B
RSA12-0.5BDL
RSAI3-0.5B
RSAI3-0.5BDL
RSAJ5-0.5B
RSAJ5-0.5BDL
RSAK5-0.5B
RSAK5-0.5BDL
SA76-0.5B
SA76-0.5BDL
SA76009-0.5B
SA76009-0.5BDL
RSAL3-0.5B
RSAL3-0.5BDL
SA100-0.5B
RSAM3-0.5B
RSAM2-0.5B
SA189-0.5B
SA189-0.5BDL
SA88-0.5B
SA88-0.5BDL
SA152-0.5B
SA152009-0.5B
RSAJ2-0.5B
RSAJ2-0.5BDL
RSAJ3-0.5B
SA202-0.5B

Introduction

This data review covers 27 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8290 for Polychlorinated Dioxins/Dibenzofurans.

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 USEPA Contract Laboratory Program National Functional Guidelines for Polychlorinated Dioxins/Dibenzofurans Data Review (September 2005) 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 XIV.

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

The following are definitions of the data qualifiers:

J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.

J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

B The analytical result may be a false positive totally attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JB The analytical result may be biased high and partially attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JK The analytical result is an estimated maximum possible concentration (EMPC).

X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.

J-TDS The analytical result is estimated based on failure of the Total Dissolved Solids (TDS) correctness check performed in accordance with the Standard Method 1030E.

J-CAB The analytical result is estimated based on failure of the cation-anion balance correctness check performed in accordance with Standard Method 1030E.

J-TDS & CAB The analytical result is unreliable based on the failure of the cation-anion balance and TDS correctness check performed in accordance with standard Method 1030E.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required daily frequency.

Retention time windows were established for all homologues. The chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomer was less than or equal to 25% .

III. Initial Calibration

A five point initial calibration was performed as required by the method.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for unlabeled compounds and less than or equal to 30.0% for labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

IV. Routine Calibration (Continuing)

Routine calibration was performed at the required frequencies.

All of the routine calibration percent differences (%D) between the initial calibration RRF and the routine calibration RRF were less than or equal to 20.0% for unlabeled compounds and less than or equal to 30.0% for labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

V. Blanks

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

Method Blank ID	Extraction Date	Compound	Concentration	Associated Samples
EQ0900197-01	6/10/09	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,4,6,7,8-HpCDF OCDF Total HpCDD	0.449 ng/Kg 3.26 ng/Kg 0.193 ng/Kg 0.399 ng/Kg 0.449 ng/Kg	RSA12-0.5B RSA12-0.5BDL RSAI3-0.5B RSAI3-0.5BDL RSAJ5-0.5B RSAJ5-0.5BDL RSAK5-0.5B RSAK5-0.5BDL SA76-0.5B SA76-0.5BDL SA76009-0.5B SA76009-0.5BDL RSAL3-0.5B RSAL3-0.5BDL SA100-0.5B RSAM3-0.5B RSAM2-0.5B SA88-0.5B SA88-0.5BDL SA152-0.5B RSAJ2-0.5B RSAJ2-0.5BDL SA202-0.5B
EQ0900210-01	6/16/09	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,4,6,7,8-HpCDF OCDF Total HpCDD Total HpCDF	0.283 ng/Kg 1.52 ng/Kg 0.268 ng/Kg 0.468 ng/Kg 0.283 ng/Kg 0.268 ng/Kg	SA189-0.5B SA189-0.5BDL SA152009-0.5B RSAJ3-0.5B

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	Reported Concentration	Modified Final Concentration
SA100-0.5B	OCDD	14.3 ng/Kg	14.3U ng/Kg
RSAM2-0.5B	1,2,3,4,6,7,8-HpCDD OCDD	1.94 ng/Kg 5.08 ng/Kg	1.94U ng/Kg 5.08U ng/Kg

Sample FB072109-SO (from SDG R0904016) was identified as a field blank. No polychlorinated dioxin/dibenzofuran contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072109-SO	7/21/09	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF Total HpCDD Total HxCDF Total HpCDF	8.37 pg/L 21.8 pg/L 6.33 pg/L 3.57 pg/L 4.04 pg/L 43.3 pg/L 19.6 pg/L 205 pg/L 8.37 pg/L 18.1 pg/L 72.1 pg/L	All samples in SDG R0903051

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

VI. 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.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Although the LCSD percent recoveries (%R) and relative percent differences (RPD) were not within QC limits for some compounds, the LCS or LCSD percent recoveries (%R) were within QC limits and no data were qualified.

VIII. Regional Quality Assurance and Quality Control

Not applicable.

IX. Internal Standards

All internal standard recoveries were within QC limits with the following exceptions:

Sample	Internal Standards	%R (Limits)	Compound	Flag	A or P
RSA12-0.5B	^{13}C-2,3,7,8-TCDF	19 (40-135)	2,3,7,8-TCDF Total TCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P
RSA12-0.5BDL	^{13}C-2,3,7,8-TCDF (DB-225)	156 (40-135)	2,3,7,8-TCDF (DB-225)	J (all detects) UJ (all non-detects)	P

Sample	Internal Standards	%R (Limits)	Compound	Flag	A or P
SA76-0.5B	^{13}C-2,3,7,8-TCDF	20 (40-135)	2,3,7,8-TCDF Total TCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P
SA76009-0.5B	^{13}C-2,3,7,8-TCDF (DB-225) ^{13}C-2,3,7,8-TCDF (DB-5)	142 (40-135) 17 (40-135)	2,3,7,8-TCDF (DB-225) 2,3,7,8-TCDF (DB-5) Total TCDF	J (all detects) UJ (all non-detects)	P
SA76009-0.5BDL	^{13}C-2,3,7,8-TCDF ^{13}C-1,2,3,4,7,8-HxCDF	17 (40-135) 38 (40-135)	2,3,7,8-TCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF	J (all detects) UJ (all non-detects)	P
SA202-0.5B	^{13}C-2,3,7,8-TCDF	38 (40-135)	2,3,7,8-TCDF Total TCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P

X. Target Compound Identifications

Raw data were not reviewed for this SDG.

XI. Project Quantitation Limit

All project quantitation limits were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
RSA12-0.5B SA76009-0.5B SA76-0.5B	2,3,7,8-TCDD 1,2,3,7,8-PeCDD 1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF Total TCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A

Sample	Compound	Finding	Criteria	Flag	A or P
RSAI3-0.5B	1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
RSAJ5-0.5B SA88-0.5B RSAJ2-0.5B	1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
RSAK5-0.5B	1,2,3,7,8-PeCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
RSAL3-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A

Sample	Compound	Finding	Criteria	Flag	A or P
SA189-0.5B	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
RSAJ3-0.5B	1,2,3,4,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903051	All compounds reported below the PQL.	J (all detects)	A

All compounds reported as EMPC were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903051	All compounds reported as estimated maximum possible concentration (EMPC).	JK (all detects)	A

Raw data were not reviewed for this SDG.

XII. System Performance

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
RSA12-0.5B SA76009-0.5B SA76-0.5B	2,3,7,8-TCDD 1,2,3,7,8-PeCDD 1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X X X X X X X X X	A
RSA12-0.5BDL SA76009-0.5BDL SA100-0.5B RSAM3-0.5B RSAM2-0.5B SA152-0.5B SA152009-0.5B RSAJ3-0.5B SA202-0.5B SA76-0.5B	2,3,7,8-TCDF (from DB-5)	X	A
RSAI3-0.5B	1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X X X X X	A
RSAI3-0.5BDL	All TCL compounds except 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-225)	X	A

Sample	Compound	Flag	A or P
RSAJ5-0.5B SA88-0.5B RSAJ2-0.5B	1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X X X X X X	A
RSAJ5-0.5BDL SA88-0.5BDL RSAJ2-0.5BDL	All TCL compounds except 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-225)	X	A
RSAK5-0.5B	1,2,3,7,8-PeCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X X X X X X	A

Sample	Compound	Flag	A or P
RSAK5-0.5BDL	All TCL compounds except 1,2,3,7,8-PeCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-225)	X	A
RSAL3-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X	A
RSAL3-0.5BDL	All TCL compounds except 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF	X	A
SA189-0.5B	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X	A
SA189-0.5BDL	All TCL compounds except 1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF	X	A

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

XIV. Field Duplicates

Samples SA76-0.5B and SA76009-0.5B, samples SA76-0.5BDL and SA76009-0.5BDL, and samples SA152-0.5B and SA152009-0.5B were identified as field duplicates. No polychlorinated dioxins/dibenzofurans were detected in any of the samples with the following exceptions:

Compound	Concentration (ng/Kg)		RPD (Limits)	Difference (Limits)	Flag	A or P
	SA76-0.5B	SA76009-0.5B				
2,3,7,8-TCDD	433	676	44 (≤50)	-	-	-
1,2,3,7,8-PeCDD	2460	3870	45 (≤50)	-	-	-
1,2,3,4,7,8-HxCDD	1860	3070	49 (≤50)	-	-	-
1,2,3,6,7,8-HxCDD	3330	5260	45 (≤50)	-	-	-
1,2,3,7,8,9-HxCDD	4020	6580	48 (≤50)	-	-	-
1,2,3,4,6,7,8-HpCDD	14400	17200	18 (≤50)	-	-	-
OCDD	13200	20800	45 (≤50)	-	-	-
2,3,7,8-TCDF	81400	138000	52 (≤50)	-	J (all detects)	A
1,2,3,7,8-PeCDF	29900	51900	54 (≤50)	-	J (all detects)	A
2,3,4,7,8-PeCDF	14500	26700	59 (≤50)	-	J (all detects)	A
1,2,3,4,7,8-HxCDF	77200	120000	43 (≤50)	-	-	-
1,2,3,6,7,8-HxCDF	47000	77900	49 (≤50)	-	-	-
1,2,3,7,8,9-HxCDF	9010	16400	58 (≤50)	-	J (all detects)	A
2,3,4,6,7,8-HxCDF	9770	16400	51 (≤50)	-	J (all detects)	A
1,2,3,4,6,7,8-HpCDF	95300	132000	32 (≤50)	-	-	-
1,2,3,4,7,8,9-HpCDF	84900	121000	35 (≤50)	-	-	-
OCDF	197000	271000	32 (≤50)	-	-	-

Compound	Concentration (ng/Kg)		RPD (Limits)	Difference (Limits)	Flag	A or P
	SA76-0.5B	SA76009-0.5B				
Total TCDD	25100	35700	35 (≤50)	-	-	-
Total PeCDD	31200	48800	44 (≤50)	-	-	-
Total HxCDD	26900	43600	47 (≤50)	-	-	-
Total HpCDD	22400	26700	18 (≤50)	-	-	-
Total TCDF	983000	1630000	50 (≤50)	-	-	-
Total PeCDF	234000	283000	19 (≤50)	-	-	-
Total HxCDF	366000	536000	38 (≤50)	-	-	-
Total HpCDF	296000	431000	37 (≤50)	-	-	-
2,3,7,8-TCDF (DB-225)	12900	15100	16 (≤50)	-	-	-

Compound	Concentration (ng/Kg)		RPD (Limits)	Difference (Limits)	Flag	A or P
	SA76-0.5BDL	SA76009-0.5BDL				
2,3,7,8-TCDD	259	376	-	117 (≤199)	-	-
1,2,3,7,8-PeCDD	1040	1190	-	150 (≤497)	-	-
1,2,3,4,7,8-HxCDD	824	1040	-	216 (≤497)	-	-
1,2,3,6,7,8-HxCDD	1920	2460	-	540 (≤497)	J (all detects)	A
1,2,3,7,8,9-HxCDD	2060	2640	-	580 (≤497)	J (all detects)	A
1,2,3,4,6,7,8-HpCDD	8140	7640	6 (≤50)	-	-	-
OCDD	8370	10600	24 (≤50)	-	-	-
2,3,7,8-TCDF	12400	103000	157 (≤50)	-	J (all detects)	A
1,2,3,7,8-PeCDF	12600	21400	52 (≤50)	-	J (all detects)	A

Compound	Concentration (ng/Kg)		RPD (Limits)	Difference (Limits)	Flag	A or P
	SA76-0.5BDL	SA76009-0.5BDL				
2,3,4,7,8-PeCDF	5050	10400	69 (≤50)	-	J (all detects)	A
1,2,3,4,7,8-HxCDF	62800	88200	34 (≤50)	-	-	-
1,2,3,6,7,8-HxCDF	37100	54500	38 (≤50)	-	-	-
1,2,3,7,8,9-HxCDF	4280	7060	49 (≤50)	-	-	-
2,3,4,6,7,8-HxCDF	8640	11700	30 (≤50)	-	-	-
1,2,3,4,6,7,8-HpCDF	135000	167000	21 (≤50)	-	-	-
1,2,3,4,7,8,9-HpCDF	62300	80600	26 (≤50)	-	-	-
OCDF	305000	397000	26 (≤50)	-	-	-
2,3,7,8-TCDF (DB-225)	6470	6240	4 (≤50)	-	-	-

Compound	Concentration (ng/Kg)		RPD (Limits)	Difference (Limits)	Flag	A or P
	SA152-0.5B	SA152009-0.5B				
2,3,7,8-TCDD	1.11	1.90U	-	0.79 (≤1.90)	-	-
1,2,3,7,8-PeCDD	3.79	4.75U	-	0.96 (≤4.75)	-	-
1,2,3,4,7,8-HxCDD	1.97	4.75U	-	2.78 (≤4.75)	-	-
1,2,3,6,7,8-HxCDD	4.33	4.75U	-	0.42 (≤4.75)	-	-
1,2,3,7,8,9-HxCDD	5.90	0.605	-	5.295 (≤4.75)	J (all detects)	A
1,2,3,4,6,7,8-HpCDD	13.7	1.50	-	12.2 (≤4.75)	J (all detects)	A
OCDD	15.9	9.17	-	6.73 (≤9.50)	-	-
2,3,7,8-TCDF	62.4	0.565	-	61.835 (≤1.90)	J (all detects)	A
1,2,3,7,8-PeCDF	52.0	4.75U	-	47.25 (≤4.75)	J (all detects) UJ (all non-detects)	A

Compound	Concentration (ng/Kg)		RPD (Limits)	Difference (Limits)	Flag	A or P
	SA152-0.5B	SA152009-0.5B				
2,3,4,7,8-PeCDF	27.9	4.75U	-	23.15 (≤4.75)	J (all detects) UJ (all non-detects)	A
1,2,3,4,7,8-HxCDF	107	0.952	-	106.048 (≤4.75)	J (all detects)	A
1,2,3,6,7,8-HxCDF	63.0	0.634	-	62.366 (≤4.75)	J (all detects)	A
1,2,3,7,8,9-HxCDF	10.0	4.75U	-	5.25 (≤4.75)	J (all detects) UJ (all non-detects)	A
2,3,4,6,7,8-HxCDF	15.9	4.75U	-	11.15 (≤4.75)	J (all detects) UJ (all non-detects)	A
1,2,3,4,6,7,8-HpCDF	187	2.52	-	184.48 (≤4.75)	J (all detects)	A
1,2,3,4,7,8,9-HpCDF	92.2	0.941	-	91.259 (≤4.75)	J (all detects)	A
OCDF	518	6.45	-	511.55 (≤9.50)	J (all detects)	A
Total TCDD	26.3	1.90U	-	24.4 (≤1.90)	J (all detects) UJ (all non-detects)	A
Total PeCDD	37.4	4.75U	-	32.65 (≤4.75)	J (all detects) UJ (all non-detects)	A
Total HxCDD	33.4	0.605	-	32.795 (≤4.75)	J (all detects)	A
Total HpCDD	21.4	1.50	-	19.9 (≤4.75)	J (all detects)	A
Total TCDF	471	0.565	-	470.435 (≤1.90)	J (all detects)	A
Total PeCDF	500	1.12	-	498.88 (≤4.75)	J (all detects)	A
Total HxCDF	400	0.952	-	399.048 (≤4.75)	J (all detects)	A
Total HpCDF	405	3.08	-	401.92 (≤4.75)	J (all detects)	A
2,3,7,8-TCDF (DB-225)	11.2	3.35	-	7.85 (≤1.90)	J (all detects)	A

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SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903051	RSA12-0.5B SA76-0.5B SA202-0.5B	2,3,7,8-TCDF Total TCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P	Internal standards (area) (i)
R0903051	RSA12-0.5BDL	2,3,7,8-TCDF (DB-225)	J (all detects) UJ (all non-detects)	P	Internal standards (area) (i)
R0903051	SA76009-0.5B	2,3,7,8-TCDF (DB-225) 2,3,7,8-TCDF (DB-5) Total TCDF	J (all detects) UJ (all non-detects)	P	Internal standards (area) (i)
R0903051	SA76009-0.5BDL	2,3,7,8-TCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF	J (all detects) UJ (all non-detects)	P	Internal standards (area) (i)
R0903051	RSA12-0.5B SA76009-0.5B SA76-0.5B	2,3,7,8-TCDD 1,2,3,7,8-PeCDD 1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF Total TCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)
R0903051	RSAI3-0.5B	1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903051	RSAJ5-0.5B SA88-0.5B RSAJ2-0.5B	1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)
R0903051	RSAK5-0.5B	1,2,3,7,8-PeCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)
R0903051	RSAL3-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)
R0903051	SA189-0.5B	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)
R0903051	RSAJ3-0.5B	1,2,3,4,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P	Project Quantitation Limit (e)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903051	RSA12-0.5B RSA12-0.5BDL RSAI3-0.5B RSAI3-0.5BDL RSAJ5-0.5B RSAJ5-0.5BDL RSAK5-0.5B RSAK5-0.5BDL SA76-0.5B SA76-0.5BDL SA76009-0.5B SA76009-0.5BDL RSAL3-0.5B RSAL3-0.5BDL SA100-0.5B RSAM3-0.5B RSAM2-0.5B SA189-0.5B SA189-0.5BDL SA88-0.5B SA88-0.5BDL SA152-0.5B SA152009-0.5B RSAJ2-0.5B RSAJ2-0.5BDL RSAJ3-0.5B SA202-0.5B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0903051	RSA12-0.5B RSA12-0.5BDL RSAI3-0.5B RSAI3-0.5BDL RSAJ5-0.5B RSAJ5-0.5BDL RSAK5-0.5B RSAK5-0.5BDL SA76-0.5B SA76-0.5BDL SA76009-0.5B SA76009-0.5BDL RSAL3-0.5B RSAL3-0.5BDL SA100-0.5B RSAM3-0.5B RSAM2-0.5B SA189-0.5B SA189-0.5BDL SA88-0.5B SA88-0.5BDL SA152-0.5B SA152009-0.5B RSAJ2-0.5B RSAJ2-0.5BDL RSAJ3-0.5B SA202-0.5B	All compounds reported as EMPC	JK (all detects)	A	Project Quantitation Limit (k)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903051	RSA12-0.5B SA76009-0.5B SA76-0.5B	2,3,7,8-TCDD 1,2,3,7,8-PeCDD 1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X X X X X X X X X	A	Overall assessment of data (o)
R0903051	RSA12-0.5BDL SA76009-0.5BDL SA100-0.5B RSAM3-0.5B RSAM2-0.5B SA152-0.5B SA152009-0.5B RSAJ3-0.5B SA202-0.5B SA76-0.5B	2,3,7,8-TCDF (from DB-5)	X	A	Overall assessment of data (o)
R0903051	RSAI3-0.5B	1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X X X X X	A	Overall assessment of data (o)
R0903051	RSAI3-0.5BDL	All TCL compounds except 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-225)	X	A	Overall assessment of data (o)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903051	RSAJ5-0.5B SA88-0.5B RSAJ2-0.5B	1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X X X X X X	A	Overall assessment of data (o)
R0903051	RSAJ5-0.5BDL SA88-0.5BDL RSAJ2-0.5BDL	All TCL compounds except 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-225)	X	A	Overall assessment of data (o)
R0903051	RSAK5-0.5B	1,2,3,7,8-PeCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X X X X X X	A	Overall assessment of data (o)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903051	RSAK5-0.5BDL	All TCL compounds except 1,2,3,7,8-PeCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-225)	X	A	Overall assessment of data (o)
R0903051	RSAL3-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X	A	Overall assessment of data (o)
R0903051	RSAL3-0.5BDL	All TCL compounds except 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF	X	A	Overall assessment of data (o)
R0903051	SA189-0.5B	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X	A	Overall assessment of data (o)
R0903051	SA189-0.5BDL	All TCL compounds except 1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF	X	A	Overall assessment of data (o)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903051	SA76-0.5B SA76009-0.5B	2,3,7,8-TCDF 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,7,8,9-HxCDF 2,3,4,6,7,8-HxCDF	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Field duplicates (RPD) (fd)
R0903051	SA76-0.5BDL SA76009-0.5BDL	1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD	J (all detects) J (all detects)	A	Field duplicates (RPD) (fd)
R0903051	SA76-0.5BDL SA76009-0.5BDL	2,3,7,8-TCDF 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF	J (all detects) J (all detects) J (all detects)	A	Field duplicates (Difference) (fd)
R0903051	SA152-0.5B SA152009-0.5B	1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD 2,3,7,8-TCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF Total HxCDD Total HpCDD Total TCDF Total PeCDF Total HxCDF Total HpCDF 2,3,7,8-TCDF (DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Field duplicates (Difference) (fd)
R0903051	SA152-0.5B SA152009-0.5B	1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,7,8,9-HxCDF 2,3,4,6,7,8-HxCDF Total TCDD Total PeCDD	J (all detects) UJ (all non-detects)	A	Field duplicates (Difference) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Dioxins/Dibenzofurans - Laboratory Blank Data Qualification Summary - SDG R0903051

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0903051	SA100-0.5B	OCDD	14.3U ng/Kg	A	bl
R0903051	RSAM2-0.5B	1,2,3,4,6,7,8-HpCDD OCDD	1.94U ng/Kg 5.08U ng/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Dioxins/Dibenzofurans - Field Blank Data Qualification Summary - SDG R0903051

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 21495C21
SDG #: R0903051
Laboratory: Columbia Analytical Services

Date: 9/8/09
Page: 1 of 1
Reviewer: 9
2nd Reviewer: K

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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: 6/1 - 4/09
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration	A	
IV.	Routine calibration/ICV	A	
V.	Blanks	SW	
VI.	Matrix spike/Matrix spike duplicates	N	client specified
VII.	Laboratory control samples	SW	LCS/D
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	SW	
X.	Target compound identifications	N	
XI.	Compound quantitation and CRQLs	SW N	
XII.	System performance	N	
XIII.	Overall assessment of data	SW	
XIV.	Field duplicates	SW	D = 9+11, 10+12, 22+23
XV.	Field blanks	SW	FB01 2109-SO (R0904016)

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

Validated Samples:

1	RSA12-0.5B	11	SA76009-0.5B	21	SA88-0.5BDL	31	ZQ0900197-01
2	RSA12-0.5BDL	12	SA76009-0.5BDL	22	SA152-0.5B	32	ZQ0900210-01
3	RSAI3-0.5B	13	RSAL3-0.5B	23	SA152009-0.5B	33	P103460
4	RSAI3-0.5BDL	14	RSAL3-0.5BDL	24	RSAJ2-0.5B	34	P103553
5	RSAJ5-0.5B	15	SA100-0.5B	25	RSAJ2-0.5BDL	35	P103515
6	RSAJ5-0.5BDL	16	RSAM3-0.5B	26	RSAJ3-0.5B	36	P20729
7	RSAK5-0.5B	17	RSAM2-0.5B	27	SA202-0.5B	37	P103529
8	RSAK5-0.5BDL	18	SA189-0.5B	28		38	P103504
9	SA76-0.5B	19	SA189-0.5BDL	29		39	P103583
10	SA76-0.5BDL	20	SA88-0.5B	30		40	P20758, P20786

Notes: 1 P132024, 2 P132003 X 3 U131957 4 U131990 X 5 U131972 6 U131990
P132041 X

VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

A. 2,3,7,8-TCDD	F. 1,2,3,4,6,7,8-HpCDD	K. 1,2,3,4,7,8-HxCDF	P. 1,2,3,4,7,8,9-HpCDF	U. Total HpCDD
B. 1,2,3,7,8-PeCDD	G. OCDD	L. 1,2,3,6,7,8-HxCDF	Q. OCDF	V. Total TCDF
C. 1,2,3,4,7,8-HxCDD	H. 2,3,7,8-TCDF	M. 2,3,4,6,7,8-HxCDF	R. Total TCDD	W. Total PeCDF
D. 1,2,3,6,7,8-HxCDD	I. 1,2,3,7,8-PeCDF	N. 1,2,3,7,8,9-HxCDF	S. Total PeCDD	X. Total HxCDF
E. 1,2,3,7,8,9-HxCDD	J. 2,3,4,7,8-PeCDF	O. 1,2,3,4,6,7,8-HpCDF	T. Total HxCDD	Y. Total HpCDF

Notes:

COMPND

LDC #: 24952/
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 4

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 8290)

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

Y N N/A Were all samples associated with a method blank?
Y N N/A Was a method blank analyzed for each matrix?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 6/10/09 **Blank analysis date:** 6/12/09
Conc. units: ng/kg Associated Samples: 1-17. 20-22. 24-25. 27 (61)

Compound	Blank ID	Sample Identification								
2,3,7,8-TCDD	00197-01	15	16	17	23		other > 5x			
F	0.449	-		1.94 J	1.50 J					
G	3.26	14.3 J		5.08 J	9.17 J					
O	0.193	-		-	-					
Q	0.399	-		-	-					
U	0.449	-			1.50 J					

Blank extraction date: 6/16/09 **Blank analysis date:** 6/22/09
Conc. units: ng/kg Associated Samples: 18-19. 23. 26 (>5x)

Compound	Blank ID	Sample Identification								
2,3,7,8-TCDD	00210-01	23	23							
F	0.283	-	1.50 J							
G	1.52	-								
O	0.268	-								
Q	0.468	-								
U	0.283	-								
X	0.268	-								

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 24905C21
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

(Y) N N/A Were field blanks identified in this SDG?
Blank units: pg/L **Associated sample units:** ng/Kg
Sampling date: 7/21/09
Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: All (>5x)

Compound	Blank ID	Sample Identification								
	FB072109-SO	5X								
F	8.37	0.04185								
G	21.8	0.109								
K	6.33	0.03165								
L	3.57	0.01785								
M	4.04	0.0202								
O	43.3	0.2165								
P	19.6	0.098								
Q	205	1.025								
U	8.37	0.04185								
X	18.1	0.0905								
Y	72.1	0.3605								
CRQL										

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Samples with compound concentrations within five times the associated field blank concentration are listed above, these sample results were qualified as not detected, "U".

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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 Was a LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?
Y (N) N/A Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?

#	Date	Lab ID/Reference	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		ZR0900197-02LCS/	A	( )	77 (79-178)	( )	1-17, 20-22,	No Qual
		03LCSD	G	( )	187 (80-130)	45 (≤20)	24-25, 27	↓
				( )	( )	( )	ZR0900197-0	(LCS m)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
		ZR0900210-02LCS/	C	( )	( )	21 (≤20)	18-19, 23, 26	No Qual
				( )	( )	( )	ZR0900210-01	(70R m)
		03LCSD		( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 21495C2
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Internal Standards

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Are all internal standard recoveries were within the 40-135% criteria?
Y N N/A Was the S/N ratio all internal standard peaks ≥ 10?

#	Date	Lab ID/Reference	Internal Standard	% Recovery (Limit: 40-135%)		Qualifications
		1	A	19	(40-135)	J/UJ/P (H.V)
					( )	
		2	A (DB-225)	156	( )	(H on DB-225)
					( )	
		#9	A	20	( )	(H.V)
					( )	
		#11	A (DB-225)	142	( )	(H on DB-225)
					( )	
		12	A	17	( )	(H)
			Z	38	( )	(K-N)
					( )	
		2,3,7,8-TCDF	A	38	( )	(H.V)
					( )	
		11	A (DB-5)	17	(40-135)	J/UJ/P (H.V)
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	

	Internal Standards	Check Standard Used		Internal Standards	Check Standard Used
A.	^{13}C-2,3,7,8-TCDF		I.	^{13}C-OCDD	
B.	^{13}C-2,3,7,8-TCDD		K.	^{13}C-1,2,3,4-TCDD	
C.	^{13}C-1,2,3,7,8-PeCDF		L.	^{13}C-1,2,3,7,8,9-HxCDD	
D.	^{13}C-1,2,3,7,8-PeCDD		M		
E.	^{13}C-1,2,3,4,7,8-HxCDF		N.		
F.	^{13}C-1,2,3,6,7,8-HxCDD		O.		
G.	^{13}C-1,2,3,4,6,7,8-HpCDF		P.		
H.	^{13}C-1,2,3,4,6,7,8-HpCDD				

LDC #: 24495c2l
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Reviewer: 9
2nd Reviewer: A

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Y N N/A
Y N N/A

Were the correct internal standard (IS), quantitation ions and relative response factors (RRF) used to quantitate the compound?
Compound quantitation and CRQLs were adjusted to reflect all sample dilutions and dry weight factors (if necessary).

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		All	EMPC results	All	~~J~~ K (E)
			cpds > calib range		
		1, 11, 9	A-Q. V1 Hon DB-5 & DB-225	1, 11, 9	lots/A (e)
		3	E-F. I-Q. Hon DB-5 & DB-225	3	
		5, 20, 24	D-F. I-Q. Hon DB-5 & DB-225	5, 20, 24	
		7	B. D-F. I-Q	7	
		13	F-F. I. K. L. O-Q. Hon DB-5 & DB-225	13	
		18	I. K. L. O-Q. Hon DB-5 & 225	18	

Comments: See sample calculation verification worksheet for recalculations

LDC #: 24950a
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Reviewer: 9
2nd Reviewer: 1

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Y N N/A Were the correct internal standard (IS), quantitation ions and relative response factors (RRF) used to quantitate the compound?
Y N N/A Compound quantitation and CRQLs were adjusted to reflect all sample dilutions and dry weight factors (if necessary).

#	Date	Sample ID	eqds > calib range Finding	Associated Samples	Qualifications
		26	K.O.P.Q. HxDB-5 ~~2,3,7,8-TCDF~~	26	J dets/P (e)

Comments: See sample calculation verification worksheet for recalculations

LDC #: 24950

SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		1, 11, 9	A-Q (H on DB-5 & DB-225)	1, 11, 9	X, O)
	5T, 26,	2, 12, 15-17, 22-23	~~DB~~ H on DB-5	2, 12, 15-17, 22, 23, 26-27	
		3	E-G. I-Q. H on DB-5 & DB-225	3	
		4	All except E-G. I-Q H on DB-225	4	
		5, 20, 24	D-G. I-Q. H on DB-5 & DB-225	5, 20, 24	
		6, 21, 25	All except D-G. I-Q. H on DB-225	6, 21, 25	
		7	B. D-G. I-Q. H on DB-5 & DB-225	7	
		8	All except B. D-G. I-Q. H on DB-225	8	

Comments: _____

C:\WPDOCS\WRK\DIOXIN90\OVR90.21

LDC #: 24926
SDG #: 1st cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Reviewer: A
2nd Reviewer: A

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		13	F-G. I. K. L. O-Q. H on DB-5 & 225	13	X 10)
		14	All except F-G. H-I. K-L. O-Q	14	
		18	F. K. L. O-Q. H on DB-5 & DB-225	18	
		19	All except H-I. K-L O-Q	19	

Comments: _____

LDC#:21495C21
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Compound	Concentration (ng/Kg) 9	Concentration (ng/Kg) 11	(≤50) RPD	(ng/Kg) Difference	(ng/Kg) Limits	Qualifications (Parent Only)
A	433	676	44			
B	2460	3870	45			
C	1860	3070	49			
D	3330	5260	45			
E	4020	6580	48			
F	14400	17200	18			
G	13200	20800	45			
H	81400	138000	52			Jdets/A (fd)
I	29900	51900	54			
J	14500	26700	59			
K	77200	120000	43			
L	47000	77900	49			
N	9010	16400	58			Jdets/A (fd)
M	9770	16400	51			
O	95300	132000	32			
P	84900	121000	35			
Q	197000	271000	32			
R	25100	35700	35			
S	31200	48800	44			
T	26900	43600	47			
U	22400	26700	18			
V	983000	1630000	50			
W	234000	283000	19			
X	366000	536000	38			
Y	296000	431000	37			
H (DB-225)	12900	15100	16			

LDC#:21495C21
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: 9
2nd Reviewer: M

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Compound	Concentration (ng/Kg) 10	Concentration (ng/Kg) 12	(≤50) RPD	(ng/Kg) Difference	(ng/Kg) Limits	Qualifications (Parent Only)
A	259	376		117	(≤199)	
B	1040	1190		150	(≤497)	
C	824	1040		216	(≤497)	
D	1920	2460		540	(≤497)	Idets/A (fd)
E	2060	2640		580	(≤497)	↓
F	8140	7640	6			
G	8370	10600	24			
H	12400	103000	157			Idets/A (fd)
I	12600	21400	52			↓
J	5050	10400	69			
K	62800	88200	34			
L	37100	54500	38			
N	4280	7060	49			
M	8640	11700	30			
O	135000	167000	21			
P	62300	80600	26			
Q	305000	397000	26			
H (DB-225)	6470	6240	4			

Compound	Concentration (ng/Kg) 22	Concentration (ng/Kg) 23	(≤50) RPD	(ng/Kg) Difference	(ng/Kg) Limits	Qualifications (Parent Only)
A	1.11	1.90U		0.79	(≤1.90)	
B	3.79	4.75U		0.96	(≤4.75)	
C	1.97	4.75U		2.78	(≤4.75)	
D	4.33	4.75U		0.42	(≤4.75)	
E	5.90	0.605		5.295	(≤4.75)	Idets/A (fd)
F	13.7	1.50		12.2	(≤4.75)	↓

LDC#:21495C21
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Compound	Concentration (ng/Kg) 22	Concentration (ng/Kg) 23	(≤50) RPD	(ng/Kg) Difference	(ng/Kg) Limits	Qualifications (Parent Only)
G	15.9	9.17		6.73	(≤9.50)	
H	62.4	0.565		61.835	(≤1.90)	dets/A (fd)
I	52.0	4.75U		47.25	(≤4.75)	J/U/A (fd)
J	27.9	4.75U		23.15	(≤4.75)	↓
K	107	0.952		106.048	(≤4.75)	dets/A (fd)
L	63.0	0.634		62.366	(≤4.75)	↓
N	10.0	4.75U		5.25	(≤4.75)	J/U/A
M	15.9	4.75U		11.15	(≤4.75)	↓
O	187	2.52		184.48	(≤4.75)	J dets/A
P	92.2	0.941		91.259	(≤4.75)	↓
Q	518	6.45		511.55	(≤9.50)	↓
R	26.3	1.90U		24.4	(≤1.90)	J/U/A
S	37.4	4.75U		32.65	(≤4.75)	↓
T	33.4	0.605		32.795	(≤4.75)	J dets/A
U	21.4	1.50		19.9	(≤4.75)	
V	471	0.565		470.435	(≤1.90)	
W	500	1.12		498.88	(≤4.75)	
X	400	0.952		399.048	(≤4.75)	
Y	405	3.08		401.92	(≤4.75)	
H (DB-225)	11.2	3.35		7.85	(≤1.90)	

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: June 5 through June 11, 2009

LDC Report Date: October 7, 2009

Matrix: Soil

Parameters: Dioxins/Dibenzofurans

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903184

Sample Identification

SA127-0.5B
SA127-0.5BDL
RSAJ6-0.5B
RSAJ6-0.5BDL
RSAK6-0.5B
RSAK8-0.5B
RSAK8-0.5BDL
RSAL7-0.5B
RSAL8-0.5B
RSAL8-0.5BDL
SA35-0.5B
SA55-0.5B
SA56-0.5B
SA176-0.5B
RSAO3-0.5B
RSAO3-0.5BDL
SA182-0.5B
SA182-0.5BDL
SA201-0.5B
SA201-0.5BDL
SA166-0.5B
RSAK4-0.5B
RSAK4-0.5BDL
RSAK4009-0.5B
RSAK4009-0.5BDL
SA134-0.5B
SA134-0.5BDL
SA127-0.5BMS
SA127-0.5BMSD

Introduction

This data review covers 29 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8290 for Polychlorinated Dioxins/Dibenzofurans.

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 USEPA Contract Laboratory Program National Functional Guidelines for Polychlorinated Dioxins/Dibenzofurans Data Review (September 2005) 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 XIV.

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

The following are definitions of the data qualifiers:

J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.

J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

B The analytical result may be a false positive totally attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JB The analytical result may be biased high and partially attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JK The analytical result is an estimated maximum possible concentration (EMPC).

X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.

J-TDS The analytical result is estimated based on failure of the Total Dissolved Solids (TDS) correctness check performed in accordance with the Standard Method 1030E.

J-CAB The analytical result is estimated based on failure of the cation-anion balance correctness check performed in accordance with Standard Method 1030E.

J-TDS & CAB The analytical result is unreliable based on the failure of the cation-anion balance and TDS correctness check performed in accordance with standard Method 1030E.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required daily frequency.

Retention time windows were established for all homologues. The chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomer was less than or equal to 25% .

III. Initial Calibration

A five point initial calibration was performed as required by the method.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for unlabeled compounds and less than or equal to 30.0% for labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

IV. Routine Calibration (Continuing)

Routine calibration was performed at the required frequencies.

All of the routine calibration percent differences (%D) between the initial calibration RRF and the routine calibration RRF were less than or equal to 20.0% for unlabeled compounds and less than or equal to 30.0% for labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

V. Blanks

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

Method Blank ID	Extraction Date	Compound	Concentration	Associated Samples
EQ0900212-01	6/17/09	OCDD OCDF	1.17 ng/Kg 1.44 ng/Kg	All samples in SDG R0903184

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

Sample	Compound	Reported Concentration	Modified Final Concentration
RSAK6-0.5B	OCDD	5.07 ng/Kg	5.07U ng/Kg
RSAL7-0.5B	OCDD	3.92 ng/Kg	3.92U ng/Kg
SA55-0.5B	OCDD OCDF	1.15 ng/Kg 3.17 ng/Kg	1.15U ng/Kg 3.17U ng/Kg
SA176-0.5B	OCDD	1.07 ng/Kg	1.07U ng/Kg
SA166-0.5B	OCDD	5.03 ng/Kg	5.03U ng/Kg
RSAK4-0.5BDL (100X)	OCDD	527 ng/Kg	527U ng/Kg
RSAK4009-0.5BDL (100X)	OCDD	558 ng/Kg	558U ng/Kg

Sample FB072109-SO (from SDG R0904016) was identified as a field blank. No polychlorinated dioxin/dibenzofuran contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072109-SO	7/21/09	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF Total HpCDD Total HxCDF Total HpCDF	8.37 pg/L 21.8 pg/L 6.33 pg/L 3.57 pg/L 4.04 pg/L 43.3 pg/L 19.6 pg/L 205 pg/L 8.37 pg/L 18.1 pg/L 72.1 pg/L	All samples in SDG R0903184

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

VI. Matrix Spike/Matrix Spike Duplicates

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

VII. Laboratory Control Samples (LCS)

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

VIII. Regional Quality Assurance and Quality Control

Not applicable.

IX. Internal Standards

All internal standard recoveries were within QC limits with the following exceptions:

Sample	Internal Standards	%R (Limits)	Compound	Flag	A or P
RSAJ6-0.5B	^{13}C-2,3,7,8-TCDF ^{13}C-1,2,3,7,8-PeCDF ^{13}C-1,2,3,7,8-PeCDD ^{13}C-1,2,3,4,6,7,8-HpCDF ^{13}C-2,3,7,8-TCDF (DB-225)	4 (40-135) 173 (40-135) 168 (40-135) 35 (40-135) 140 (40-135)	2,3,7,8-TCDF Total TCDF 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF Total PeCDF 1,2,3,7,8-PeCDD Total PeCDD 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF Total HpCDF 2,3,7,8-TCDF (DB-225)	J (all detects) UJ (all non-detects)	P
RSAJ6-0.5BDL	^{13}C-2,3,7,8-TCDF (DB-225)	4 (40-135)	2,3,7,8-TCDF (DB-225)	J (all detects) UJ (all non-detects)	P
RSAK8-0.5BDL	^{13}C-1,2,3,4,7,8-HxCDF	39 (40-135)	1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF	J (all detects) UJ (all non-detects)	P
SA55-0.5B	^{13}C-OCDD	38 (40-135)	OCDF OCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P
SA56-0.5B	^{13}C-OCDD	39 (40-135)	OCDF OCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P

X. Target Compound Identifications

Raw data were not reviewed for this SDG.

XI. Project Quantitation Limit

All project quantitation limits were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
SA127-0.5B	2,3,7,8-TCDF 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
RSAJ6-0.5B	2,3,7,8-TCDD 1,2,3,7,8-PeCDD 1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF Total TCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
RSAK8-0.5B	1,2,3,4,6,7,8-HpCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
RSAL8-0.5B RSAO3-0.5B SA56-0.5B	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A

Sample	Compound	Finding	Criteria	Flag	A or P
SA182-0.5B SA201-0.5B SA134-0.5B	2,3,7,8-TCDD 1,2,3,7,8-PeCDD 1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
RSAK4-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
RSAK4009-0.5B	1,2,3,4,6,7,8-HpCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903184	All compounds reported below the PQL.	J (all detects)	A

All compounds reported as EMPC were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903184	All compounds reported as estimated maximum possible concentration (EMPC).	JK (all detects)	A

Raw data were not reviewed for this SDG.

XII. System Performance

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
SA127-0.5B	1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X	A
SA127-0.5BDL	All TCL compounds except 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-225)	X	A

Sample	Compound	Flag	A or P
RSAJ6-0.5B SA182-0.5B SA201-0.5B SA134-0.5B	2,3,7,8-TCDD 1,2,3,7,8-PeCDD 1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X X X X X X X X X	A
RSAJ6-0.5BDL	2,3,7,8-TCDF (DB-225)	X	A
RSAK6-0.5B RSAL7-0.5B SA35-0.5B SA56-0.5B SA182-0.5BDL SA201-0.5BDL SA166-0.5B SA134-0.5BDL	2,3,7,8-TCDF (DB-5)	X	A
RSAK8-0.5B	1,2,3,4,6,7,8-HpCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X	A
RSAK8-0.5BDL	All TCL compounds except 1,2,3,4,6,7,8-HpCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X	A
RSAL8-0.5B RSAO3-0.5B	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X	A

Sample	Compound	Flag	A or P
RSAL8-0.5BDL RSAO3-0.5BDL	All TCL compounds except 1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X	A
RSAK4-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X X X X	A
RSAK4009-0.5B	1,2,3,4,6,7,8-HpCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X X X	A
RSAK4009-0.5BDL	All TCL compounds except 1,2,3,4,6,7,8-HpCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF	X	A

Sample	Compound	Flag	A or P
RSAK4-0.5BDL	All TCL compounds except 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF	X	A

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

XIV. Field Duplicates

Samples RSAK4-0.5B and RSAK4009-0.5B and samples RSAK4-0.5BDL and RSAK4009-0.5BDL were identified as field duplicates. No polychlorinated dioxins/dibenzofurans were detected in any of the samples with the following exceptions:

Compound	Concentration (ng/Kg)		RPD (Limits)	Difference (Limits)	Flag	A or P
	RSAK4-0.5B	RSAK4009-0.5B				
2,3,7,8-TCDD	32.1	34.5	7 (≤50)	-	-	-
1,2,3,7,8-PeCDD	118	127	7 (≤50)	-	-	-
1,2,3,4,7,8-HxCDD	100	109	9 (≤50)	-	-	-
1,2,3,6,7,8-HxCDD	178	186	4 (≤50)	-	-	-
1,2,3,7,8,9-HxCDD	221	233	5 (≤50)	-	-	-
1,2,3,4,6,7,8-HpCDD	729	773	6 (≤50)	-	-	-
OCDD	767	811	6 (≤50)	-	-	-
2,3,7,8-TCDF	1850	2010	8 (≤50)	-	-	-
1,2,3,7,8-PeCDF	1700	1840	8 (≤50)	-	-	-
2,3,4,7,8-PeCDF	837	903	8 (≤50)	-	-	-

Compound	Concentration (ng/Kg)		RPD (Limits)	Difference (Limits)	Flag	A or P
	RSAK4-0.5B	RSAK4009-0.5B				
1,2,3,4,7,8-HxCDF	4280	4610	7 (≤50)	-	-	-
1,2,3,6,7,8-HxCDF	2730	2930	7 (≤50)	-	-	-
1,2,3,7,8,9-HxCDF	469	447	5 (≤50)	-	-	-
2,3,4,6,7,8-HxCDF	618	669	8 (≤50)	-	-	-
1,2,3,4,6,7,8-HpCDF	9680	10100	4 (≤50)	-	-	-
1,2,3,4,7,8,9-HpCDF	4760	5190	9 (≤50)	-	-	-
OCDF	20700	22000	6 (≤50)	-	-	-
Total TCDD	1280	1350	5 (≤50)	-	-	-
Total PeCDD	1390	1490	7 (≤50)	-	-	-
Total HxCDD	1500	1580	5 (≤50)	-	-	-
Total HpCDD	1150	1230	7 (≤50)	-	-	-
Total TCDF	15200	16300	7 (≤50)	-	-	-
Total PeCDF	15200	17200	12 (≤50)	-	-	-
Total HxCDF	21100	21300	1 (≤50)	-	-	-
Total HpCDF	21400	22900	7 (≤50)	-	-	-
2,3,7,8-TCDF (DB-225)	720	795	10 (≤50)	-	-	-

Compound	Concentration (ng/Kg)		RPD (Limits)	Difference (Limits)	Flag	A or P
	RSAK4-0.5BDL	RSAK4009-0.5B				
1,2,3,7,8-PeCDD	93.5	242U	-	148.5 (≤242)	-	-
1,2,3,4,7,8-HxCDD	80.9	66.1	-	14.8 (≤251)	-	-

Compound	Concentration (ng/Kg)		RPD (Limits)	Difference (Limits)	Flag	A or P
	RSAK4-0.5BDL	RSAK4009-0.5B				
1,2,3,6,7,8-HxCDD	172	159	-	13 (≤251)	-	-
1,2,3,7,8,9-HxCDD	179	183	-	4 (≤251)	-	-
1,2,3,4,6,7,8-HpCDD	514	573	-	59 (≤501)	-	-
OCDD	527	558	-	31 (≤276)	-	-
2,3,7,8-TCDF	1430	1460	2 (≤50)	-	-	-
1,2,3,7,8-PeCDF	1300	1150	-	150 (≤251)	-	-
2,3,4,7,8-PeCDF	581	620	-	39 (≤251)	-	-
1,2,3,4,7,8-HxCDF	4410	4640	5 (≤50)	-	-	-
1,2,3,6,7,8-HxCDF	3060	3170	4 (≤50)	-	-	-
1,2,3,7,8,9-HxCDF	296	321	-	25 (≤251)	-	-
2,3,4,6,7,8-HxCDF	734	684	-	50 (≤251)	-	-
1,2,3,4,6,7,8-HpCDF	10000	11000	10 (≤50)	-	-	-
1,2,3,4,7,8,9-HpCDF	3840	4110	7 (≤50)	-	-	-
OCDF	21300	23400	9 (≤50)	-	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Dioxins/Dibenzofurans - Data Qualification Summary - SDG R0903184

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903184	RSAJ6-0.5B	2,3,7,8-TCDF Total TCDF 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF Total PeCDF 1,2,3,7,8-PeCDD Total PeCDD 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF Total HpCDF 2,3,7,8-TCDF (DB-225)	J (all detects) UJ (all non-detects)	P	Internal standards (area) (i)
R0903184	RSAJ6-0.5BDL	2,3,7,8-TCDF (DB-225)	J (all detects) UJ (all non-detects)	P	Internal standards (area) (i)
R0903184	RSAK8-0.5BDL	1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF	J (all detects) UJ (all non-detects)	P	Internal standards (area) (i)
R0903184	SA55-0.5B SA56-0.5B	OCDF OCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P	Internal standards (area) (i)
R0903184	SA127-0.5B	2,3,7,8-TCDF 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)
R0903184	RSAJ6-0.5B	2,3,7,8-TCDD 1,2,3,7,8-PeCDD 1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF Total TCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903184	RSAK8-0.5B	1,2,3,4,6,7,8-HpCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)
R0903184	RSAL8-0.5B RSAO3-0.5B SA56-0.5B	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)
R0903184	SA182-0.5B SA201-0.5B SA134-0.5B	2,3,7,8-TCDD 1,2,3,7,8-PeCDD 1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)
R0903184	RSAK4-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903184	RSAK4009-0.5B	1,2,3,4,6,7,8-HpCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)
R0903184	SA127-0.5B SA127-0.5BDL RSAJ6-0.5B RSAJ6-0.5BDL RSAK6-0.5B RSAK8-0.5B RSAK8-0.5BDL RSAL7-0.5B RSAL8-0.5B RSAL8-0.5BDL SA35-0.5B SA55-0.5B SA56-0.5B SA176-0.5B RSAO3-0.5B RSAO3-0.5BDL SA182-0.5B SA182-0.5BDL SA201-0.5B SA201-0.5BDL SA166-0.5B RSAK4-0.5B RSAK4-0.5BDL RSAK4009-0.5B RSAK4009-0.5BDL SA134-0.5B SA134-0.5BDL	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903184	SA127-0.5B SA127-0.5BDL RSAJ6-0.5B RSAJ6-0.5BDL RSAK6-0.5B RSAK8-0.5B RSAK8-0.5BDL RSAL7-0.5B RSAL8-0.5B RSAL8-0.5BDL SA35-0.5B SA55-0.5B SA56-0.5B SA176-0.5B RSAO3-0.5B RSAO3-0.5BDL SA182-0.5B SA182-0.5BDL SA201-0.5B SA201-0.5BDL SA166-0.5B RSAK4-0.5B RSAK4-0.5BDL RSAK4009-0.5B RSAK4009-0.5BDL SA134-0.5B SA134-0.5BDL	All compounds reported as EMPC	JK (all detects)	A	Project Quantitation Limit (k)
R0903184	SA127-0.5B	1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X	A	Overall assessment of data (o)
R0903184	SA127-0.5BDL	All TCL compounds except 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-225)	X	A	Overall assessment of data (o)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903184	RSAJ6-0.5B SA182-0.5B SA201-0.5B SA134-0.5B	2,3,7,8-TCDD 1,2,3,7,8-PeCDD 1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X X X X X X X X X	A	Overall assessment of data (o)
R0903184	RSAJ6-0.5BDL	2,3,7,8-TCDF (DB-225)	X	A	Overall assessment of data (o)
R0903184	RSAK6-0.5B RSAL7-0.5B SA35-0.5B SA56-0.5B SA182-0.5BDL SA201-0.5BDL SA166-0.5B SA134-0.5BDL	2,3,7,8-TCDF (DB-5)	X	A	Overall assessment of data (o)
R0903184	RSAK8-0.5B	1,2,3,4,6,7,8-HpCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X	A	Overall assessment of data (o)
R0903184	RSAK8-0.5BDL	All TCL compounds except 1,2,3,4,6,7,8-HpCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X	A	Overall assessment of data (o)
R0903184	RSAL8-0.5B RSAO3-0.5B	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X	A	Overall assessment of data (o)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903184	RSAL8-0.5BDL RSAO3-0.5BDL	All TCL compounds except 1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF Total TCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X	A	Overall assessment of data (o)
R0903184	RSAK4-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X X X X	A	Overall assessment of data (o)
R0903184	RSAK4009-0.5B	1,2,3,4,6,7,8-HpCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X X X	A	Overall assessment of data (o)
R0903184	RSAK4009-0.5BDL	All TCL compounds except 1,2,3,4,6,7,8-HpCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF	X	A	Overall assessment of data (o)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903184	RSAK4-0.5BDL	All TCL compounds except 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF	X	A	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Dioxins/Dibenzofurans - Laboratory Blank Data Qualification Summary - SDG R0903184

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0903184	RSAK6-0.5B	OCDD	5.07U ng/Kg	A	bl
R0903184	RSAL7-0.5B	OCDD	3.92U ng/Kg	A	bl
R0903184	SA55-0.5B	OCDD OCDF	1.15U ng/Kg 3.17U ng/Kg	A	bl
R0903184	SA176-0.5B	OCDD	1.07U ng/Kg	A	bl
R0903184	SA166-0.5B	OCDD	5.03U ng/Kg	A	bl
R0903184	RSAK4-0.5BDL (100X)	OCDD	527U ng/Kg	A	bl
R0903184	RSAK4009-0.5BDL (100X)	OCDD	558U ng/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Dioxins/Dibenzofurans - Field Blank Data Qualification Summary - SDG R0903184

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 21495F21
SDG #: R0903184
Laboratory: Columbia Analytical Services

Date: 9/17/09
Page: 1 of 1
Reviewer: 9
2nd Reviewer: 2

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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: 6/5-11/09
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration	A	
IV.	Routine calibration/ICV	A	
V.	Blanks	SW	
VI.	Matrix spike/Matrix spike duplicates	SW	2859: %R and RPD out – No Qual (ACESN)
VII.	Laboratory control samples	A	LCS
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	SW	
X.	Target compound identifications	N	
XI.	Compound quantitation and CRQLs	SW N	
XII.	System performance	N	
XIII.	Overall assessment of data	SW	
XIV.	Field duplicates	SW	D = 22+24, 23+25
XV.	Field blanks	SW	FB072109-SO (R0904016)

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:

MS/D: 13

1	SA127-0.5B	11	SA35-0.5B	21	SA166-0.5B	31	ER090012-01
2	SA127-0.5BDL	12	SA55-0.5B	22	RSAK4-0.5B	32	
3	RSAJ6-0.5B	13	SA56-0.5B	23	RSAK4-0.5BDL	33	
4	RSAJ6-0.5BDL	14	SA176-0.5B	24	RSAK4009-0.5B	34	U13204
5	RSAK6-0.5B	15	RSA03-0.5B	25	RSAK4009-0.5BDL	35	U13208
6	RSAK8-0.5B	16	RSA03-0.5BDL	26	SA134-0.5B	36	U13207
7	RSAK8-0.5BDL	17	SA182-0.5B	27	SA134-0.5BDL	37	P202989
8	RSAL7-0.5B	18	SA182-0.5BDL	28	SA127-0.5BMS	38	U22057
9	RSAL8-0.5B	19	SA201-0.5B	29	SA127-0.5BMSD	39	
10	RSAL8-0.5BDL	20	SA201-0.5BDL	30		40	

Notes: 1 P103559 2 P202924 3 P103612 4 U219519 5 P202903
6 P103573 7 P103583 8 P202869

VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

A. 2,3,7,8-TCDD	F. 1,2,3,4,6,7,8-HpCDD	K. 1,2,3,4,7,8-HxCDF	P. 1,2,3,4,7,8,9-HpCDF	U. Total HpCDD
B. 1,2,3,7,8-PeCDD	G. OCDD	L. 1,2,3,6,7,8-HxCDF	Q. OCDF	V. Total TCDF
C. 1,2,3,4,7,8-HxCDD	H. 2,3,7,8-TCDF	M. 2,3,4,6,7,8-HxCDF	R. Total TCDD	W. Total PeCDF
D. 1,2,3,6,7,8-HxCDD	I. 1,2,3,7,8-PeCDF	N. 1,2,3,7,8,9-HxCDF	S. Total PeCDD	X. Total HxCDF
E. 1,2,3,7,8,9-HxCDD	J. 2,3,4,7,8-PeCDF	O. 1,2,3,4,6,7,8-HpCDF	T. Total HxCDD	Y. Total HpCDF

Notes:

LDC #: 24952

SDG #: Sediment

VALIDATION FINDINGS WORKSHEET
Blanks

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 8290)

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

Y N N/A Were all samples associated with a method blank?

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

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

Blank extraction date: 6/17/09 **Blank analysis date:** 6/23/09

Conc. units: ng/kg Associated Samples: all (bl)

Compound	Blank ID	Sample Identification								
2,3,7,8-TCDD	02/2-01	5	8	12	14	21	23 (100x)	25 (100)		
TCDF	1.17	5.0T/U	3.9J/U	1.1J/U	1.0T/U	5.03/U	52T/U	558/U		
TCDD	1.44	—	—	3.1T/U	—	—				

Blank extraction date: _____ **Blank analysis date:** _____

Conc. units: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								

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

All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 24495P1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: 9
2nd Reviewer: K

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

(Y) N N/A Were field blanks identified in this SDG?
Blank units: pg/L **Associated sample units:** ng/Kg
Sampling date: 7/21/09
Field blank type: (circle one) Field Blank / Rinsate / Other: _____ Associated Samples: all (5x)

Compound	Blank ID	Sample Identification								
	FB072109-SO	5X								
F	8.37	0.04185								
G	21.8	0.109								
K	6.33	0.03165								
L	3.57	0.01785								
M	4.04	0.0202								
O	43.3	0.2165								
P	19.6	0.098								
Q	205	1.025								
U	8.37	0.04185								
X	18.1	0.0905								
Y	72.1	0.3605								
CRQL										

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Samples with compound concentrations within five times the associated field blank concentration are listed above, these sample results were qualified as not detected, "U".

LDC #: 21495F2/
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Internal Standards

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
Y N N/A Are all internal standard recoveries were within the 40-135% criteria?
Y N N/A Was the S/N ratio all internal standard peaks ≥ 10?

#	Date	Lab ID/Reference	Internal Standard	% Recovery (Limit: 40-135%)		Qualifications (Code: J)
		3	A	A	(40-135)	√/M/P (H.V)
			~~B~~ C	173	( )	(I.V.W)
			D	168	( )	(B.S)
			G	35	( )	(O.P.Y)
			A (DB-225)	140	( )	(H on DB-225)
					( )	
		4	A (DB-225)	4	(40-135)	√/M/P (H on DB-225)
					( )	
					( )	
		7	E	39	( )	√/M/P (K-N)
					( )	
		12	I	38	(40-135)	√/M/P (F.Q)
					( )	
		13	I	39	( )	
					( )	
		28 (MS)	E	39	(40-135)	No qual.
			I	38	( )	
		29 (MSD)	I	38	( )	
			E	34	( )	
			G	38	( )	

	Internal Standards	Check Standard Used		Internal Standards	Check Standard Used
A.	^{13}C-2,3,7,8-TCDF		I.	^{13}C-OCDD	
B.	^{13}C-2,3,7,8-TCDD		K.	^{13}C-1,2,3,4-TCDD	
C.	^{13}C-1,2,3,7,8-PeCDF		L.	^{13}C-1,2,3,7,8,9-HxCDD	
D.	^{13}C-1,2,3,7,8-PeCDD		M		
E.	^{13}C-1,2,3,4,7,8-HxCDF		N.		
F.	^{13}C-1,2,3,6,7,8-HxCDD		O.		
G.	^{13}C-1,2,3,4,6,7,8-HpCDF		P.		
H.	^{13}C-1,2,3,4,6,7,8-HpCDD				

LDC #: 21495F2
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Reviewer: 9
2nd Reviewer: R

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Y N N/A Were the correct internal standard (IS), quantitation ions and relative response factors (RRF) used to quantitate the compound?
Y N N/A Compound quantitation and CRQLs were adjusted to reflect all sample dilutions and dry weight factors (if necessary).

#	Date	Sample ID	qds > calib range Finding	Associated Samples	Qualifications
		1	H—∠.O—Q	1	√dets/A(e)
			(H on both DB-5 & DB-225)		
		3	A—Q.√(H on both	3	
			DB-5 & DB-225)		
		6	F.H—∠.O—Q	6	
			(H on DB-5 & DB-225)		
		9, 15	H.I.K.∠.O—Q	9, 15	
			(H on DB-5 & DB-225)		
		13	H.I.K.∠.O—Q	13	√dets/F(e)
			(H on DB-5 & DB-225)		
		17, 19, 26	A—Q (H on DB-5 & DB-225)	17, 19, 26	√dets/A(e)

Comments: See sample calculation verification worksheet for recalculations

LDC #: 24495F2/
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Reviewer: 9
2nd Reviewer: 4

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Y N N/A Were the correct internal standard (IS), quantitation ions and relative response factors (RRF) used to quantitate the compound?
Y N N/A Compound quantitation and CRQLs were adjusted to reflect all sample dilutions and dry weight factors (if necessary).

#	Date	Sample ID	Finding (eds > calib range)	Associated Samples	Qualifications
		22	F, G. H-Q (HxCDB-5 & DB-225)	22	√det=/A (e)
		24	F. H-Q (HxCDB-5 & DB-225)	24	
		All	ZMPC results	All	√K (E)

Comments: See sample calculation verification worksheet for recalculations

LDC #: 21495F2
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

Y N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		1	H-L. O-Q (H on both DB-5 & DB-225)	1	X (O)
		2	All except I-L O-Q, H on DB-225	2	
		3, 17, 19, 26	A-Q. (H on DB-5 & DB-225)	3, 17, 19	
		4	H on DB-225 (FS low)	4	
	27, 21,	5, 8, 11, 13, 18, 20	H on DB-5	21, 5, 8, 18, 20, 27	
		6	F. H-L. O-Q (H on DB-5, DB-225)	6	
		7	All except F. H-L. O-Q	7	

Comments: _____

LDC #: 2495F21
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Reviewer: 9
2nd Reviewer: 11

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

Y N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		9, 15	H. I. K. L. O-Q (H on DB-5 & DB-225)	9, 15	X (10)
		10, 16	All except above	10, 16	
		22	F. G. H-Q (H on DB-5 & DB-225)	22	
		24	F. H-Q (& H on DB-5 & DB-225)	24	
		25	All except F. H-Q	25	
		23	All except F. G. H-Q	23	

Comments: _____

LDC#:21495F21
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: a
2nd Reviewer: A

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Compound	Concentration (ng/Kg)		(≤50) RPD	(ng/Kg) Difference	(ng/Kg) Limits	Qualifications (Parent Only)
	22	24				
A	32.1	34.5	7			
B	118	127	7			
C	100	109	9			
D	178	186	4			
E	221	233	5			
F	729	773	6			
G	767	811	6			
H	1850	2010	8			
I	1700	1840	8			
J	837	903	8			
K	4280	4610	7			
L	2730	2930	7			
N	469	447	5			
M	618	669	8			
O	9680	10100	4			
P	4760	5190	9			
Q	20700	22000	6			
R	1280	1350	5			
S	1390	1490	7			
T	1500	1580	5			
U	1150	1230	7			
V	15200	16300	7			
W	15200	17200	12			
X	21100	21300	1			
Y	21400	22900	7			
H (DB-225)	720	795	10			

LDC#:21495I21
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: Q
2nd Reviewer: A

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Compound	Concentration (ng/Kg)		(≤50) RPD	(ng/Kg) Difference	(ng/Kg) Limits	Qualifications (Parent Only)
	23	25				
B	93.5	242U		148.5	(≤242)	
C	80.9	66.1		14.8	(≤251)	
D	172	159		13	(≤251)	
E	179	183		4	(≤251)	
F	514	573		59	(≤501)	
G	527	558		31	(≤276)	
H	1430	1460	2			
I	1300	1150		150	(≤251)	
J	581	620		39	(≤251)	
K	4410	4640	5			
L	3060	3170	4			
N	296	321		25	(≤251)	
M	734	684		50	(≤251)	
O	10000	11000	10			
P	3840	4110	7			
Q	21300	23400	9			

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: June 19 through June 24, 2009

LDC Report Date: September 27, 2009

Matrix: Soil

Parameters: Dioxins/Dibenzofurans

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903443

Sample Identification

SA197-0.5B
SA198-0.5B
SA198-0.5BDL
SA64-0.5B
SA104-0.5B
SA104-0.5BDL
SA129-0.5B
SA129-0.5BDL
SA70-0.5B
SA70-0.5BDL
SA60-0.5B
SA60-0.5BDL
SA150-0.5B
SA150-0.5BDL
RSAN5-0.5B
SA53-0.5B
SA43009-0.5B
SA40-0.5B
SA200-0.5B
SA200-0.5BDL
RSAO6-0.5B
SA51-0.5B
SA51-0.5BDL
SA43-0.5B
SA150-0.5BMS
SA150-0.5BMSD

Introduction

This data review covers 26 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8290 for Polychlorinated Dioxins/Dibenzofurans.

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 USEPA Contract Laboratory Program National Functional Guidelines for Polychlorinated Dioxins/Dibenzofurans Data Review (September 2005) 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 XIV.

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

The following are definitions of the data qualifiers:

J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.

J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

B The analytical result may be a false positive totally attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JB The analytical result may be biased high and partially attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JK The analytical result is an estimated maximum possible concentration (EMPC).

X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.

J-TDS The analytical result is estimated based on failure of the Total Dissolved Solids (TDS) correctness check performed in accordance with the Standard Method 1030E.

J-CAB The analytical result is estimated based on failure of the cation-anion balance correctness check performed in accordance with Standard Method 1030E.

J-TDS & CAB The analytical result is unreliable based on the failure of the cation-anion balance and TDS correctness check performed in accordance with standard Method 1030E.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required daily frequency.

Retention time windows were established for all homologues. The chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomer was less than or equal to 25% .

III. Initial Calibration

A five point initial calibration was performed as required by the method.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for unlabeled compounds and less than or equal to 30.0% for labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

IV. Routine Calibration (Continuing)

Routine calibration was performed at the required frequencies.

All of the routine calibration percent differences (%D) between the initial calibration RRF and the routine calibration RRF were less than or equal to 20.0% for unlabeled compounds and less than or equal to 30.0% for labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

V. Blanks

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

Method Blank ID	Extraction Date	Compound	Concentration	Associated Samples
EQ0900235-01	6/29/09	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,4,6,7,8-HpCDF OCDF Total HpCDF	0.199 ng/Kg 3.11 ng/Kg 0.218 ng/Kg 0.955 ng/Kg 0.218 ng/Kg	All samples in SDG R0903443

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

Sample	Compound	Reported Concentration	Modified Final Concentration
SA53-0.5B	1,2,3,4,6,7,8-HpCDD OCDD	0.502 ng/Kg 1.70 ng/Kg	0.502U ng/Kg 1.70U ng/Kg
RSAN5-0.5B	OCDD	7.58 ng/Kg	7.58U ng/Kg
RSAO6-0.5B	OCDD	12.6 ng/Kg	12.6U ng/Kg

Sample FB072109-SO (from SDG R0904016) was identified as a field blank. No polychlorinated dioxin/dibenzofuran contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072109-SO	7/21/09	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF Total HpCDD Total HxCDF Total HpCDF	8.37 pg/L 21.8 pg/L 6.33 pg/L 3.57 pg/L 4.04 pg/L 43.3 pg/L 19.6 pg/L 205 pg/L 8.37 pg/L 18.1 pg/L 72.1 pg/L	All samples in SDG R0903443

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

VI. 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 the QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
SA150-0.5BMS/MSD (SA150-0.5B SA150-0.5BDL)	OCDF	-	-	28 (≤20)	J (all detects)	A

VII. Laboratory Control Samples (LCS)

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

LCS ID	Compound	%R (Limits)	Associated Samples	Flag	A or P
EQ0900235-02LCS	OCDF	148 (70-130)	All samples in SDG R0903443	J+ (all detects)	P

VIII. Regional Quality Assurance and Quality Control

Not applicable.

IX. Internal Standards

All internal standard recoveries were within QC limits with the following exceptions:

Sample	Internal Standards	%R (Limits)	Compound	Flag	A or P
SA129-0.5B	^{13}C-1,2,3,6,7,8-HxCDD ^{13}C-OCDD	32 (40-135) 17 (40-135)	1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD Total HxCDD OCDD OCDF	J (all detects) UJ (all non-detects)	P
SA129-0.5BDL	^{13}C-1,2,3,6,7,8-HxCDD ^{13}C-OCDD	37 (40-135) 17 (40-135)	1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD OCDD OCDF	J (all detects) UJ (all non-detects)	P
SA60-0.5BDL	^{13}C-OCDD	38 (40-135)	OCDD OCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P
SA150-0.5BDL	^{13}C-OCDD	39 (40-135)	OCDD OCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P

X. Target Compound Identifications

Raw data were not reviewed for this SDG.

XI. Project Quantitation Limit

All project quantitation limits were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
SA197-0.5B	1,2,3,4,6,7,8-HpCDF OCDF	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects)	P
SA198-0.5B SA70-0.5B	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
SA64-0.5B	1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P
SA104-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
SA129-0.5B	OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A

XI. Project Quantitation Limit

All project quantitation limits were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
SA197-0.5B	1,2,3,4,6,7,8-HpCDF OCDF	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects)	P
SA198-0.5B SA70-0.5B	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
SA64-0.5B	1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P
SA104-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
SA129-0.5B	OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
SA60-0.5B SA150-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A

Sample	Compound	Finding	Criteria	Flag	A or P
SA43009-0.5B SA43-0.5B	1,2,3,4,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P
SA40-0.5B	1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P
SA200-0.5B	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
SA51-0.5B	1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903443	All compounds reported below the PQL.	J (all detects)	A

All compounds reported as EMPC were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903443	All compounds reported as estimated maximum possible concentration (EMPC).	JK (all detects)	A

Raw data were not reviewed for this SDG.

XII. System Performance

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
SA197-0.5B SA64-0.5B RSAN5-0.5B SA53-0.5B SA43009-0.5B SA40-0.5B RSAO6-0.5B SA43-0.5B	2,3,7,8-TCDF (from DB-5)	X	A
SA198-0.5B SA70-0.5B	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X	A
SA198-0.5BDL SA70-0.5BDL	All TCL compounds except 1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF	X	A
SA104-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X X X	A

Sample	Compound	Flag	A or P
SA104-0.5BDL	All TCL compounds except 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5)	X	A
SA129-0.5B	OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X	A
SA129-0.5BDL	All TCL compounds except OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF	X	A
SA60-0.5B SA150-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X X X X	A
SA60-0.5BDL SA150-0.5BDL	All TCL compounds except 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5)	X	A

Sample	Compound	Flag	A or P
SA200-0.5B	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X	A
SA200-0.5BDL	All TCL compounds except 1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF	X	A
SA51-0.5B	1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X	A
SA51-0.5BDL	All TCL compounds except 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF	X	A

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

XIV. Field Duplicates

Samples SA43009-0.5B and SA43-0.5B were identified as field duplicates. No polychlorinated dioxins/dibenzofurans were detected in any of the samples with the following exceptions:

Compound	Concentration (ng/Kg)		RPD (Limits)	Difference (Limits)	Flag	A or P
	SA43009-0.5B	SA43-0.5B				
2,3,7,8-TCDD	8.27	8.38	1 (≤50)	-	-	-

Compound	Concentration (ng/Kg)		RPD (Limits)	Difference (Limits)	Flag	A or P
	SA43009-0.5B	SA43-0.5B				
1,2,3,7,8-PeCDD	27.3	26.9	1 (≤50)	-	-	-
1,2,3,4,7,8-HxCDD	18.1	18.6	3 (≤50)	-	-	-
1,2,3,6,7,8-HxCDD	32.7	32.2	2 (≤50)	-	-	-
1,2,3,7,8,9-HxCDD	36.9	37.9	3 (≤50)	-	-	-
1,2,3,4,6,7,8-HpCDD	159	176	10 (≤50)	-	-	-
OCDD	419	572	31 (≤50)	-	-	-
2,3,7,8-TCDF	488	475	3 (≤50)	-	-	-
1,2,3,7,8-PeCDF	374	372	1 (≤50)	-	-	-
2,3,4,7,8-PeCDF	185	181	2 (≤50)	-	-	-
1,2,3,4,7,8-HxCDF	786	789	0 (≤50)	-	-	-
1,2,3,6,7,8-HxCDF	470	478	2 (≤50)	-	-	-
1,2,3,7,8,9-HxCDF	83.9	75.8	10 (≤50)	-	-	-
2,3,4,6,7,8-HxCDF	278	278	0 (≤50)	-	-	-
1,2,3,4,6,7,8-HpCDF	1660	1660	0 (≤50)	-	-	-
1,2,3,4,7,8,9-HpCDF	811	767	6 (≤50)	-	-	-
OCDF	5830	5730	2 (≤50)	-	-	-
Total TCDD	350	326	7 (≤50)	-	-	-
Total PeCDD	310	302	3 (≤50)	-	-	-
Total HxCDD	268	271	1 (≤50)	-	-	-
Total HpCDD	263	296	12 (≤50)	-	-	-

Compound	Concentration (ng/Kg)		RPD (Limits)	Difference (Limits)	Flag	A or P
	SA43009-0.5B	SA43-0.5B				
Total TCDF	3220	3090	4 (≤50)	-	-	-
Total PeCDF	2980	2910	2 (≤50)	-	-	-
Total HxCDF	3450	3650	6 (≤50)	-	-	-
Total HpCDF	3590	3510	2 (≤50)	-	-	-
2,3,7,8-TCDF (DB-225)	233	231	1 (≤50)	-	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Dioxins/Dibenzofurans - Data Qualification Summary - SDG R0903443

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903443	SA150-0.5B SA150-0.5BDL	OCDF	J (all detects)	A	Matrix spike/Matrix spike duplicates (RPD) (ld)
R0903443	SA197-0.5B SA198-0.5B SA198-0.5BDL SA64-0.5B SA104-0.5B SA104-0.5BDL SA129-0.5B SA129-0.5BDL SA70-0.5B SA70-0.5BDL SA60-0.5B SA60-0.5BDL SA150-0.5B SA150-0.5BDL RSAN5-0.5B SA53-0.5B SA43009-0.5B SA40-0.5B SA200-0.5B SA200-0.5BDL RSAO6-0.5B SA51-0.5B SA51-0.5BDL SA43-0.5B	OCDF	J+ (all detects)	P	Laboratory control samples (%R) (l)
R0903443	SA129-0.5B	1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD Total HxCDD OCDD OCDF	J (all detects) UJ (all non-detects)	P	Internal standards (area) (i)
R0903443	SA129-0.5BDL	1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD OCDD OCDF	J (all detects) UJ (all non-detects)	P	Internal standards (area) (i)
R0903443	SA60-0.5BDL SA150-0.5BDL	OCDD OCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P	Internal standards (area) (i)
R0903443	SA197-0.5B	1,2,3,4,6,7,8-HpCDF OCDF	J (all detects) J (all detects)	P	Project Quantitation Limit (e)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903443	SA198-0.5B SA70-0.5B	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)
R0903443	SA64-0.5B	1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P	Project Quantitation Limit (e)
R0903443	SA104-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)
R0903443	SA129-0.5B	OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)
R0903443	SA60-0.5B SA150-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)
R0903443	SA43009-0.5B SA43-0.5B	1,2,3,4,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P	Project Quantitation Limit (e)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903443	SA40-0.5B	1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P	Project Quantitation Limit (e)
R0903443	SA200-0.5B	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)
R0903443	SA51-0.5B	1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)
R0903443	SA197-0.5B SA198-0.5B SA198-0.5BDL SA64-0.5B SA104-0.5B SA104-0.5BDL SA129-0.5B SA129-0.5BDL SA70-0.5B SA70-0.5BDL SA60-0.5B SA60-0.5BDL SA150-0.5B SA150-0.5BDL RSAN5-0.5B SA53-0.5B SA43009-0.5B SA40-0.5B SA200-0.5B SA200-0.5BDL RSAO6-0.5B SA51-0.5B SA51-0.5BDL SA43-0.5B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903443	SA197-0.5B SA198-0.5B SA198-0.5BDL SA64-0.5B SA104-0.5B SA104-0.5BDL SA129-0.5B SA129-0.5BDL SA70-0.5B SA70-0.5BDL SA60-0.5B SA60-0.5BDL SA150-0.5B SA150-0.5BDL RSAN5-0.5B SA53-0.5B SA43009-0.5B SA40-0.5B SA200-0.5B SA200-0.5BDL RSAO6-0.5B SA51-0.5B SA51-0.5BDL SA43-0.5B	All compounds reported as EMPC	JK (all detects)	A	Project Quantitation Limit (k)
R0903443	SA197-0.5B SA64-0.5B RSAN5-0.5B SA53-0.5B SA43009-0.5B SA40-0.5B RSAO6-0.5B SA43-0.5B	2,3,7,8-TCDF (from DB-5)	X	A	Overall assessment of data (o)
R0903443	SA198-0.5B SA70-0.5B	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X	A	Overall assessment of data (o)
R0903443	SA198-0.5BDL SA70-0.5BDL	All TCL compounds except 1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF	X	A	Overall assessment of data (o)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903443	SA104-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X X X	A	Overall assessment of data (o)
R0903443	SA104-0.5BDL	All TCL compounds except 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5)	X	A	Overall assessment of data (o)
R0903443	SA129-0.5B	OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X	A	Overall assessment of data (o)
R0903443	SA129-0.5BDL	All TCL compounds except OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF	X	A	Overall assessment of data (o)
R0903443	SA60-0.5B SA150-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X X X X	A	Overall assessment of data (o)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903443	SA60-0.5BDL SA150-0.5BDL	All TCL compounds except 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5)	X	A	Overall assessment of data (o)
R0903443	SA200-0.5B	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X	A	Overall assessment of data (o)
R0903443	SA200-0.5BDL	All TCL compounds except 1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF	X	A	Overall assessment of data (o)
R0903443	SA51-0.5B	1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X	A	Overall assessment of data (o)
R0903443	SA51-0.5BDL	All TCL compounds except 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF	X	A	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Dioxins/Dibenzofurans - Laboratory Blank Data Qualification Summary - SDG R0903443

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0903443	SA53-0.5B	1,2,3,4,6,7,8-HpCDD OCDD	0.502U ng/Kg 1.70U ng/Kg	A	bl
R0903443	RSAN5-0.5B	OCDD	7.58U ng/Kg	A	bl
R0903443	RSAO6-0.5B	OCDD	12.6U ng/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Dioxins/Dibenzofurans - Field Blank Data Qualification Summary - SDG R0903443

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 21495G21
SDG #: R0903443
Laboratory: Columbia Analytical Services

Date: 9/18/09
Page: 1 of 1
Reviewer: 9
2nd Reviewer: A

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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: 6/19 - 24/09
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration	A	
IV.	Routine calibration/ICV	A	
V.	Blanks	SW	
VI.	Matrix spike/Matrix spike duplicates	SW	
VII.	Laboratory control samples	SW	LCS
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	SW	
X.	Target compound identifications	N	
XI.	Compound quantitation and CRQLs	SW N	
XII.	System performance	N	
XIII.	Overall assessment of data	A	
XIV.	Field duplicates	SW	D=16 17+24
XV.	Field blanks	SW	FB07=1045O (R0904016)

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:
MS: 9

1	SA197-0.5B	11	SA60-0.5B	21	RSAO6-0.5B	31	EQ0900235-01
2	SA198-0.5B	12	SA60-0.5BDL	22	SA51-0.5B	32	
3	SA198-0.5BDL	13	SA150-0.5B	23	SA51-0.5BDL	33	P10373
4	SA64-0.5B	14	SA150-0.5BDL	24	SA43-0.5B	34	P10381
5	SA104-0.5B	15	RSAN5-0.5B	25	SA150-0.5BMS	35	P10375
6	SA104-0.5BDL	16	SA53-0.5B	26	SA150-0.5BMSD	36	P10384
7	SA129-0.5B	17	SA43009-0.5B	27		37	P10382
8	SA129-0.5BDL	18	SA40-0.5B	28		38	U21965
9	SA70-0.5B	19	SA200-0.5B	29		39	P10379
10	SA70-0.5BDL	20	SA200-0.5BDL	30		40	P10386

Notes: P20306, 2P20309 4. 3P20315 4P20313 5P20312O 6P10386 9P10387 11 P10380

VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

A. 2,3,7,8-TCDD	F. 1,2,3,4,6,7,8-HpCDD	K. 1,2,3,4,7,8-HxCDF	P. 1,2,3,4,7,8,9-HpCDF	U. Total HpCDD
B. 1,2,3,7,8-PeCDD	G. OCDD	L. 1,2,3,6,7,8-HxCDF	Q. OCDF	V. Total TCDF
C. 1,2,3,4,7,8-HxCDD	H. 2,3,7,8-TCDF	M. 2,3,4,6,7,8-HxCDF	R. Total TCDD	W. Total PeCDF
D. 1,2,3,6,7,8-HxCDD	I. 1,2,3,7,8-PeCDF	N. 1,2,3,7,8,9-HxCDF	S. Total PeCDD	X. Total HxCDF
E. 1,2,3,7,8,9-HxCDD	J. 2,3,4,7,8-PeCDF	O. 1,2,3,4,6,7,8-HpCDF	T. Total HxCDD	Y. Total HpCDF

Notes:

COMPND

LDC #: 24952/
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 4

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 8290)

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

Y N N/A Were all samples associated with a method blank?
Y N N/A Was a method blank analyzed for each matrix?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: ~~6/29/09~~ **Blank analysis date:** 7/2/09
Conc. units: ~~ng/g~~ Associated Samples: MA (6L)

Compound	Blank ID	Sample Identification								
2009 02	BS-01	16	~~2~~ 15	21						
F	0.199	0.502 U	–	–						
~~G~~	3.11	1.70 U	7.58 U	~~2~~ 12.6 U						
O	0.218	–		–						
Q	0.955	–		–						
X	0.218	–		–						

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

Compound	Blank ID	Sample Identification								

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 21d95c21
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

(Y) N N/A Were field blanks identified in this SDG?
Blank units: pg/L **Associated sample units:** ng/Kg
Sampling date: 7/21/09
Field blank type: (circle one) Field Blank / Rinsate / Other: Associated Samples: all (>5x)

Compound	Blank ID	Sample Identification								
	FB072109-SO	5X								
F	8.37	0.04185								
G	21.8	0.109								
K	6.33	0.03165								
L	3.57	0.01785								
M	4.04	0.0202								
O	43.3	0.2165								
P	19.6	0.098								
Q	205	1.025								
U	8.37	0.04185								
X	18.1	0.0905								
Y	72.1	0.3605								
CRQL										

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Samples with compound concentrations within five times the associated field blank concentration are listed above, these sample results were qualified as not detected, "U".

LDC #: 2K495/2
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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
		25/26	8	-129 (70-130)	-133 (70-130)	28 (20)	13-K	Vdets/A (d) *
				( )	( )	( )		
				( )	( )	( )		* No qual for R
				( )	( )	( )		due to conc > 4x SA
				( )	( )	( )		
				( )	( )	( )		
		25/26	OTHS	%R and RPD	( )	( )	13-K	No qual (LCS in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 24952?1
SDG #: See cover

Reviewer: ?
2nd Reviewer: ?

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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 Was a LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?
Y (N) N/A Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the QC limits?

#	Date	Lab ID/Reference	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		E0090235-02LCS	Q	148 (70-130)	( )	( )	All + Blk	J+dets/P1 (?)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 21495E2
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Internal Standards

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 4

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Y N N/A Are all internal standard recoveries were within the 40-135% criteria?

Y N N/A Was the S/N ratio all internal standard peaks ≥ 10?

#	Date	Lab ID/Reference	Internal Standard	% Recovery (Limit: 40-135%)		Qualifications
		T	F	32	(40-135)	J (all compounds) (C-E, I)
			I	17	( )	(F, R)
					( )	
		8	F	37	( )	(C-E)
			I	17	( )	(F, R)
					( )	
		12	I	38	( )	(F, R)
					( )	
		14	I	39	( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	

	Internal Standards	Check Standard Used		Internal Standards	Check Standard Used
A.	^{13}C-2,3,7,8-TCDF		I.	^{13}C-OCDD	
B.	^{13}C-2,3,7,8-TCDD		K.	^{13}C-1,2,3,4-TCDD	
C.	^{13}C-1,2,3,7,8-PeCDF		L.	^{13}C-1,2,3,7,8,9-HxCDD	
D.	^{13}C-1,2,3,7,8-PeCDD		M		
E.	^{13}C-1,2,3,4,7,8-HxCDF		N.		
F.	^{13}C-1,2,3,6,7,8-HxCDD		O.		
G.	^{13}C-1,2,3,4,6,7,8-HpCDF		P.		
H.	^{13}C-1,2,3,4,6,7,8-HpCDD				

LDC #: 24495F
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Y N N/A Were the correct internal standard (IS), quantitation ions and relative response factors (RRF) used to quantitate the compound?
Y N N/A Compound quantitation and CRQLs were adjusted to reflect all sample dilutions and dry weight factors (if necessary).

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		All	EMPC results.	all	J+ (E)
			Cpds > calib range		
		1	0.1 pg	1	J det, J+ (E)
		2, 9	I, K, L, O, P, Q and H on DB-5 and DB-225	2, 9	J det, J (E)
		4	K, L, O, P, Q, H on DB-5 & DB-225	4	J det, J+ (E)
		5	F, G, I-L, M, O-Q, H on DB-5 & DB-225	5	J det, J (E)
		T	G, I-K, O-Q, H on DB-5 & DB-225	T	↓

Comments: See sample calculation verification worksheet for recalculations

LDC #: 21495F2
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Y N N/A
Y N N/A

Were the correct internal standard (IS), quantitation ions and relative response factors (RRF) used to quantitate the compound?
Compound quantitation and CRQLs were adjusted to reflect all sample dilutions and dry weight factors (if necessary).

#	Date	Sample ID	Finding (conc > calib range)	Associated Samples	Qualifications
		11, 13	F-Q (HxCDD-5 & OCDD-225)	11, 13	dets/A (e)
		17, 24	K.O.P.Q. HxCDD-5 & OCDD-225	17, 24	dets/P (e)
		18	K.L.O.P.Q. HxCDD-5 & OCDD-225	18	↓
		FB 19	I.K.L.M.O.P.Q. HxCDD-5 & OCDD-225	19	dets/A (e)
		22	I-M.O-PQ. HxCDD-5 & OCDD-225	22	↓

Comments: See sample calculation verification worksheet for recalculations

LDC #: 34962
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		1, 4, ~~8~~ 15-18, 21 24	H on DB-5	1, 4, ~~8~~, 15-18, 21 24	X (10)
		2, 9	I. K. L. O. P. Q and H on DB-5 and DB-225	2, 9	
		3, 10	~~All~~ except H. I. K. L. O. P. Q	3, 10	
		5	F-G. I-M. O-Q. H on DB-5 ~~& DB-225~~	DB-225 5	
		6	~~All~~ except F-G. I-M. O-Q. ~~B on DB-5~~ H on DB-5	6	
		7	G. I-K. O-Q. H on DB-5 & ~~DB-225~~	7	
		8	~~All~~ except G. H-K. O-Q	8	

Comments: _____

LDC #: 24955-2
SDG #: Recover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: a
2nd Reviewer: a

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		11, 13	F-Q (HxCDD-5 & DB-225)	11, 13	X (O)
		12, 14	All except F, G & I-Q HxCDD-5	12, 14	
		19	~~H~~ I. K. L. M. O-Q. HxCDD-5 & DB-225	19	
		20	All except H, I. K. L. M O. P. Q	20	
		22	I-M. O-Q. HxCDD-5 & DB-225	21	
		23	All except H-M. O-Q	22	

Comments: _____

C:\WPDOCS\WRK\DIOXIN90\OVR90.21

LDC#:21495G21
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: 9
2nd Reviewer: AC

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Compound	Concentration (ng/Kg)		(≤50) RPD	(ng/Kg) Difference	(ng/Kg) Limits	Qualifications (Parent Only)
	17	24				
A	8.27	8.38	1			
B	27.3	26.9	1			
C	18.1	18.6	3			
D	32.7	32.2	2			
E	36.9	37.9	3			
F	159	176	10			
G	419	572	31			
H	488	475	3			
I	374	372	1			
J	185	181	2			
K	786	789	0			
L	470	478	2			
N	83.9	75.8	10			
M	278	278	0			
O	1660	1660	0			
P	811	767	6			
Q	5830	5730	2			
R	350	326	7			
S	310	302	3			
T	268	271	1			
U	263	296	12			
V	3220	3090	4			
W	2980	2910	2			
X	3450	3650	6			
Y	3590	3510	2			
H (DB-225)	233	231	1			

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: June 29 through June 30, 2009

LDC Report Date: September 29, 2009

Matrix: Soil

Parameters: Dioxins/Dibenzofurans

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903615

Sample Identification

SA45-0.5B
SA452009-0.5B
SA187-0.5B
SA187-0.5BDL
SA153-0.5B
SA186-0.5B
SA185-0.5B
RSAO5-0.5B
SA50-0.5B
SA54-0.5B
SA106-0.5B
SA106-0.5BDL
SA102-0.5B
SA109-0.5B
SA106-0.5BMS
SA106-0.5BMSD

Introduction

This data review covers 16 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8290 for Polychlorinated Dioxins/Dibenzofurans.

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 USEPA Contract Laboratory Program National Functional Guidelines for Polychlorinated Dioxins/Dibenzofurans Data Review (September 2005) 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 XIV.

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

The following are definitions of the data qualifiers:

J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.

J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

B The analytical result may be a false positive totally attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JB The analytical result may be biased high and partially attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JK The analytical result is an estimated maximum possible concentration (EMPC).

X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.

J-TDS The analytical result is estimated based on failure of the Total Dissolved Solids (TDS) correctness check performed in accordance with the Standard Method 1030E.

J-CAB The analytical result is estimated based on failure of the cation-anion balance correctness check performed in accordance with Standard Method 1030E.

J-TDS & CAB The analytical result is unreliable based on the failure of the cation-anion balance and TDS correctness check performed in accordance with standard Method 1030E.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required daily frequency.

Retention time windows were established for all homologues. The chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomer was less than or equal to 25% .

III. Initial Calibration

A five point initial calibration was performed as required by the method.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for unlabeled compounds and less than or equal to 30.0% for labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

IV. Routine Calibration (Continuing)

Routine calibration was performed at the required frequencies.

All of the routine calibration percent differences (%D) between the initial calibration RRF and the routine calibration RRF were less than or equal to 20.0% for unlabeled compounds and less than or equal to 30.0% for labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

V. Blanks

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

Method Blank ID	Extraction Date	Compound	Concentration	Associated Samples
EQ0900252-01	7/8/09	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,4,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF OCDF Total HpCDD Total HpCDF	0.189 ng/Kg 0.496 ng/Kg 0.358 ng/Kg 0.609 ng/Kg 1.55 ng/Kg 0.213 ng/Kg 0.609 ng/Kg	All samples in SDG R0903615

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

Sample	Compound	Reported Concentration	Modified Final Concentration
SA45-0.5B	OCDD	1.97 ng/Kg	1.97U ng/Kg
SA452009-0.5B	OCDD	2.16 ng/Kg	2.16U ng/Kg
SA153-0.5B	OCDD	3.02 ng/Kg	3.02U ng/Kg
SA54-0.5B	1,2,3,4,6,7,8-HpCDD OCDD Total HpCDD	0.419 ng/Kg 0.900 ng/Kg 0.419 ng/Kg	0.419U ng/Kg 0.900U ng/Kg 0.419U ng/Kg

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

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

VII. Laboratory Control Samples (LCS)

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

VIII. Regional Quality Assurance and Quality Control

Not applicable.

IX. Internal Standards

All internal standard recoveries were within QC limits with the following exceptions:

Sample	Internal Standards	%R (Limits)	Compound	Flag	A or P
RSAO5-0.5B	^{13}C-OCDD	34 (40-135)	OCDD OCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P
SA50-0.5B	^{13}C-OCDD	26 (40-135)	OCDD OCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P
SA54-0.5B	^{13}C-OCDD	29 (40-135)	OCDD OCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P

X. Target Compound Identifications

Raw data were not reviewed for this SDG.

XI. Project Quantitation Limit

All project quantitation limits were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
SA187-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A

Sample	Compound	Finding	Criteria	Flag	A or P
SA106-0.5B	2,3,7,8-TCDD 1,2,3,7,8-PeCDD 1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
SA106-0.5BDL	OCDF	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	A

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903615	All compounds reported below the PQL.	J (all detects)	A

All compounds reported as EMPC were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903615	All compounds reported as estimated maximum possible concentration (EMPC).	JK (all detects)	A

Raw data were not reviewed for this SDG.

XII. System Performance

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
SA187-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X X X X	A
SA187-0.5BDL	All TCL compounds except 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-225)	X	A
SA45-0.5B SA452009-0.5B SA153-0.5B SA186-0.5B SA185-0.5B RSAO5-0.5B SA50-0.5B SA54-0.5B SA102-0.5B SA109-0.5B SA106-0.5BDL	2,3,7,8-TCDF (DB-5)	X	A
SA106-0.5B	2,3,7,8-TCDD 1,2,3,7,8-PeCDD 1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X X X X X X X X X	A

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

XIV. Field Duplicates

Samples SA45-0.5B and SA452009-0.5B were identified as field duplicates. No polychlorinated dioxins/dibenzofurans were detected in any of the samples with the following exceptions:

Compound	Concentration (ng/Kg)		RPD (Limits)	Difference (Limits)	Flag	A or P
	SA45-0.5B	SA452009-0.5B				
2,3,7,8-TCDD	0.189	0.204	-	0.015 (≤0.952)	-	-
1,2,3,7,8-PeCDD	0.277	0.255	-	0.022 (≤2.38)	-	-
1,2,3,4,7,8-HxCDD	0.135	0.114	-	0.021 (≤2.38)	-	-
1,2,3,6,7,8-HxCDD	0.413	0.410	-	0.003 (≤2.38)	-	-
1,2,3,7,8,9-HxCDD	0.462	0.480	-	0.018 (≤2.38)	-	-
1,2,3,4,6,7,8-HpCDD	1.10	1.14	-	0.04 (≤2.38)	-	-
OCDD	1.97	2.16	-	0.19 (≤4.76)	-	-
2,3,7,8-TCDF	2.79	3.42	-	0.63 (≤0.952)	-	-
1,2,3,7,8-PeCDF	1.96	2.27	-	0.31 (≤2.38)	-	-
2,3,4,7,8-PeCDF	1.12	1.23	-	0.11 (≤2.38)	-	-
1,2,3,4,7,8-HxCDF	3.52	3.67	-	0.15 (≤2.38)	-	-
1,2,3,6,7,8-HxCDF	2.28	2.46	-	0.18 (≤2.38)	-	-
1,2,3,7,8,9-HxCDF	0.461	0.483	-	0.022 (≤2.38)	-	-
2,3,4,6,7,8-HxCDF	1.55	1.43	-	0.12 (≤2.38)	-	-
1,2,3,4,6,7,8-HpCDF	7.03	6.76	-	0.27 (≤2.38)	-	-
1,2,3,4,7,8,9-HpCDF	3.16	3.12	-	0.04 (≤2.38)	-	-
OCDF	19.3	19.2	-	0.1 (≤4.76)	-	-

Compound	Concentration (ng/Kg)		RPD (Limits)	Difference (Limits)	Flag	A or P
	SA45-0.5B	SA452009-0.5B				
Total TCDD	0.695	1.45	-	0.755 (≤0.952)	-	-
Total PeCDD	0.542	1.03	-	0.488 (≤2.38)	-	-
Total HxCDD	1.01	2.12	-	1.11 (≤2.38)	-	-
Total HpCDD	2.21	2.18	-	0.03 (≤2.38)	-	-
Total TCDF	18.4	21.5	16 (≤50)	-	-	-
Total PeCDF	17.2	18.3	6 (≤50)	-	-	-
Total HxCDF	16.4	17.4	6 (≤50)	-	-	-
Total HpCDF	14.6	14.3	2 (≤50)	-	-	-
2,3,7,8-TCDF (DB-225)	1.01	2.10	-	1.09 (≤0.952)	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Dioxins/Dibenzofurans - Data Qualification Summary - SDG R0903615

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903615	RSAO5-0.5B SA50-0.5B SA54-0.5B	OCDD OCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P	Internal standards (%R) (i)
R0903615	SA187-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)
R0903615	SA106-0.5B	2,3,7,8-TCDD 1,2,3,7,8-PeCDD 1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)
R0903615	SA106-0.5BDL	OCDF	J (all detects)	A	Project Quantitation Limit (e)
R0903615	SA45-0.5B SA452009-0.5B SA187-0.5B SA187-0.5BDL SA153-0.5B SA186-0.5B SA185-0.5B RSAO5-0.5B SA50-0.5B SA54-0.5B SA106-0.5B SA106-0.5BDL SA102-0.5B SA109-0.5B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903615	SA45-0.5B SA452009-0.5B SA187-0.5B SA187-0.5BDL SA153-0.5B SA186-0.5B SA185-0.5B RSAO5-0.5B SA50-0.5B SA54-0.5B SA106-0.5B SA106-0.5BDL SA102-0.5B SA109-0.5B	All compounds reported as EMPC	JK (all detects)	A	Project Quantitation Limit (k)
R0903615	SA187-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X X X X	A	Overall assessment of data (o)
R0903615	SA187-0.5BDL	All TCL compounds except 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-225)	X	A	Overall assessment of data (o)
R0903615	SA45-0.5B SA452009-0.5B SA153-0.5B SA186-0.5B SA185-0.5B RSAO5-0.5B SA50-0.5B SA54-0.5B SA102-0.5B SA109-0.5B SA106-0.5BDL	2,3,7,8-TCDF (DB-5)	X	A	Overall assessment of data (o)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903615	SA106-0.5B	2,3,7,8-TCDD 1,2,3,7,8-PeCDD 1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X X X X X X X X X	A	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Dioxins/Dibenzofurans - Laboratory Blank Data Qualification Summary - SDG R0903615

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0903615	SA45-0.5B	OCDD	1.97U ng/Kg	A	bl
R0903615	SA452009-0.5B	OCDD	2.16U ng/Kg	A	bl
R0903615	SA153-0.5B	OCDD	3.02U ng/Kg	A	bl
R0903615	SA54-0.5B	1,2,3,4,6,7,8-HpCDD OCDD Total HpCDD	0.419U ng/Kg 0.900U ng/Kg 0.419U ng/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Dioxins/Dibenzofurans - Field Blank Data Qualification Summary - SDG R0903615

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 21495H21
SDG #: R0903615
Laboratory: Columbia Analytical Services

Date: 9/17/09
Page: 1 of 1
Reviewer: R
2nd Reviewer: A

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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: 6/29-30/09
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration	A	
IV.	Routine calibration/ICV	A	
V.	Blanks	SW	
VI.	Matrix spike/Matrix spike duplicates	SW	%R and RPD out SW 15/16 - No Cmal (LCS in)
VII.	Laboratory control samples	A	LCS
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	SW	
X.	Target compound identifications	N	
XI.	Compound quantitation and CRQLs	SW N	
XII.	System performance	N	
XIII.	Overall assessment of data	SW	
XIV.	Field duplicates	SW	2 = 1+2 .
XV.	Field blanks	X N	~~FB01-09-S01-090401-1~~ D

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

Validated Samples: All Soils

1	SA45-0.5B	11	SA106-0.5B	21	ZQ0900252-01	31	U219T52
2	SA452009-0.5B	12	SA106-0.5BDL	22		32	P103991
3	SA187-0.5B	13	SA102-0.5B	23		33	U219T03
4	SA187-0.5DL BDL	14	SA109-0.5B	24		34	P103952
5	SA153-0.5B	15	SA106-0.5BMS	25		35	
6	SA186-0.5B	16	SA106-0.5BMSD	26		36	
7	SA185-0.5B	17		27	P203448	37	
8	RSAO5-0.5B	18		28	P203311	38	
9	SA50-0.5B	19		29	P203360	39	
10	SA54-0.5B	20		30	P203327	40	

Notes: _____

VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

A. 2,3,7,8-TCDD	F. 1,2,3,4,6,7,8-HpCDD	K. 1,2,3,4,7,8-HxCDF	P. 1,2,3,4,7,8,9-HpCDF	U. Total HpCDD
B. 1,2,3,7,8-PeCDD	G. OCDD	L. 1,2,3,6,7,8-HxCDF	Q. OCDF	V. Total TCDF
C. 1,2,3,4,7,8-HxCDD	H. 2,3,7,8-TCDF	M. 2,3,4,6,7,8-HxCDF	R. Total TCDD	W. Total PeCDF
D. 1,2,3,6,7,8-HxCDD	I. 1,2,3,7,8-PeCDF	N. 1,2,3,7,8,9-HxCDF	S. Total PeCDD	X. Total HxCDF
E. 1,2,3,7,8,9-HxCDD	J. 2,3,4,7,8-PeCDF	O. 1,2,3,4,6,7,8-HpCDF	T. Total HxCDD	Y. Total HpCDF

Notes:

COMPNDL

LDC #: 21495b1
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: 9
2nd Reviewer: 9

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 8290)

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

Y N N/A Were all samples associated with a method blank?
Y N N/A Was a method blank analyzed for each matrix?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 7/8/09 **Blank analysis date:** 7/14/09
Conc. units: pg/g Associated Samples: 1 thru 10

Compound	Blank ID	Sample Identification								
EPA90250-01		1	2	5	10		others > 5X			
F	0.189	~~ND~~	-	-	0.419/U					
G	0.496	1.97/U	2.16/U	3.02/U	0.900/U					
K	0.358	-	-	-	-					
O	0.609	-	-	-	-					
Q	1.55	-	-	-	-					
U	0.213	-	-	-	0.419/U					
Y	0.609	-	-	-	-					

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

Compound	Blank ID	Sample Identification								

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 24954-2
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Internal Standards

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Y N N/A Are all internal standard recoveries were within the 40-135% criteria?

Y N N/A Was the S/N ratio all internal standard peaks ≥ 10?

#	Date	Lab ID/Reference	Internal Standard	% Recovery (Limit: 40-135%)	Code = I Qualifications
		8	I	34 (40-135)	J (EMPC (E.R.))
				( )	
		9	I	26 ( )	
				( )	
		10	I	29 ( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

	Internal Standards	Check Standard Used		Internal Standards	Check Standard Used
A.	^{13}C-2,3,7,8-TCDF		I.	^{13}C-OCDD	
B.	^{13}C-2,3,7,8-TCDD		K.	^{13}C-1,2,3,4-TCDD	
C.	^{13}C-1,2,3,7,8-PeCDF		L.	^{13}C-1,2,3,7,8,9-HxCDD	
D.	^{13}C-1,2,3,7,8-PeCDD		M		
E.	^{13}C-1,2,3,4,7,8-HxCDF		N.		
F.	^{13}C-1,2,3,6,7,8-HxCDD		O.		
G.	^{13}C-1,2,3,4,6,7,8-HpCDF		P.		
H.	^{13}C-1,2,3,4,6,7,8-HpCDD				

LDC #: 26954b1
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Y N N/A Were the correct internal standard (IS), quantitation ions and relative response factors (RRF) used to quantitate the compound?
Y N N/A Compound quantitation and CRQLs were adjusted to reflect all sample dilutions and dry weight factors (if necessary).

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		3	F → A (+ on both DB-5 & DB-225)	3	J- (all) / A (e)
		11	A - A (+ on both DB-5 and DB-225)	11	
		12	A	12	
		All	EMPC results	All	J+ (K)

Comments: See sample calculation verification worksheet for recalculations

LDC #: 24951b1
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 4

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		3	F → Q. (H on both DB-5 & DB-225)	3	X (10)
		4	All except F. G. I → Q. H on DB-225	4	
		1-2. 5-10, 13-14	Q H on DB-5	1-2. 5-11	
		11	A – Q (H on both DB-5 & DB-225)	11	
		12	H on DB-5	12	

Comments: _____

LDC#:21495H21
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: [signature]
2nd Reviewer: [signature]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Compound	Concentration (ng/Kg) 1	Concentration (ng/Kg) 2	(≤50) RPD	(ng/Kg) Difference	(ng/Kg) Limits	Qualifications (Parent Only)
A	0.189	0.204		0.015	(≤0.952)	
B	0.277	0.255		0.022	(≤2.38)	
C	0.135	0.114		0.021	(≤2.38)	
D	0.413	0.410		0.003	(≤2.38)	
E	0.462	0.480		0.018	(≤2.38)	
F	1.10	1.14		0.04	(≤2.38)	
G	1.97	2.16		0.19	(≤4.76)	
H	2.79	3.42		0.63	(≤0.952)	
I	1.96	2.27		0.31	(≤2.38)	
J	1.12	1.23		0.11	(≤2.38)	
K	3.52	3.67		0.15	(≤2.38)	
L	2.28	2.46		0.18	(≤2.38)	
N	0.461	0.483		0.022	(≤2.38)	
M	1.55	1.43		0.12	(≤2.38)	
O	7.03	6.76		0.27	(≤2.38)	
P	3.16	3.12		0.04	(≤2.38)	
Q	19.3	19.2		0.1	(≤4.76)	
R	0.695	1.45		0.755	(≤0.952)	
S	0.542	1.03		0.488	(≤2.38)	
T	1.01	2.12		1.11	(≤2.38)	
U	2.21	2.18		0.03	(≤2.38)	
V	18.4	21.5	16			
W	17.2	18.3	6			
X	16.4	17.4	6			
Y	14.6	14.3	2			
H (DB-225)	1.01	2.10		1.09	(<0.952)	

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: July 1 through July 2, 2009

LDC Report Date: September 27, 2009

Matrix: Soil

Parameters: Dioxins/Dibenzofurans

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903678

Sample Identification

SA114-0.5B
SA114-0.5BDL
SA114009-0.5B
SA114009-0.5BDL
RSAN6-0.5B
SA82-0.5B
SA82-0.5BDL
RSAK3-0.5B
RSAK3-0.5BDL
SA82-0.5BMS
SA82-0.5BMSD

Introduction

This data review covers 11 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8290 for Polychlorinated Dioxins/Dibenzofurans.

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 USEPA Contract Laboratory Program National Functional Guidelines for Polychlorinated Dioxins/Dibenzofurans Data Review (September 2005) 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 XIV.

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

The following are definitions of the data qualifiers:

J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.

J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

B The analytical result may be a false positive totally attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JB The analytical result may be biased high and partially attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JK The analytical result is an estimated maximum possible concentration (EMPC).

X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.

J-TDS The analytical result is estimated based on failure of the Total Dissolved Solids (TDS) correctness check performed in accordance with the Standard Method 1030E.

J-CAB The analytical result is estimated based on failure of the cation-anion balance correctness check performed in accordance with Standard Method 1030E.

J-TDS & CAB The analytical result is unreliable based on the failure of the cation-anion balance and TDS correctness check performed in accordance with standard Method 1030E.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required daily frequency.

Retention time windows were established for all homologues. The chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomer was less than or equal to 25% .

III. Initial Calibration

A five point initial calibration was performed as required by the method.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for unlabeled compounds and less than or equal to 30.0% for labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

IV. Routine Calibration (Continuing)

Routine calibration was performed at the required frequencies.

All of the routine calibration percent differences (%D) between the initial calibration RRF and the routine calibration RRF were less than or equal to 20.0% for unlabeled compounds and less than or equal to 30.0% for labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

V. Blanks

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

Method Blank ID	Extraction Date	Compound	Concentration	Associated Samples
EQ0900252-01	7/8/09	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,4,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF OCDF Total HpCDD Total HpCDF	0.189 ng/Kg 0.496 ng/Kg 0.358 ng/Kg 0.609 ng/Kg 1.55 ng/Kg 0.213 ng/Kg 0.609 ng/Kg	All samples in SDG R0903678

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

Sample FB072109-SO (from SDG R0904016) was identified as a field blank. No polychlorinated dioxin/dibenzofuran contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072109-SO	7/21/09	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF Total HpCDD Total HxCDF Total HpCDF	8.37 pg/L 21.8 pg/L 6.33 pg/L 3.57 pg/L 4.04 pg/L 43.3 pg/L 19.6 pg/L 205 pg/L 8.37 pg/L 18.1 pg/L 72.1 pg/L	SA82-0.5B SA82-0.5BDL RSAK3-0.5B RSAK3-0.5BDL

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

VI. Matrix Spike/Matrix Spike Duplicates

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

VII. Laboratory Control Samples (LCS)

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

VIII. Regional Quality Assurance and Quality Control

Not applicable.

IX. Internal Standards

All internal standard recoveries were within QC limits with the following exceptions:

Sample	Internal Standards	%R (Limits)	Compound	Flag	A or P
SA114-0.5BDL	^{13}C-OCDD	39 (40-135)	OCDD OCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P
SA114009-0.5B	^{13}C-OCDD	37 (40-135)	OCDD OCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P
SA114009-0.5BDL	^{13}C-OCDD	29 (40-135)	OCDD OCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P
SA82-0.5BDL	^{13}C-OCDD	37 (40-135)	OCDD OCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P
RSAK3-0.5B	^{13}C-2,3,7,8-TCDF ^{13}C-2,3,7,8-TCDD ^{13}C-1,2,3,4,6,7,8-HpCDF ^{13}C-OCDD	11 (40-135) 29 (40-135) 30 (40-135) 32 (40-135)	2,3,7,8-TCDF Total TCDF 2,3,7,8-TCDD Total TCDD 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF Total HpCDF OCDD OCDF	J (all detects) UJ (all non-detects)	P
RSAK3-0.5BDL	^{13}C-2,3,7,8-TCDF ^{13}C-2,3,7,8-TCDD ^{13}C-1,2,3,4,7,8-HxCDF ^{13}C-1,2,3,6,7,8-HxCDD ^{13}C-1,2,3,4,6,7,8-HpCDF ^{13}C-OCDD	11 (40-135) 27 (40-135) 34 (40-135) 36 (40-135) 30 (40-135) 23 (40-135)	2,3,7,8-TCDF Total TCDF 2,3,7,8-TCDD Total TCDD 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF Total HxCDF 1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD Total HxCDD 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF Total HpCDF OCDD OCDF	J (all detects) UJ (all non-detects)	P

X. Target Compound Identifications

Raw data were not reviewed for this SDG.

XI. Project Quantitation Limit

All project quantitation limits were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
SA114-0.5B SA114009-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 2,3,7,8-TCDF 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
RSAN6-0.5B	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
SA82-0.5B	2,3,7,8-TCDF 1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
RSAK3-0.5B	2,3,7,8-TCDD 1,2,3,7,8-PeCDD 1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 2,3,7,8-TCDF 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903678	All compounds reported below the PQL.	J (all detects)	A

All compounds reported as EMPC were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903678	All compounds reported as estimated maximum possible concentration (EMPC).	JK (all detects)	A

Raw data were not reviewed for this SDG.

XII. System Performance

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
SA114-0.5B SA114009-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-225)	X X X X X X X X X X X X	A

Sample	Compound	Flag	A or P
SA114-0.5BDL SA114009-0.5BDL	All TCL compounds except 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-225)	X	A
SA82-0.5B	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-225)	X X X X X X X X	A
SA82-0.5BDL	All TCL compounds except 2,3,7,8-TCDF 1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF	X	A
RSAK3-0.5B	2,3,7,8-TCDD 1,2,3,7,8-PeCDD 1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-225)	X X X X X X X X X X X X X X X X X X	A
RSAN6-0.5B RSAK3-0.5BDL	2,3,7,8-TCDF (DB-5)	X	A

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

XIV. Field Duplicates

Samples SA114-0.5B and SA114009-0.5B and samples SA114-0.5BDL and SA114009-0.5BDL were identified as field duplicates. No polychlorinated dioxins/dibenzofurans were detected in any of the samples with the following exceptions:

Compound	Concentration (ng/Kg)		RPD (Limits)	Difference (Limits)	Flag	A or P
	SA114-0.5B	SA114009-0.5B				
2,3,7,8-TCDD	73.5	57.7	24 (≤50)	-	-	-
1,2,3,7,8-PeCDD	263	195	30 (≤50)	-	-	-
1,2,3,4,7,8-HxCDD	213	152	33 (≤50)	-	-	-
1,2,3,6,7,8-HxCDD	356	256	33 (≤50)	-	-	-
1,2,3,7,8,9-HxCDD	417	286	37 (≤50)	-	-	-
1,2,3,4,6,7,8-HpCDD	1240	940	28 (≤50)	-	-	-
OCDD	1360	1050	26 (≤50)	-	-	-
2,3,7,8-TCDF	3510	4190	18 (≤50)	-	-	-
1,2,3,7,8-PeCDF	2590	2860	10 (≤50)	-	-	-
2,3,4,7,8-PeCDF	1440	1530	6 (≤50)	-	-	-
1,2,3,4,7,8-HxCDF	6050	6620	9 (≤50)	-	-	-
1,2,3,6,7,8-HxCDF	3330	3950	17 (≤50)	-	-	-
1,2,3,7,8,9-HxCDF	559	725	26 (≤50)	-	-	-
2,3,4,6,7,8-HxCDF	2070	2290	10 (≤50)	-	-	-
1,2,3,4,6,7,8-HpCDF	11500	13600	17 (≤50)	-	-	-
1,2,3,4,7,8,9-HpCDF	6040	6870	13 (≤50)	-	-	-
OCDF	32900	42800	26 (≤50)	-	-	-

Compound	Concentration (ng/Kg)		RPD (Limits)	Difference (Limits)	Flag	A or P
	SA114-0.5B	SA114009-0.5B				
Total TCDD	3340	2310	36 (≤50)	-	-	-
Total PeCDD	2960	2200	29 (≤50)	-	-	-
Total HxCDD	2990	2230	29 (≤50)	-	-	-
Total HpCDD	1900	1500	24 (≤50)	-	-	-
Total TCDF	33400	42600	24 (≤50)	-	-	-
Total PeCDF	21100	23500	11 (≤50)	-	-	-
Total HxCDF	25500	19400	27 (≤50)	-	-	-
Total HpCDF	26300	24700	6 (≤50)	-	-	-
2,3,7,8-TCDF (DB-225)	1120	1380	21 (≤50)	-	-	-

Compound	Concentration (ng/Kg)		RPD (Limits)	Difference (Limits)	Flag	A or P
	SA114-0.5BDL	SA114009-0.5BDL				
2,3,7,8-TCDD	81.0	77.5	-	3.5 (≤65.3)	-	-
1,2,3,7,8-PeCDD	251	206	-	45 (≤138)	-	-
1,2,3,4,7,8-HxCDD	244	163	-	81 (≤138)	-	-
1,2,3,6,7,8-HxCDD	404	315	-	89 (≤138)	-	-
1,2,3,7,8,9-HxCDD	448	357	-	91 (≤138)	-	-
1,2,3,4,6,7,8-HpCDD	1250	972	25 (≤50)	-	-	-
OCDD	1780	1240	-	540 (≤276)	J (all detects)	A
2,3,7,8-TCDF	3810	5960	44 (≤50)	-	-	-
1,2,3,7,8-PeCDF	2150	2960	32 (≤50)	-	-	-

Compound	Concentration (ng/Kg)		RPD (Limits)	Difference (Limits)	Flag	A or P
	SA114-0.5BDL	SA114009-0.5BDL				
2,3,4,7,8-PeCDF	1150	1490	26 (≤50)	-	-	-
1,2,3,4,7,8-HxCDF	6930	8090	15 (≤50)	-	-	-
1,2,3,6,7,8-HxCDF	3710	4990	29 (≤50)	-	-	-
1,2,3,7,8,9-HxCDF	651	680	-	29 (≤138)	-	-
2,3,4,6,7,8-HxCDF	2210	2670	19 (≤50)	-	-	-
1,2,3,4,6,7,8-HpCDF	14600	17700	19 (≤50)	-	-	-
1,2,3,4,7,8,9-HpCDF	6710	7480	11 (≤50)	-	-	-
OCDF	43200	55000	24 (≤50)	-	-	-
2,3,7,8-TCDF (DB-225)	881	1040	17 (≤50)	-	-	-

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Dioxins/Dibenzofurans - Data Qualification Summary - SDG R0903678

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903678	SA114-0.5BDL SA114009-0.5B SA114009-0.5BDL SA82-0.5BDL	OCDD OCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P	Internal standards (%R) (i)
R0903678	RSAK3-0.5B	2,3,7,8-TCDF Total TCDF 2,3,7,8-TCDD Total TCDD 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF Total HpCDF OCDD OCDF	J (all detects) UJ (all non-detects)	P	Internal standards (%R) (i)
R0903678	RSAK3-0.5BDL	2,3,7,8-TCDF Total TCDF 2,3,7,8-TCDD Total TCDD 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF Total HxCDF 1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD Total HxCDD 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF Total HpCDF OCDD OCDF	J (all detects) UJ (all non-detects)	P	Internal standards (%R) (i)
R0903678	SA114-0.5B SA114009-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 2,3,7,8-TCDF 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)
R0903678	RSAN6-0.5B	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903678	SA82-0.5B	2,3,7,8-TCDF 1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)
R0903678	RSAK3-0.5B	2,3,7,8-TCDD 1,2,3,7,8-PeCDD 1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 2,3,7,8-TCDF 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)
R0903678	SA114-0.5B SA114-0.5BDL SA114009-0.5B SA114009-0.5BDL RSAN6-0.5B SA82-0.5B SA82-0.5BDL RSAK3-0.5B RSAK3-0.5BDL	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0903678	SA114-0.5B SA114-0.5BDL SA114009-0.5B SA114009-0.5BDL RSAN6-0.5B SA82-0.5B SA82-0.5BDL RSAK3-0.5B RSAK3-0.5BDL	All compounds reported as EMPC	JK (all detects)	A	Project Quantitation Limit (k)
R0903678	SA114-0.5B SA114009-0.5B	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-225)	X X X X X X X X X X X X	A	Overall assessment of data (o)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903678	SA114-0.5BDL SA114009-0.5BDL	All TCL compounds except 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-225)	X	A	Overall assessment of data (o)
R0903678	SA82-0.5B	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-225)	X X X X X X X X	A	Overall assessment of data (o)
R0903678	SA82-0.5BDL	All TCL compounds except 2,3,7,8-TCDF 1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF	X	A	Overall assessment of data (o)
R0903678	RSAK3-0.5B	2,3,7,8-TCDD 1,2,3,7,8-PeCDD 1,2,3,4,7,8-HxCDD 1,2,3,6,7,8-HxCDD 1,2,3,7,8,9-HxCDD 1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-225)	X X X X X X X X X X X X X X X X X	A	Overall assessment of data (o)
R0903678	RSAN6-0.5B RSAK3-0.5BDL	2,3,7,8-TCDF (DB-5)	X	A	Overall assessment of data (o)
R0903678	SA114-0.5BDL SA114009-0.5BDL	OCDD	J (all detects)	A	Field duplicates (Difference) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Dioxins/Dibenzofurans - Laboratory Blank Data Qualification Summary - SDG R0903678

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Dioxins/Dibenzofurans - Field Blank Data Qualification Summary - SDG R0903678

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 21495I21
SDG #: R0903678
Laboratory: Columbia Analytical Services

Date: 9/17/09
Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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: 7/1-2/09
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration	A	
IV.	Routine calibration/ICV	A	
V.	Blanks	SW	
VI.	Matrix spike/Matrix spike duplicates	SW	
VII.	Laboratory control samples	A	LCS
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	SW	
X.	Target compound identifications	N	
XI.	Compound quantitation and CRQLs	SW N	
XII.	System performance	SW N	
XIII.	Overall assessment of data	SW	
XIV.	Field duplicates	SW	D=1+3. 2+4.
XV.	Field blanks	SW	FB0731 09-SO(R0904016)

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

Validated Samples:

All Soils

1	SA114-0.5B	X	11	SA82-0.5BMSD		21	1	280900252-01	31	1	U219763
2	SA114-0.5BDL	X	12			22			32	2	P103952
3	SA114009-0.5B	X	13			23			33	3	U219794
4	SA114009-0.5BDL	X	14			24			34	4	P103938
5	RSAN6-0.5B	X	15			25			35	5	P103978
6	SA82-0.5B		16			26			36		
7	SA82-0.5BDL		17			27	1	P203292	37		
8	RSAK3-0.5B		18			28	2	P203345	38		
9	RSAK3-0.5BDL		19			29	3	P203311	39		
10	SA82-0.5BMS		20			30	4	P203327	40		

Notes: _____

VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

A. 2,3,7,8-TCDD	F. 1,2,3,4,6,7,8-HpCDD	K. 1,2,3,4,7,8-HxCDF	P. 1,2,3,4,7,8,9-HpCDF	U. Total HpCDD
B. 1,2,3,7,8-PeCDD	G. OCDD	L. 1,2,3,6,7,8-HxCDF	Q. OCDF	V. Total TCDF
C. 1,2,3,4,7,8-HxCDD	H. 2,3,7,8-TCDF	M. 2,3,4,6,7,8-HxCDF	R. Total TCDD	W. Total PeCDF
D. 1,2,3,6,7,8-HxCDD	I. 1,2,3,7,8-PeCDF	N. 1,2,3,7,8,9-HxCDF	S. Total PeCDD	X. Total HxCDF
E. 1,2,3,7,8,9-HxCDD	J. 2,3,4,7,8-PeCDF	O. 1,2,3,4,6,7,8-HpCDF	T. Total HxCDD	Y. Total HpCDF

Notes:

COMPNDL

LDC #: 24951-2
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 8290)

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

Y N N/A Were all samples associated with a method blank?
Y N N/A Was a method blank analyzed for each matrix?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 7/8/09 **Blank analysis date:** 7/14/09
Conc. units: ng/kg Associated Samples: All (>5x)

Compound	Blank ID	Sample Identification								
2,3,7,8-TCDD	0052-01									
F	0.189									
F	0.496									
K	0.358									
O	0.609									
Q	1.55									
U	0.213									
Y	0.609									

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

Compound	Blank ID	Sample Identification								

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 24195|21
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

Reviewer: 9
2nd Reviewer: K

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

Y N N/A Were field blanks identified in this SDG?
Blank units: pg/L **Associated sample units:** ng/Kg
Sampling date: 7/21/09
Field blank type: (circle one) Field Blank / Rinsate / Other: Associated Samples: ~~1-4 (>5x)~~ 6-7. 8-9 (>5x)

Compound	Blank ID	Sample Identification								
	FB072109-SO	5X								
F	8.37	0.04185								
G	21.8	0.109								
K	6.33	0.03165								
L	3.57	0.01785								
M	4.04	0.0202								
O	43.3	0.2165								
P	19.6	0.098								
Q	205	1.025								
U	8.37	0.04185								
X	18.1	0.0905								
Y	72.1	0.3605								
CRQL										

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Samples with compound concentrations within five times the associated field blank concentration are listed above, these sample results were qualified as not detected, "U".

LDC #: 21495I21
SDG #: See cover

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

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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
		10/11	%R and RPD out	(	)	( )	6	No Qual
				( )	( )	( )		(LCS in)
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC #: 21495|2
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Internal Standards

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y (N) N/A Are all internal standard recoveries were within the 40-135% criteria?
Y (N) N/A Was the S/N ratio all internal standard peaks > 10?

#	Date	Lab ID/Reference	Internal Standard	% Recovery (Limit: 40-135%)		Qualifications
		~~11 (MSD)~~	~~F~~	~~33~~	~~(40-135)~~	~~No Qual~~ :K
					( )	
					( )	
		2	J	39	(40-135)	√M/P (F.R)
					( )	
		3	F	37	( )	
					( )	
		4	J	29	( )	
					( )	
		7	I	37	( )	
					( )	
		8	A	11	( )	√M/P (H.V)
			B	29	( )	(A.R)
			F	30	( )	(O.P.Y)
			I	32	( )	(F.R)
					( )	
		~~9~~	~~A~~	~~21~~	( )	
			~~B~~		( )	
					( )	
					( )	

	Internal Standards	Check Standard Used		Internal Standards	Check Standard Used
A.	^{13}C-2,3,7,8-TCDF		I.	^{13}C-OCDD	
B.	^{13}C-2,3,7,8-TCDD		K.	^{13}C-1,2,3,4-TCDD	
C.	^{13}C-1,2,3,7,8-PeCDF		L.	^{13}C-1,2,3,7,8,9-HxCDD	
D.	^{13}C-1,2,3,7,8-PeCDD		M		
E.	^{13}C-1,2,3,4,7,8-HxCDF		N.		
F.	^{13}C-1,2,3,6,7,8-HxCDD		O.		
G.	^{13}C-1,2,3,4,6,7,8-HpCDF		P.		
H.	^{13}C-1,2,3,4,6,7,8-HpCDD				

LDC #: 24962 | 2
SDG #: Review

VALIDATION FINDINGS WORKSHEET
Internal Standards

Reviewer: 9
2nd Reviewer: 4

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Are all internal standard recoveries were within the 40-135% criteria?
Y N N/A Was the S/N ratio all internal standard peaks ≥ 10?

#	Date	Lab ID/Reference	Internal Standard	% Recovery (Limit: 40-135%)	code = i Qualifications
		9	A	11 (40-135)	Y/N/A (H.V)
			B	27 ( )	(A.R)
			E	34 ( )	(K-N.X)
			F	36 ( )	(E-Z.T)
			G	30 ( )	(O.P.Y)
			I	23 ( )	(4.8)
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

	Internal Standards	Check Standard Used		Internal Standards	Check Standard Used
A.	^{13}C-2,3,7,8-TCDF		I.	^{13}C-OCDD	
B.	^{13}C-2,3,7,8-TCDD		K.	^{13}C-1,2,3,4-TCDD	
C.	^{13}C-1,2,3,7,8-PeCDF		L.	^{13}C-1,2,3,7,8,9-HxCDD	
D.	^{13}C-1,2,3,7,8-PeCDD		M		
E.	^{13}C-1,2,3,4,7,8-HxCDF		N.		
F.	^{13}C-1,2,3,6,7,8-HxCDD		O.		
G.	^{13}C-1,2,3,4,6,7,8-HpCDF		P.		
H.	^{13}C-1,2,3,4,6,7,8-HpCDD				

LDC #: 21495|2|
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 4

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Y N N/A Were the correct internal standard (IS), quantitation ions and relative response factors (RRF) used to quantitate the compound?
Y N N/A Compound quantitation and CRQLs were adjusted to reflect all sample dilutions and dry weight factors (if necessary).

#	Date	Sample ID	Findings > calib range Finding	Associated Samples	Qualifications
		1, 3	F → Q	1, 3	vdet3/A (e)
		5	I. K. L. O. P. Q, H on DB-225	5	
		6	H. I. K. L. M. O. P. Q	6	
		8	A- Q	8	
		All	EMPC results	All	JK (f)

Comments: See sample calculation verification worksheet for recalculations

LDC #: 21485-21
SDG #: Second

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Reviewer: 9
2nd Reviewer: K

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		1, 3	F → Q. H on DB-225	1, 3	X (10)
		2, 4	All except F. G. I-Q and H on DB-225	2, 4	
		6	H. I. K. L. M. O. P. Q and H on DB-225	6	
		~~R~~	~~All except~~		
		T	All except H. I. K. L	T	
			M. O. P. Q		
		8	A - Q, H on DB-225	8	
		~~9~~	~~All except A~~		
		9, 5	H on DB-5	9, 5	

Comments: _____

LDC#:21495I21
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: 9
2nd Reviewer: W

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Compound	Concentration (ng/Kg) 1	Concentration (ng/Kg) 3	(≤50) RPD	(ng/Kg) Difference	(ng/Kg) Limits	Qualifications (Parent Only)
A	73.5	57.7	24			No qual
B	263	195	30			
C	213	152	33			
D	356	256	33			
E	417	286	37			
F	1240	940	28			
G	1360	1050	26			
H	3510	4190	18			
I	2590	2860	10			
J	1440	1530	6			
K	6050	6620	9			
L	3330	3950	17			
N	559	725	26			
M	2070	2290	10			
O	11500	13600	17			
P	6040	6870	13			
Q	32900	42800	26			
R	3340	2310	36			
S	2960	2200	29			
T	2990	2230	29			
U	1900	1500	24			
V	33400	42600	24			
W	21100	23500	11			
X	25500	19400	27			
Y	26300	24700	6			
H (DB-225)	1120	1380	21			

LDC#:21495I21
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: 9
2nd Reviewer: K

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Compound	Concentration (ng/Kg) 2	Concentration (ng/Kg) 4	(≤50) RPD	(ng/Kg) Difference	(ng/Kg) Limits	Qualifications (Parent Only)
A	81.0	77.5		3.5	(≤55.3)	~~A~~
B	251	206		45	(≤138)	
C	244	163		81	(≤138)	
D	404	315		89	(≤138)	
E	448	357		91	(≤138)	
F	1250	972	25			
G	1780	1240		540	(≤276)	Idet=A (+d)
H	3810	5960	44			
I	2150	2960	32			
J	1150	1490	26			
K	6930	8090	15			
L	3710	4990	29			
N	651	680		29	(≤138)	
M	2210	2670	19			
O	14600	17700	19			
P	6710	7480	11			
Q	43200	55000	24			
H (DB-225)	881	1040	17			

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: June 26, 2009

LDC Report Date: September 27, 2009

Matrix: Soil

Parameters: Dioxins/Dibenzofurans

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903584

Sample Identification

SA188-0.5B
SA172-0.5B
SA41-0.5B
SA41-0.5BDL
SA44-0.5B
SA42-0.5B

Introduction

This data review covers 6 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8290 for Polychlorinated Dioxins/Dibenzofurans.

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 USEPA Contract Laboratory Program National Functional Guidelines for Polychlorinated Dioxins/Dibenzofurans Data Review (September 2005) 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 XIV.

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

The following are definitions of the data qualifiers:

J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.

J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

B The analytical result may be a false positive totally attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JB The analytical result may be biased high and partially attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JK The analytical result is an estimated maximum possible concentration (EMPC).

X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.

J-TDS The analytical result is estimated based on failure of the Total Dissolved Solids (TDS) correctness check performed in accordance with the Standard Method 1030E.

J-CAB The analytical result is estimated based on failure of the cation-anion balance correctness check performed in accordance with Standard Method 1030E.

J-TDS & CAB The analytical result is unreliable based on the failure of the cation-anion balance and TDS correctness check performed in accordance with standard Method 1030E.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required daily frequency.

Retention time windows were established for all homologues. The chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomer was less than or equal to 25% .

III. Initial Calibration

A five point initial calibration was performed as required by the method.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for unlabeled compounds and less than or equal to 30.0% for labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

IV. Routine Calibration (Continuing)

Routine calibration was performed at the required frequencies.

All of the routine calibration percent differences (%D) between the initial calibration RRF and the routine calibration RRF were less than or equal to 20.0% for unlabeled compounds and less than or equal to 30.0% for labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

V. Blanks

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

Method Blank ID	Extraction Date	Compound	Concentration	Associated Samples
EQ0900248-01	7/6/09	1,2,3,4,6,7,8-HpCDD OCDD OCDF Total HpCDD	0.126 ng/Kg 0.629 ng/Kg 0.177 ng/Kg 0.136 ng/Kg	All samples in SDG R0903584

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

No field blanks were identified in this SDG.

VI. 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.

VII. Laboratory Control Samples (LCS)

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

VIII. Regional Quality Assurance and Quality Control

Not applicable.

IX. Internal Standards

All internal standard recoveries were within QC limits with the following exceptions:

Sample	Internal Standards	%R (Limits)	Compound	Flag	A or P
SA44-0.5B	^{13}C-OCDD	33 (40-135)	OCDD OCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P

X. Target Compound Identifications

Raw data were not reviewed for this SDG.

XI. Project Quantitation Limit

All project quantitation limits were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
SA188-0.5B SA44-0.5B	1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P

Sample	Compound	Finding	Criteria	Flag	A or P
SA172-0.5B	OCDF	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	P
SA41-0.5B	1,2,3,4,6,7,8-HpCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903584	All compounds reported below the PQL.	J (all detects)	A

All compounds reported as EMPC were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903584	All compounds reported as estimated maximum possible concentration (EMPC).	JK (all detects)	A

Raw data were not reviewed for this SDG.

XII. System Performance

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
SA188-0.5B SA172-0.5B SA44-0.5B SA42-0.5B	2,3,7,8-TCDF (DB-5)	X	A
SA41-0.5B	1,2,3,4,6,7,8-HpCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	X X X X X X X X X X X	A
SA41-0.5BDL	All TCL compounds except 1,2,3,4,6,7,8-HpCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-225)	X	A

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

XIV. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Dioxins/Dibenzofurans - Data Qualification Summary - SDG R0903584

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903584	SA44-0.5B	OCDD OCDF	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	P	Internal standards (%R) (i)
R0903584	SA188-0.5B SA44-0.5B	1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P	Project Quantitation Limit (e)
R0903584	SA172-0.5B	OCDF	J (all detects)	P	Project Quantitation Limit (e)
R0903584	SA41-0.5B	1,2,3,4,6,7,8-HpCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Project Quantitation Limit (e)
R0903584	SA188-0.5B SA172-0.5B SA41-0.5B SA41-0.5BDL SA44-0.5B SA42-0.5B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0903584	SA188-0.5B SA172-0.5B SA41-0.5B SA41-0.5BDL SA44-0.5B SA42-0.5B	All compounds reported as EMPC	JK (all detects)	A	Project Quantitation Limit (k)
R0903584	SA188-0.5B SA172-0.5B SA44-0.5B SA42-0.5B	2,3,7,8-TCDF (DB-5)	X	A	Overall assessment of data (o)

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903584	SA41-0.5B	1,2,3,4,6,7,8-HpCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-225)	X X X X X X X X X X X	A	Overall assessment of data (o)
R0903584	SA41-0.5BDL	All TCL compounds except 1,2,3,4,6,7,8-HpCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-225)	X	A	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Dioxins/Dibenzofurans - Laboratory Blank Data Qualification Summary - SDG R0903584

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Dioxins/Dibenzofurans - Field Blank Data Qualification Summary - SDG R0903584

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 21495K21
SDG #: R0903584
Laboratory: Columbia Analytical Services

Date: 9/17/09
Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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: 6/26/09
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration	A	
IV.	Routine calibration/ICV	A	
V.	Blanks	SW	
VI.	Matrix spike/Matrix spike duplicates	N	client spiked.
VII.	Laboratory control samples	A	LCS/D
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	SW	
X.	Target compound identifications	N	
XI.	Compound quantitation and CRQLs	SW N	
XII.	System performance	N	
XIII.	Overall assessment of data	SW	
XIV.	Field duplicates	N	
XV.	Field blanks	~~SW~~ N	~~FB 2109-SO (R0904016) 9~~

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: MS 30 | S

1	SA188-0.5B	11	R0900248-01	21	P10385	31	P20328
2	SA172-0.5B	12		22	P10386	32	P20329
3	SA41-0.5B	13		23	P10396	33	P20327
4	SA41-0.5BDL	14		24	P10384	34	
5	SA44-0.5B	15		25		35	
6	SA42-0.5B	16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes: _____

VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

A. 2,3,7,8-TCDD	F. 1,2,3,4,6,7,8-HpCDD	K. 1,2,3,4,7,8-HxCDF	P. 1,2,3,4,7,8,9-HpCDF	U. Total HpCDD
B. 1,2,3,7,8-PeCDD	G. OCDD	L. 1,2,3,6,7,8-HxCDF	Q. OCDF	V. Total TCDF
C. 1,2,3,4,7,8-HxCDD	H. 2,3,7,8-TCDF	M. 2,3,4,6,7,8-HxCDF	R. Total TCDD	W. Total PeCDF
D. 1,2,3,6,7,8-HxCDD	I. 1,2,3,7,8-PeCDF	N. 1,2,3,7,8,9-HxCDF	S. Total PeCDD	X. Total HxCDF
E. 1,2,3,7,8,9-HxCDD	J. 2,3,4,7,8-PeCDF	O. 1,2,3,4,6,7,8-HpCDF	T. Total HxCDD	Y. Total HpCDF

Notes:

COMPNDI

LDC #: 24951
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 4

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 8290)

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

(Y) N N/A Were all samples associated with a method blank?
(Y) N N/A Was a method blank analyzed for each matrix?
(Y) N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 7/6/09 **Blank analysis date:** 7/9/09
Conc. units: ng/kg Associated Samples: All (<5X)

Compound	Blank ID	Sample Identification								
2,3,7,8-TCDD	248-01	R								
F	0.126									
G	0.629									
Q	0.177									
U	0.126									

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

Compound	Blank ID	Sample Identification								

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 21495b1
SDG #: see cover

VALIDATION FINDINGS WORKSHEET
Internal Standards

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Are all internal standard recoveries were within the 40-135% criteria?
Y/N N/A Was the S/N ratio all internal standard peaks ≥ 10?

#	Date	Lab ID/Reference	Internal Standard	% Recovery (Limit: 40-135%)	Code = I Qualifications
		5	I	33 (40-135)	J (all compounds) (F, A)
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

	Internal Standards	Check Standard Used		Internal Standards	Check Standard Used
A.	^{13}C-2,3,7,8-TCDF		I.	^{13}C-OCDD	
B.	^{13}C-2,3,7,8-TCDD		K.	^{13}C-1,2,3,4-TCDD	
C.	^{13}C-1,2,3,7,8-PeCDF		L.	^{13}C-1,2,3,7,8,9-HxCDD	
D.	^{13}C-1,2,3,7,8-PeCDD		M		
E.	^{13}C-1,2,3,4,7,8-HxCDF		N.		
F.	^{13}C-1,2,3,6,7,8-HxCDD		O.		
G.	^{13}C-1,2,3,4,6,7,8-HpCDF		P.		
H.	^{13}C-1,2,3,4,6,7,8-HpCDD				

LDC #: 21495k2
SDG # See cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Reviewer: 9
2nd Reviewer: A

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Y N N/A
Y N N/A

Were the correct internal standard (IS), quantitation ions and relative response factors (RRF) used to quantitate the compound?
Compound quantitation and CRQLs were adjusted to reflect all sample dilutions and dry weight factors (if necessary).

#	Date	Sample ID	cpds > calib range Finding	Associated Samples	Qualifications
		1,5	H.K.L.O.P.Q (H on both DB-5 and DB-225)	1,5	J dets/P (e)
		2	Q	2	↓
		3	F.H.I.J.K.L.M.N	3	J dets/A (e)
			O.P.Q (H on both DB-5 and DB-225)		
		All ~~2~~	2378 results	All	JK (e)

Comments: See sample calculation verification worksheet for recalculations

LDC #: 24495k21
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		1-2, ~~3~~, 5, 6	2,3,7,8-TCDF on DB-5	1-2, ~~3~~, 5, 6	X (0)
		3	F, ~~N~~, I, V, K, L, M, N, O, P, Q, H (DB-225) DB-5)	3	
		4	~~All~~ except F, ~~N~~, I, V, K, L, M, N, O, P, Q, ~~R~~ and H on DB-225	4	

Comments: _____

C:\WPDOCS\WRK\DIOXIN90\OVR90.21

Laboratory Data Consultants, Inc.
Data Validation Report

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

Collection Date: July 6 through July 7, 2009

LDC Report Date: September 27, 2009

Matrix: Soil

Parameters: Dioxins/Dibenzofurans

Validation Level: Stage 2B

Laboratory: Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903729

Sample Identification

SA206-0.5B
RSAL4-0.5B
RSAL4009-0.5B
SA69-0.5B

Introduction

This data review covers 4 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 8290 for Polychlorinated Dioxins/Dibenzofurans.

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 USEPA Contract Laboratory Program National Functional Guidelines for Polychlorinated Dioxins/Dibenzofurans Data Review (September 2005) 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 XIV.

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

The following are definitions of the data qualifiers:

J+ Data are qualified as estimated, with a high bias likely to occur. False positives or false negatives are unlikely to have been reported.

J- Data are qualified as estimated, with a low bias likely to occur. False positives or false negatives are unlikely to have been reported.

J Data are qualified as estimated; it is not possible to assess the direction of the potential bias. False positives or false negatives are unlikely to have been reported.

U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.

R Data are qualified as rejected. There is a significant potential for the reporting of false negatives or false positives.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

B The analytical result may be a false positive totally attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JB The analytical result may be biased high and partially attributable to blank contamination. This qualifier is applicable to radiochemistry analysis only.

JK The analytical result is an estimated maximum possible concentration (EMPC).

X The analytical result is not used for reporting because a more accurate and precise result is reported in its place.

J-TDS The analytical result is estimated based on failure of the Total Dissolved Solids (TDS) correctness check performed in accordance with the Standard Method 1030E.

J-CAB The analytical result is estimated based on failure of the cation-anion balance correctness check performed in accordance with Standard Method 1030E.

J-TDS & CAB The analytical result is unreliable based on the failure of the cation-anion balance and TDS correctness check performed in accordance with standard Method 1030E.

A Indicates the finding is based upon technical validation criteria.

P Indicates the finding is related to a protocol/contractual deviation.

None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

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

II. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required daily frequency.

Retention time windows were established for all homologues. The chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomer was less than or equal to 25% .

III. Initial Calibration

A five point initial calibration was performed as required by the method.

Percent relative standard deviations (%RSD) were less than or equal to 20.0% for unlabeled compounds and less than or equal to 30.0% for labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

IV. Routine Calibration (Continuing)

Routine calibration was performed at the required frequencies.

All of the routine calibration percent differences (%D) between the initial calibration RRF and the routine calibration RRF were less than or equal to 20.0% for unlabeled compounds and less than or equal to 30.0% for labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

V. Blanks

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

Method Blank ID	Extraction Date	Compound	Concentration	Associated Samples
EQ0900258-01	7/10/09	OCDD 1,2,3,4,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF OCDF Total HxCDF Total HpCDF	3.72 ng/Kg 0.730 ng/Kg 2.77 ng/Kg 11.5 ng/Kg 0.730 ng/Kg 2.77 ng/Kg	All samples in SDG R0903729

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

Sample	Compound	Reported Concentration	Modified Final Concentration
SA69-0.5B	OCDD	4.70 ng/Kg	4.70U ng/Kg

Sample FB072109-SO (from SDG R0904016) was identified as a field blank. No polychlorinated dioxin/dibenzofuran contaminants were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Compound	Concentration	Associated Samples
FB072109-SO	7/21/09	1,2,3,4,6,7,8-HpCDD OCDD 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF Total HpCDD Total HxCDF Total HpCDF	8.37 pg/L 21.8 pg/L 6.33 pg/L 3.57 pg/L 4.04 pg/L 43.3 pg/L 19.6 pg/L 205 pg/L 8.37 pg/L 18.1 pg/L 72.1 pg/L	All samples in SDG R0903729

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

VI. 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.

VII. Laboratory Control Samples (LCS)

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

VIII. Regional Quality Assurance and Quality Control

Not applicable.

IX. Internal Standards

All internal standard recoveries were within QC limits with the following exceptions:

Sample	Internal Standards	%R (Limits)	Compound	Flag	A or P
EQ0900258-01	^{13}C-2,3,7,8-TCDD ^{13}C-1,2,3,7,8-PeCDF ^{13}C-1,2,3,4,7,8-HxCDF ^{13}C-1,2,3,6,7,8-HxCDD ^{13}C-1,2,3,4,6,7,8-HpCDF ^{13}C-1,2,3,4,6,7,8-HpCDD ^{13}C-OCDD	36 (40-135) 37 (40-135) 37 (40-135) 39 (40-135) 24 (40-135) 21 (40-135) 6 (40-135)	2,3,7,8-TCDD Total TCDD 1,2,3,7,8-PeCDF 2,3,4,7,8-PeCDF Total PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF Total HxCDF 1,2,3,4,7,8-HxCDD 1,2,3,7,8,9-HxCDD Total HxCDD 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF Total HpCDF 1,2,3,4,6,7,8-HpCDD Total HpCDD OCDD OCDF 1,2,3,6,7,8-HxCDD	J (all detects) UJ (all non-detects)	P

X. Target Compound Identifications

Raw data were not reviewed for this SDG.

XI. Project Quantitation Limit

All project quantitation limits were within validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
SA206-0.5B	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P
RSAL4-0.5B	2,3,7,8-TCDF 1,2,3,4,6,7,8-HpCDF OCDF	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects) J (all detects)	P
RSAL4009-0.5B	1,2,3,4,6,7,8-HpCDF OCDF	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects) J (all detects)	P

All compounds reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903729	All compounds reported below the PQL.	J (all detects)	A

All compounds reported as EMPC were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903729	All compounds reported as estimated maximum possible concentration (EMPC).	JK (all detects)	A

Raw data were not reviewed for this SDG.

XII. System Performance

Raw data were not reviewed for this SDG.

XIII. Overall Assessment of Data

The overall assessment of data was acceptable. In the case where more than one result was reported for an individual sample, the least technically acceptable results were rejected as follows:

Sample	Compound	Flag	A or P
All samples in SDG R0903729	2,3,7,8-TCDF (DB-5)	X	A

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

XIV. Field Duplicates

Samples RSAL4-0.5B and RSAL4009-0.5B were identified as field duplicates. No polychlorinated dioxins/dibenzofurans were detected in any of the samples with the following exceptions:

Compound	Concentration (ng/Kg)		RPD (Limits)	Difference (Limits)	Flag	A or P
	RSAL4-0.5B	RSAL4009-0.5B				
2,3,7,8-TCDD	5.51	4.50	-	1.01 (≤1.04)	-	-
1,2,3,7,8-PeCDD	18.4	15.7	16 (≤50)	-	-	-

Compound	Concentration (ng/Kg)		RPD (Limits)	Difference (Limits)	Flag	A or P
	RSAL4-0.5B	RSAL4009-0.5B				
1,2,3,4,7,8-HxCDD	13.9	12.1	-	1.8 (≤2.59)	-	-
1,2,3,6,7,8-HxCDD	26.4	23.2	13 (≤50)	-	-	-
1,2,3,7,8,9-HxCDD	28.5	24.4	16 (≤50)	-	-	-
1,2,3,4,6,7,8-HpCDD	90.5	76.9	16 (≤50)	-	-	-
OCDD	104	87.2	18 (≤50)	-	-	-
2,3,7,8-TCDF	234	202	15 (≤50)	-	-	-
1,2,3,7,8-PeCDF	208	171	20 (≤50)	-	-	-
2,3,4,7,8-PeCDF	96.8	86.0	12 (≤50)	-	-	-
1,2,3,4,7,8-HxCDF	492	415	17 (≤50)	-	-	-
1,2,3,6,7,8-HxCDF	274	243	12 (≤50)	-	-	-
1,2,3,7,8,9-HxCDF	45.9	36.8	22 (≤50)	-	-	-
2,3,4,6,7,8-HxCDF	167	135	21 (≤50)	-	-	-
1,2,3,4,6,7,8-HpCDF	990	822	19 (≤50)	-	-	-
1,2,3,4,7,8,9-HpCDF	458	386	17 (≤50)	-	-	-
OCDF	3030	2520	18 (≤50)	-	-	-
Total TCDD	165	150	10 (≤50)	-	-	-
Total PeCDD	201	179	12 (≤50)	-	-	-
Total HxCDD	211	184	14 (≤50)	-	-	-
Total HpCDD	141	121	15 (≤50)	-	-	-
Total TCDF	1450	1250	15 (≤50)	-	-	-

Compound	Concentration (ng/Kg)		RPD (Limits)	Difference (Limits)	Flag	A or P
	RSAL4-0.5B	RSAL4009-0.5B				
Total PeCDF	1840	1510	20 (≤50)	-	-	-
Total HxCDF	2200	1850	17 (≤50)	-	-	-
Total HpCDF	2120	1770	18 (≤50)	-	-	-
2,3,7,8-TCDF (DB-225)	110	93.2	17 (≤50)	-	-	-

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Dioxins/Dibenzofurans - Data Qualification Summary - SDG R0903729

SDG	Sample	Compound	Flag	A or P	Reason (Code)
R0903729	SA206-0.5B	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF 1,2,3,4,6,7,8-HpCDF 1,2,3,4,7,8,9-HpCDF OCDF 2,3,7,8-TCDF (DB-5 & DB-225)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	P	Project Quantitation Limit (e)
R0903729	RSAL4-0.5B	2,3,7,8-TCDF 1,2,3,4,6,7,8-HpCDF OCDF	J (all detects) J (all detects) J (all detects)	P	Project Quantitation Limit (e)
R0903729	RSAL4009-0.5B	1,2,3,4,6,7,8-HpCDF OCDF	J (all detects) J (all detects)	P	Project Quantitation Limit (e)
R0903729	SA206-0.5B RSAL4-0.5B RSAL4009-0.5B SA69-0.5B	All compounds reported below the PQL.	J (all detects)	A	Project Quantitation Limit (sp)
R0903729	SA206-0.5B RSAL4-0.5B RSAL4009-0.5B SA69-0.5B	All compounds reported as EMPC	JK (all detects)	A	Project Quantitation Limit (k)
R0903729	SA206-0.5B RSAL4-0.5B RSAL4009-0.5B SA69-0.5B	2,3,7,8-TCDF (DB-5)	X	A	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Dioxins/Dibenzofurans - Laboratory Blank Data Qualification Summary - SDG R0903729

SDG	Sample	Compound	Modified Final Concentration	A or P	Code
R0903729	SA69-0.5B	OCDD	4.70U ng/Kg	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Dioxins/Dibenzofurans - Field Blank Data Qualification Summary - SDG R0903729

No Sample Data Qualified in this SDG

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 21495L21
SDG #: R0903729
Laboratory: Columbia Analytical Services

Date: 9/17/09
Page: 1 of 1
Reviewer: R
2nd Reviewer: W

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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: 7/6-7/09
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration	A	
IV.	Routine calibration/ICV	A	
V.	Blanks	SW	
VI.	Matrix spike/Matrix spike duplicates	N	client specified.
VII.	Laboratory control samples	A	LCS/D
VIII.	Regional quality assurance and quality control	N	
IX.	Internal standards	SW	
X.	Target compound identifications	N	
XI.	Compound quantitation and CRQLs	SW N	
XII.	System performance	N	
XIII.	Overall assessment of data	SW	
XIV.	Field duplicates	SW	D = 2+3.
XV.	Field blanks	SW N	FBOT2109-SO (R0904016)

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

Validated Samples:

1	SA206-0.5B S	11	ZQ0900258-01	21	U219TT9	31	P203360
2	RSAL4-0.5B	12		22	P102991	32	
3	RSAL4009-0.5B	13		23		33	
4	SA69-0.5B	14		24		34	
5		15		25		35	
6		16		26		36	
7		17		27		37	
8		18		28		38	
9		19		29		39	
10		20		30		40	

Notes: _____

VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

A. 2,3,7,8-TCDD	F. 1,2,3,4,6,7,8-HpCDD	K. 1,2,3,4,7,8-HxCDF	P. 1,2,3,4,7,8,9-HpCDF	U. Total HpCDD
B. 1,2,3,7,8-PeCDD	G. OCDD	L. 1,2,3,6,7,8-HxCDF	Q. OCDF	V. Total TCDF
C. 1,2,3,4,7,8-HxCDD	H. 2,3,7,8-TCDF	M. 2,3,4,6,7,8-HxCDF	R. Total TCDD	W. Total PeCDF
D. 1,2,3,6,7,8-HxCDD	I. 1,2,3,7,8-PeCDF	N. 1,2,3,7,8,9-HxCDF	S. Total PeCDD	X. Total HxCDF
E. 1,2,3,7,8,9-HxCDD	J. 2,3,4,7,8-PeCDF	O. 1,2,3,4,6,7,8-HpCDF	T. Total HxCDD	Y. Total HpCDF

Notes:

COMPNDL

LDC #: 21495c2
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 4

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 8290)

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

Y N N/A Were all samples associated with a method blank?
Y N N/A Was a method blank analyzed for each matrix?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 7/10/09 **Blank analysis date:** 7/15/09
Conc. units: ng/Kg Associated Samples: all (6l)

Compound	Blank ID	Sample Identification								
2,3,7,8-TCDD	20090258-01	4		others > 5x						
4	3.72	4.70/4								
K	0.730	(20.0)								
O	2.77	(42.6)								
Q	11.5	(121)								
X	0.730	(85.6)								
Y	2.77	(87.9)								

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

Compound	Blank ID	Sample Identification								

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 24952A1
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Field Blanks

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

Y N N/A Were field blanks identified in this SDG?
Blank units: pg/L **Associated sample units:** ng/Kg
Sampling date: 7/21/09
Field blank type: (circle one) Field Blank / Rinsate / Other: Associated Samples: All (>5x)

Compound	Blank ID	Sample Identification									
	FB072109-SO	5X									
F	8.37	0.04185									
G	21.8	0.109									
K	6.33	0.03165									
L	3.57	0.01785									
M	4.04	0.0202									
O	43.3	0.2165									
P	19.6	0.098									
Q	205	1.025									
U	8.37	0.04185									
X	18.1	0.0905									
Y	72.1	0.3605									
CRQL											

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Samples with compound concentrations within five times the associated field blank concentration are listed above, these sample results were qualified as not detected, "U".

LDC #: 24092
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Internal Standards

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y (N) N/A Are all internal standard recoveries were within the 40-135% criteria?
(Y) N N/A Was the S/N ratio all internal standard peaks ≥ 10?

#	Date	Lab ID/Reference	Internal Standard	% Recovery (Limit: 40-135%)		Code: F Qualifications
		EB0900258-01	B	36	(40-135)	✓MY (A. R)
			C	37	( )	(I. J. W)
			E	37	( )	(K-N. X)
			F	39	( )	(C-E. T)
			G	24	( )	(O. P. Y)
			H	21	( )	(F. U)
			J	6	( )	(F. Q)
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	
					( )	

	Internal Standards	Check Standard Used		Internal Standards	Check Standard Used
A.	^{13}C-2,3,7,8-TCDF		I.	^{13}C-OCDD	
B.	^{13}C-2,3,7,8-TCDD		K.	^{13}C-1,2,3,4-TCDD	
C.	^{13}C-1,2,3,7,8-PeCDF		L.	^{13}C-1,2,3,7,8,9-HxCDD	
D.	^{13}C-1,2,3,7,8-PeCDD		M		
E.	^{13}C-1,2,3,4,7,8-HxCDF		N.		
F.	^{13}C-1,2,3,6,7,8-HxCDD		O.		
G.	^{13}C-1,2,3,4,6,7,8-HpCDF		P.		
H.	^{13}C-1,2,3,4,6,7,8-HpCDD				

LDC #: 2KK95J2
SDG #: See cover

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

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

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Y N N/A Were the correct internal standard (IS), quantitation ions and relative response factors (RRF) used to quantitate the compound?
Y N N/A Compound quantitation and CRQLs were adjusted to reflect all sample dilutions and dry weight factors (if necessary).

#	Date	Sample ID	Finding (EDS > calib range)	Associated Samples	Qualifications
		1	H. F. K < 0, P, A	1	J detects/P (e)
			(H on both DB-5 & DB-225)		
		2	H. 0. A,	2	
		3	0. A.	3	
		M	2M-PC MS/MSD	All	J+ (K)
		B	~~H on DB-225~~	B	~~J detects/P (e)~~ A

Comments: See sample calculation verification worksheet for recalculations

LDC #: 24952
SDG #: See Cover

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

(Y) N N/A Was the overall quality and usability of the data acceptable?

#	Date	Sample ID	Finding	Associated Samples	Qualifications
		All	2,3,7,8-TCDF on DB-5	All	X (O)

Comments:

LDC#:21495L21
SDG#: See Cover

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: [signature]
2nd Reviewer: [signature]

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290)

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

Compound	Concentration (ng/Kg) 2	Concentration (ng/Kg) 3	(≤50) RPD	(ng/Kg) Difference	(ng/Kg) Limits	Qualifications (Parent Only)
A	5.51	4.50		1.01	(≤1.04)	No Qual
B	18.4	15.7	16			
C	13.9	12.1		1.8	(≤2.59)	
D	26.4	23.2	13			
E	28.5	24.4	16			
F	90.5	76.9	16			
G	104	87.2	18			
H	234	202	15			
I	208	171	20			
J	96.8	86.0	12			
K	492	415	17			
L	274	243	12			
N	45.9	36.8	22			
M	167	135	21			
O	990	822	19			
P	458	386	17			
Q	3030	2520	18			
R	165	150	10			
S	201	179	12			
T	211	184	14			
U	141	121	15			
V	1450	1250	15			
W	1840	1510	20			
X	2200	1850	17			
Y	2120	1770	18			
H (DB-225)	110	93.2	17			