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

Wet Chemistry

100

LDC Report# 21495A6

Laboratory Data Consultants, Inc. Data Validation Report

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

Collection Date: May 21, 2009

LDC Report Date: September 21, 2009

Matrix: Water

Parameters: Dissolved Hexavalent Chromium

Validation Level: Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0902886

Sample Identification

MC-3B-FILT

Introduction

This data review covers one water sample listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA SW 846 Method 218.6 for Dissolved Hexavalent Chromium.

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

Field duplicates are summarized in Section X.

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. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met.

III. Blanks

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

Sample MC-3B-FILT was identified as a filter blank. No hexavalent chromium was found in this blank.

IV. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Duplicates

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

VI. Laboratory Control Samples

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

VII. Sample Result Verification and Project Quantitation Limit

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0902886	All analytes reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

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

IX. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Dissolved Hexavalent Chromium - Data Qualification Summary - SDG R0902886

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0902886	MC-3B-FILT	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Dissolved Hexavalent Chromium - Laboratory Blank Data Qualification Summary -SDG R0902886

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Dissolved Hexavalent Chromium - Field Blank Data Qualification Summary - SDG R0902886

No Sample Data Qualified in this SDG

LDC #: 21495A6

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

Stage 2B

SDG #: R0902886

Laboratory: Columbia Analytical Services

Date: Page: Reviewer 2nd Reviewe

METHOD: (Analyte) Hexavalent Chromium (EPA Method 218.6)

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
١.	Technical holding times	A	Sampling dates: 5/>1/09
lla.	Initial calibration	Ă	
llb.	Calibration verification	A	
111.	Blanks	A	
١V	Matrix Spike/Matrix Spike Duplicates	A	juy/ kyp from Sny Rogo3.06
v	Duplicates	A	
VI.	Laboratory control samples	A	Leg
VII.	Sample result verification	Ň	
VIII.	Overall assessment of data	_ A	
IX.	Field duplicates	N_	
Lx	Field blanks	ŃD	Filter Blogk =

Note:

A = Acceptable N = Not provided/applicable

b

SW = See worksheet

ND = No compounds detected R = Rinsate FB = Field blank

D = Duplicate TB = Trip blank EB = Equipment blank

Validated Samples:

1	MC-3B-FILT	11	MAS	21	31	
2		12	1.2	22	32	
3		13		23	 33	
4		14	۹. ۱	24	 34	
5		15		25	35	
6	-	16		26	 36	
7		17	·. 、	27	 37	
8		18		28	38	
9		19		29	39	
10		20		30	40	

Notes:

Laboratory Data Consultants, Inc. Data Validation Report

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

Collection Date: May 27 through June 4, 2009

LDC Report Date: October 4, 2009

Matrix: Water

Parameters: Wet Chemistry

Validation Level: Stage 4

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903006

Sample Identification

MC-3B EB052709 M-127B FB060409 MC-3BMS MC-3BDUP

Introduction

This data review covers 6 water samples listed on the cover sheet. The analyses were per Standard Method 2320B for Alkalinity, EPA Method 350.1 for Ammonia as Nitrogen, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, Nitrite as Nitrogen, and Sulfate, EPA Method 353.2 for Nitrite as Nitrogen, EPA 300.1 for Chlorate, EPA Method 120.1 for Conductivity, EPA SW 846 Method 9012A for Cyanide, EPA Method 218.6 for Dissolved Hexavalent Chromium, EPA SW 846 Method 314.0 for Perchlorate, EPA Method 365.1 for Total Phosphorus, Standard Method 2540C for Total Dissolved Solids, Standard Method 2540D for Total Suspended Solids, and EPA SW 846 Method 9060 for Total Organic Carbon.

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

Field duplicates are summarized in Section X.

The following are definitions of the data qualifiers:

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- 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

Sample	Analyte	Total Time From Sample Collection Until Analysis	Required Holding Time From Sample Collection Until Analysis	Flag	A or P
MC-3B EB052709	Bromide	42 days	28 days	J- (all detects) UJ (all non-detects)	A
МС-3В	Cyanide	15 days	14 days	J- (all detects) UJ (all non-detects)	A
МС-3В	Nitrite as N (353.2)	7 days	48 hours	J- (all detects) R (all non-detects)	Ρ
M-127B	Nitrite as N (353.2)	6 days	48 hours	J- (all detects) R (all non-detects)	Ρ
EB052709	рН	50 hours	48 hours	J (all detects) UJ (all non-detects)	Ρ
FB060409	Nitrite as N (9056) Nitrate as N (9056)	48 hours 48 hours	5 days 5 days	J- (all detects) R (all non-detects) J- (all detects) R (all non-detects)	A

All technical holding time requirements were met with the following exceptions:

All samples were received in good condition with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
M-127B	Cyanide	Analysis was performed on unpreserved sample (pH was 11 units).	Analysis must be performed on an preserved aliquot at ≥12 pH units.	J- (all detects) R (all non-detects)	Ρ

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

II. Calibration

Calibration verification frequency and analysis criteria were met for each method when applicable with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
5/29/09	CCV (9:17)	Nitrite as N (9056)	112.3 (90-110)	MC-3B EB052709	J+ (all detects)	Р
5/29/09	CCV (13:01)	Nitrite as N (9056)	110.7 (90-110)	MC-3B EB052709	J+ (all detects)	Р

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Concentration	Associated Samples
МВ	Alkalinity, total Alkalinity, bicarbonate	1.9 mg/L 1.9 mg/L	All samples in SDG R0903006
ICB/CCB	Alkalinity, total	1.9 mg/L	All samples in SDG R0903006
МВ	Total phosphorus	0.01 mg/L	MC-3B EB052709 M-127B
ICB/CCB	Total phosphorus	0.01 mg/L	MC-3B EB052709 M-127B
МВ	Chloride Nitrate as N	0.11 mg/L 0.090 mg/L	M-127B
ICB/CCB	Chloride	0.110 mg/L	M-127B
МВ	Total phosphorus Chloride	0.015 mg/L 0.06 mg/L	FB060409
ICB/CCB	Total phosphorus Chloride	0.015 mg/L 0.06 mg/L	FB060409

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	Analyte	Reported Concentration	Modified Final Concentration
EB052709	Alkalinity, total	1.9 mg/L	2.0U mg/L
	Alkalinity, bicarbonate	1.9 mg/L	2.0U mg/L
	Total phosphorus	0.01 mg/L	0.05U mg/L
M-127B	Total phosphorus	0.042 mg/L	0.05U mg/L
FB060409	Alkalinity, total	1.9 mg/L	2.0U mg/L
	Alkalinity, bicarbonate	1.9 mg/L	2.0U mg/L
	Total phosphorus	0.020 mg/L	0.05U mg/L

Sample EB052709 was identified as an equipment blank. No contaminant concentrations were found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
EB052709	5/27/09	Alkalinity, total Alkalinity, bicarbonate Total organic carbon Conductivity pH Total phosphorus	1.9 mg/L 1.9 mg/L 0.3 mg/L 2.47 umhos/cm 5.99 units 0.01 mg/L	MC-3B

Sample FB060409 was identified as a field blank. No contaminant concentrations were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
FB060409	6/4/09	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Total organic carbon Conductivity pH Total phosphorus	1.9 mg/L 1.9 mg/L 0.102 mg/L 0.4 mg/L 1.81 umhos/cm 6.08 units 0.020 mg/L	MC-3B M-127B

Sample MC-3B-FILT (from SDG R0902886) was identified as a filter blank. No contaminant concentrations were found in this blank.

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

Sample	Analyte	Reported Concentration	Modified Final Concentration
MC-3B	Ammonia as N	0.537 mg/L	0.537J+ mg/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
M-127B	Ammonia as N	0.030 mg/L	0.050U mg/L
	Total phosphorus	0.042 mg/L	0.050U mg/L

IV. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

V. Duplicates

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

VI. Laboratory Control Samples

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

VII. Surrogates

Surrogates were added to all samples and blanks as required by method 300.1. All surrogate recoveries (%R) were within QC limits.

VIII. Sample Result Verification and Project Quantitation Limit

All sample result verifications were acceptable.

The project quantitation limits were met with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
MC-3B EB052709 M-127B FB060409	Nitrite as N (9056)	Laboratory reporting limit reported at 0.012 mg/L.	PQL should be reported at 0.010 mg/L per the QAPP.	None	Р

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903006	All analytes reported below the PQL.	J (all detects)	Α

IX. Overall Assessment

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
MC-3B M-127B	Nitrite as N (353.2)	x	A

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

X. Field Duplicates

No field duplicates were identified in this SDG.

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R0903006

SDG	Sample	Analyte	Flag	A or P	Reason
R0903006	MC-3B EB052709	Bromide	J- (all detects) UJ (all non-detects)	A	Technical holding times (h)
R0903006	MC-3B	Cyanide	J- (all detects) UJ (all non-detects)	A	Technical holding times (h)
R0903006	MC-3B M-127B	Nitrite as N (353.2)	J- (all detects) R (all non-detects)	Р	Technical holding times (h)
R0903006	EB052709	рН	J (all detects) UJ (all non-detects)	Р	Technical holding times (h)
R0903006	FB060409	Nitrite as N (9056) Nitrate as N (9056)	J- (all detects) R (all non-detects) J- (all detects) R (all non-detects)	A	Technical holding times (h)
R0903006	M-127B	Cyanide	J- (all detects) R (all non-detects)	Р	Sample condition (preservation) (pH)
R0903006	MC-3B EB052709	Nitrite as N (9056)	J+ (all detects)	Р	Calibration (CCV %R) (c)
R0903006	MC-3B EB052709 M-127B FB060409	Nitrite as N (9056)	None	Р	Sample result verification
R0903006	MC-3B EB052709 M-127B FB060409 MC-3BMS MC-3BDUP	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)
R0903006	MC-3B M-127B	Nitrite as N (353.2)	х	A	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R0903006

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903006	EB052709	Alkalinity, total Alkalinity, bicarbonate Total phosphorus	2.0U mg/L 2.0U mg/L 0.05U mg/L	A	bl
R0903006	M-127B	Total phosphorus	0.05U mg/L	A	bl
R0903006	FB060409	Alkalinity, total Alkalinity, bicarbonate Total phosphorus	2.0U mg/L 2.0U mg/L 0.05U mg/L	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R0903006

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903006	МС-ЗВ	Ammonia as N	0.537J+ mg/L	A	bf
R0903006	M-127B	Ammonia as N Total phosphorus	0.050U mg/L 0.050U mg/L	A	bf

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

Stage 4

Date Page: Reviewer: 2nd Reviewer:

SDG #: R0903006 Laboratory: Columbia Analytical Services

LDC #: 21495B6

METHOD: (Analyte) Alkalinity (SM2320B), Ammonia-N (EPA Method 350.1), Bromide, Chloride/Nitrate-N, Nitrite-N, Sulfate (EPA SW846 Method 9056), Nitrite-N (EPA Method 353.2), Chlorate (EPA SW846 Method 9056M), Conductivity (EPA Method 120.1), Cyanide (EPA SW846 Method 9012A), Dissolved Hexavalent Chromium (EPA Method 218.6), pH (EPA SW846 Method 9040B), Surfactants (SM5540C), Perchlorate (EPA Method 314.0), Total Phosphorus (EPA Method 365.1), TDS (SM2540C), TSS (SM2540D), TOC (EPA SW846 Method 9060), Cation-Anion Balance Difference, Calculated TDS/EC Ratio, Measured TDS/EC Ratio, Conductivity Ratio, TDS Ratio (SM1030E)

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

	Validation Area		Comments
<u>I.</u>	Technical holding times	SW	Sampling dates: 5/21/09 - 6/4/09
lla.	Initial calibration	A	
IIb.	Calibration verification	astat	
- 111.	Blanks	GW	
IV	Surrogate	A	
v	Matrix Spike/Matrix Spike Duplicates	Δ	245/mar
VI.	Duplicates	Á	
VII.	Laboratory control samples	Ą	Lay
VIII.	Sample result verification	SWAF	
IX.	Overall assessment of data	KWAR	
X .	Field duplicates	Ϋ́	
XI	Field blanks	SW	Filter Blank=MC-3B-FILT (R0902886), EB=2, FB=4

Note:

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

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate TB = Trip blank EB = Equipment blank

Validated Samples: AQ

1	MC-3B	11	Int	21	31	
2	EB052709	12		22	32	
2 3	M-127B	13		23	33	
4	FB060409	14		24	34	
5	MC-3BMS	15		25	35	
6	MC-3BDUP	16		26	36	
7		17		27	37	
8		18		28	38	
9		19		29	39	
10		20		30	40	

Notes:

LDC #: 1495 Bb SDG #: yer com

VALIDATION FINDINGS CHECKLIST

Page: 1 of 1 Reviewer: 44 2nd Reviewer: 4

Method: Inorganics (EPA Method Lu Coul				
Validation Area	Yes	No	NA	Findings/Comments
in the second particular in the second particular in the second	a)	通信		
All technical holding times were met.	<u> </u>	1		
Cooker temperature criteria was met.	1/	1		
	清白	和出		
Were all instruments calibrated daily, each set-up time?				
Were the proper number of standards used?	1			
Were all initial calibration correlation coefficients > 0.995?	1	/	ļ	
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	X	x/	<u> </u>	
Were titrant checks performed as required? (Level IV only)	1		[
Were balance checks performed as required? (Level IV only)				
Was a method blank associated with every sample in this SDG?	1			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP, Soil / Water.	XK	/		very elos of
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	/			0
Were the MS/MSD or duplicate relative percent differences (RPD) \leq 20% for waters and \leq 35% for soil samples? A control limit of \leq CRDL(\leq 2X CRDL for soil) was used for samples that were \leq 5X the CRDL, including when only one of the duplicate sample values were \leq 5X the CRDL.	/			
Was an LCS anaytzed for this SDG?				
Was an LCS analyzed per extraction batch?				
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?				
P. Republic and Association and				
Were performance evaluation (PE) samples performed?		-		
Were the performance evaluation (PF) samples within the acceptance limits?	Ī		1	

LDC # 149513b SDG #: 11 C con

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VALIDATION FINDINGS CHECKLIST

Page: V_{of} YReviewer: MM2nd Reviewer: -

Validation Area	Yes		NA	Findings/Comments
MILSampro Hasul Verilication	11 Ma	i.i.	£41	
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	1			
Were detection limits < RL?	17		1	
Overall assessment of data was found to be acceptable.	1	Γ		
Field duplicate pairs were identified in this SDG.				
Target analytes were detected in the field duplicates.				
Field blanks were identified in this SDG.	\checkmark			
Target analytes were detected in the field blanks.	7			

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page:_	
Reviewer:	\checkmark
2nd reviewer:	0
-	7

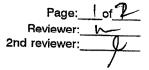
All circled methods are applicable to each sample. _____

4		
Sample ID	Matrix	Parameter
1-4	As-	Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond CIO3 CIO4
1.3	Az	Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
~5	A	Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond $(ClO_3 ClO_4)$
Vb		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond (ClO ₄ ClO ₄ $ClO4$ ClO
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr^{6+} T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr^{6+} T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁵⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁵⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
		CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
		CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
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		CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
		CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio

Comments:_____

LDC #: MUGSBb SDG #: Ler un

VALIDATION FINDINGS WORKSHEET Technical Holding Times

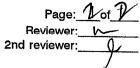


All circled dates have exceeded the technical holding time. NNA Were all samples preserved as applicable to each method ? NNA Were all cooler temperatures within validation criteria?

Method:	r cooler tempera	905b	9-1-A	353.2	G. J. In	1		Ī
Parameters:		Br	CN	NO2-N	9.4.B			-
Technical holding ti	me:	18 LV	146	481-	482			
Sample ID	Sampling date	Analysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier	
1,2	shilog	7/8/09	(42-ty	1			J-/ug/	٦i .
				/			A	() ()
	5/27/29		6/1/09	(15 tay	•)		J-117/A	L
	5/29/.5		/				,,	
3	5/28/09			6/3/09	(1 Jap)		J-R/D	LI
				6/3/09	(6 Log)	V.]]
2	5/11.9				5/29/09	(to he	7/-1	
					<u>[0.67</u>	<u> </u>	J/T/p	
		·····						
					·			

LDC #: <u>1459</u>B6 SDG #: <u>Sec</u>

VALIDATION FINDINGS WORKSHEET Technical Holding Times



All circled dates have ex <u>ANN/A</u> Were all <u>YNN/A</u> Were all	ceeded the tech samples preser cooler tempera	ved as applicat	ole to each meth	nod ?			J	
Method:		9056		90/~A		T		- freedown
Parameters:		103-N, 10	R-N	CN				
Technical holding tin	ne:	484	ł					
Sample ID	Sampling date	Analysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier	
4	614109	6/9/.9	(5 kg	•			J-/R/P	(4)
. 2				PH=11 ()	z_{1r}		J-/R/p	(off
				······································				
				**				
				2				

1495366	Ler Cores
LDC #: >	SDG #:

VALIDATION FINDINGS WORKSHEET Calibration

0 đ F Page: Reviewer: 2nd Reviewer:

35 ابح METHOD: Inorganics, EPA Method_

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Y N NA Were all instruments calibrated daily, each set-up time, and were the proper number of standards used? X N NA Were all initial and continuing calibration verification percent recoveries (%R) within the control limits of 90-110% ? <u>Y N NA</u> Are all correlation coefficients <u>></u>0.395 ? LEVEL IV/D ONLY:

Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recaluculation Worksheet for recalulations. Was a balance check conducted prior to the TDS analysis.? Was the titrant normality checked? N NA N NA N NA

5

Qualifications $\frac{\overline{J} - \sqrt{n \cdot \frac{1}{2}}}{p} + \frac{1}{2}$		THINK CC)				
Associated Samples		2	}			
ж. Вв. 3	× 2	(12,3	6.01			
Analyte <u> المحمر</u> (1-1) علام		W2-N (MJ20D)				
Calibration ID ゴムゾ	eed	(4F b) /22	Ces (1301)			
# Date	5-1819 2	3 51815	4 51260			

Comments:_

CAL6

SDG #: See Cover LDC #: 21495B6

VALIDATION FINDINGS WORKSHEET <u>Blanks</u>

2nd Reviewer: Page: 1 of _ Reviewer:

METHOD: Inorganics, Method See Cover

<u>A N N/A</u> Were all samples associated with a given method blank? Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Reason Code: bl

Conc. units: mg/L

Associated Samples: All

Analyte	Blank ID	Maximum					Sample Identification	cation		
	MB	ICB/CCB	Action Limit	2	4		•			
Total Alk	1.9	1.9		1.9 / 2.0	1.9 / 2.0					
Bicar Alk	19			19/20						

Conc. units: mg/L

Associated Samples: T-P:1-3, CI, NO3-N:3

Analyte		Blank ID Maximum Blank	Blank			ŭ	Sample Identification	ation		
	MB	ICB/CCB	ICB/CCB Action Limit	2	3					
Т-Р	0.01	0.01		0.01 / 0.05 0.042 / 0.05	0.042 / 0.05					
ci	0.11	0.110								
NO3-N	0.090		0.90							

Conc. units: mg/L

Associated Samples: 4

4	0.020 / 0.05	
	0.015	0.06
MB	0.015	0.06
		0.015

LDC #: 21495B6 SDG #: See Cover

VALIDATION FINDINGS WORKSHEET

Field Blanks

Page: 1 of Z Reviewer: 2nd Reviewer.

Were target analytes detected in the field blanks? METHOD: Inorganics, MethodSee CoverN N/AWere field blanks identified in this SDG?N N/AWere target analytes detected in the field blank:Blank units: mg/LAssociated sample units: mg/LSampling date:5/27/09Field blank type: (circle one)Field Blank / Rinsate / Other. EB

Reason Code: be

Associated Samples: 1 (>RL)

Analyte	Blank ID		Sample Identification	fication		
	st t	Action Level				
Total Alkalinity	1.9					
Bicarbonate Alkalinity	1.9					
TOC (average)	0.3					
Conductivity (umhos/cm)	2.47	24.7				
pH (pH Units)	5.99					
Total Phosphorus	0.01					

LDC #: 21495B6 SDG #: <u>See Cover</u>

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

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

METHOD: Inorganics, MethodSee CoverY N N/AWere field blanks identified in this SDG?Y N N/AWere target analytes detected in the field blanks?Mank units: mg/LAssociated sample units: mg/LSampling date:6/4/09Field blank type: (circle one) Field Blank / Rinsate / Other. FB

Associated Samples: 1,3

Reason Code: bf

Blank ID Sample Identification	4 Action 1 3 Level	1.6	ty 1.9	0.102 1.02 0.537 J+ 0.030 / 0.050	0.4	cm) 1:81	6.08	0.020 0.042 / 0.050	
Blank ID	4	1.9	1.9	0.102	0.4	1.81	6.08	0.020	
Analyte		Total Alkalinity	Bicarbonate Alkalinity	Ammonia as N	TOC (average)	Conductivity (umhos/cm)	pH (pH Units)	Total Phosphorus	

LDC #: 2149586

VALIDATION FINDINGS WORKSHEET Sample Result Verification

Page: 1 of Reviewer: MH 2nd Reviewer

METHOD: Inorganics, Method Cer un

#	Sample 10	Analyte	Lab Reporting Limit (units)	a APP Lowie ADL (units)	Finding	Qualifications
-	$\gamma, \zeta, \zeta, 1$	N-401	7/8m ~ 1000	0.0/04/	les drit	Amerland hands
ł		17061-4 ·				
		~ 1				
	-	~				
				-		
	comments.			· · · · · · · · · · · · · · · · · · ·		

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9254	man and the
LDC #: 🗸	SDG #:

VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

o, HM Page: |

METHOD: Inorganics, Method ______

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.

 $\overrightarrow{(Y)}$ N N/A Was the overall quality and usability of the data acceptable?

7					
*	Date	Sample ID	Finding	Associated Samples	Qualifications
<u> </u>	_	~ ~	101-15 h 353.2	which HT > 1	X((0)
-					(4-)
<u> </u>					
	-				
	Lever .				
500	Comments:				

OVR.6

Method: Inorganics, Method <u>J.el</u> <u>J</u>	Method : Inorganics, Method he correlation coefficient (r) for t h			ntinuing Cali	<u>ntinuing Calibration Calculatio</u>	Initial and Continuing Calibration Calculation Verification	ation	Reviewer:
The correlation coefficient (r) for the calibration of $\frac{U^{3}U}{U^{3}}$ was recalculated Calibration date: $\frac{U}{U^{3}}\frac{2}{J^{2}}\frac{2}{J^{2}}$. An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula: Where, Found X 100. Where, Found = concentration of each analyte interaction of each analyte in the ICV or CCV solution True = concentration of each analyte in the ICV or CCV source. True = concentration of each analyte in the ICV or CCV source. True = concentration of each analyte in the ICV or CCV source. True = concentration of each analyte in the ICV or CCV source. True = concentration of each analyte in the ICV or CCV source. True = concentration of each analyte in the ICV or CCV source. True = concentration of each analyte in the ICV or CCV source. True = concentration of each analyte in the ICV or CCV source. True = concentration of each analyte in the ICV or CCV source. True = concentration of each analyte in the ICV or CCV source. True = concentration of each analyte in the ICV or CCV source. COLOMENTION of the concentration of each analyte in the ICV or CCV source. Collibration Verification To CICA = 20 0.010 0.023 0.999656 0.999656 0.999656 0.004 0.023 0.999656 0.007 0.023 0.999656 0.007 0.023 0.999656 0.007 0.999 0.999656 0.007 0.99 0.999656 0.999656 0.99965 0.999656 0.999656 0.999656 0.999656 0.999656 0.99965 0.999656 0.999656 0.999656 0.999656 0.999656 0.999656 0.999656 0.999656 0.999656 0.999656 0.999965 0.999656 0.999656 0.999656 0.99965	he correlation coefficient (r) for th		Jel an	}				2nd Reviewer:
An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula: $\frac{MR = Found X 100}{True} \qquad Where, Found = concentration of each analyte in the ICV or CCV solution True = concentration of each analyte in the ICV or CCV solution True = concentration of each analyte in the ICV or CCV solution True = concentration of each analyte in the ICV or CCV solution True = concentration of each analyte in the ICV or CCV solution True = concentration of each analyte in the ICV or CCV solution True = concentration of each analyte in the ICV or CCV solution True = concentration of each analyte in the ICV or CCV solution True = concentration of each analyte in the ICV or CCV solution Initial calibration CIO4 size 1 0 0.002 0.999654 0.999656 7 Size 10 0.002 0.999656 0.999656 7 Calibration verification To CIO4 size 2 0.004 0.023 0.999656 7 Calibration verification To CIO {0,1} 0.023 0.999656 0.999656 7 Calibration verification To CIO {0,1} 0.01 0.023 0.999656 0.099656 7 Calibration verification To CIO {0,1} 0.92 0.013 0.999656 0.004 0.999656 7 Calibration verification For IC 0 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0$		he calibra	ttion of $\underline{\mathcal{U}}$	<u>¢</u>	ulated.Calibratio	n date: 4129/	60	
Where, Analyte Stand Analyte Stand CIO4 $\frac{s1}{s3}$ CIO4 $\frac{s2}{s5}$ s5 s5 s5 s5 s5 s5 s5 s5 s5 s5 s5 s5 s5	n initial or continuing calibration	verificati	on percent rec	overy (%R) was I	recalculated for e	each type of analys	sis using the follo	wing formula:
Type of analysisAnalyteStandardConc. (ug/L)AreaRecalculatedReportedAcceptableInitial calibrations10000000Initial calibrationclo4s210.0020.9996540.9996567S1s2100.01s320.0040.9996540.9996567Calibration verificationToL100,11.1N.Y7Calibration verification5 046,46,3260.0580.05877Calibration verification5 046,46,3260.513101.1N.YCalibration verification5 046,46,3260.513101.1N.YCalibration verification5 046,46,3260.513101.1N.YCalibration verification5 046,46,3260.513101.1N.YCalibration verification5 046,40.513112N.YColibration verification5 046,40.513112N.YColibration verification5 0,40.5130.51310310YColibration verification0.5130.513112N.D000Colibration verification findings worksheet for list of qualifications and associated samples when reported results do not agr	sR = <u>Found X 100</u> True	-	Where,	Found = concen True = concen	tration of each a tration of each a	inalyte <u>measured</u> ir nalyte in the ICV o	ו the analysis of t r CCV source	he ICV or CCV solution
Initial calibration standard Conc. (ug/L) Area r or r						Recalculated	Reported	Acceptable
Initial calibration s1 0 0 CIO4 s2 1 0.002 0.999654 0.999656 7 CIO4 s2 1 0.002 0.999654 0.999656 7 claip curve s5 10 0.023 0.999656 7 s5 10 0.023 0.058 1.0 0.023 calibration verification ToL 1.0 1.0 N. Y calibration verification Sof b.4 b.326 0.058 N. Y calibration verification Sof b.4 b.326 N. N. Y calibration verification Sof b.4 b.326 N. N. Y calibration verification Sof b.4 b.326 N. Y Y calibration verification Sof b.4 b.326 N. Y Y calibration verification Sof b.3 o.53 N. Y Y Y<		alyte	Standard	Conc. (ug/L)	Area	r or r ^ć	r or r²	(X/N)
Clo4s210.0020.9996540.999656 γ s450.01s5100.0230.999656 γ s5100.0230.01bbbbcalibration verificationToL1010,1LoLLoLKM γ calibration verificationSO4b,4b,3b0.57bqM γ calibration verificationSO4b,50.57bqM γ calibration verificationCollibration verificationc,5 b0.57bqM γ comments: Refer to Calibration Verificationc,5 b0.57b1.0 f γ γ γ comments: Refer to Calibration Verificationc,6 b0.57b0.57b γ γ γ γ comments: Refer to Calibration Verificationc,6 b0.57b0.57b γ γ γ γ comments: Refer to Calibration Verificationc,6 b0.57b0.57b γ γ γ γ comments: Refer to Calibration Verificationc,6 b0.57b0.57b γ γ γ γ comments: Refer to Calibration Verificationc,6 b0.57b γ γ γ γ comments: Refer to Calibration Verificationc,6 b γ γ γ γ γ comments: Refer to Calibration Verificationcomments γ γ γ γ γ commentercommentercommentercommenter<	Initial calibration	I -	s1	0	0			
s3 2 0.004 s4 5 0.01 s5 10 0.023 s6 25 0.058 calibration verification To L Io Io, I Culturation verification 504 6.1 Io, I Nr Calibration verification 504 6.4 6.3×6 7 Nr Calibration verification 504 6.4 6.3×6 7 Nr V Calibration verification 504 6.4 6.3×6 7 Nr V Calibration verification 504 6.4 6.3×6 7 Nr V Calibration verification 504 6.4 6.5×6 7 Nr V Outsite of verification verification 504 0.5×7 1 7 V V Of the recolution verification 20 0.5×7 0.5×7 1 5 Nr V	ō	5	s2	-	0.002	0.999654	0.999656	-
s450.01s5100.023s6250.058Calibration verificationToL10 CJ 1010,1 CJ 50,46,32,6Calibration verification50,46,32,6Calibration verification50,46,32,6Calibration verification50,46,32,6Calibration verification50,46,32,6Calibration verification50,46,32,6Calibration verification50,46,32,6Calibration verification verification0,57,310,3Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree wit			s3	7	0.004			
s5 10 0.023 s6 25 0.028 calibration verification To 10 10,1 Calibration verification To 10,1 Nr Y Calibration verification Soy b,4 b,3% b,1% Nr Y Calibration verification Soy b,4 b,3% c,1% Nr Y Calibration verification Soy b,4 b,3% c,1% Y Y Calibration verification Soy b,4 b,3% c,1% Y Y Y Calibration verification Soy b,4 b,3% o,5% o,5% Y Y Y Domments: Refer to Calibration Verification Cycl o,5% N Y Y Y Y DM% of the recoluments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree wit		1	s4	2	0.01			
Calibration verificationToIoIoIoIoCalibration verificationToIoIoIoIoIoCubration verificationSoftbbbbbbCalibration verificationSoftbbbbbbCalibration verificationSoftbbbbbbCalibration verificationCodetoocccComments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree with the recolution contents			\$5	10	0.023			
Calibration verification To I			s6	25	0.058			
CulturationSofb.4b.326 99 W 1 Calibration verificationCollibrationCollibration 0.57 0.513 10°		L	0	10, 1			đ	7
Calibration $C_{\sqrt{6}}f$ $a_{\sqrt{5}}a_{\sqrt{5}}$ $a_{\sqrt{5}}f$ $a_{\sqrt{5}}f$ $b_{\sqrt{5}}f$ $b_{\sqrt{5}}$		40	p.9	6.326			M	
Comments: Refer to Calibration Verification findings worksheet for list of qualifications and associated samples when reported results do not agree wit		vet	دىم،	0.513		٤٠)	M	>
	omments: Refer to Calibration Ver 1 0% of the recelerited results	rification	findings work	sheet for list of q	ualifications and	l associated samp	les when reported	d results do not agree wi

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VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

Page: ______ Reviewer: ______ 2nd Reviewer: _______

METHOD: Inorganics, Method).el con

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

concentration of each analyte <u>measured</u> in the analysis of the sample. For the matrix spike calculation, Found = SSR (spiked sample result) - SR (sample result).	concentration of each analyte in the source.
Found =	True =
Where,	
%R = <u>Found</u> x 100 True	

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

I 00	# Q
Where,	
x 100	
RPD = 15-D1	(S+D)/2

Original sample concentration Duplicate sample concentration

					Recalculated	Reported	
Bampie (D	Type of Analysis	Element	Found / S (units)	True / D (unite)	¥R / RPD	XR / RPD	Acceptable (Y.M)
	Laboratory control sample						
R		ΒY	960	٥	46	96	7
ļ	Matrix spike sample		(SSR-SR)				ł
is.		cept	12200	مهومر	M	(1)	
	Dupitoate sample	1					1
٩		a town	(60)	166	Ś	~	

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

TOTCLC.6

ETH ease N N N Ompo calcu	NA Have results NA Are results w NA Are results w NA Are all detected Dund (analyte) results to results to ration = 1	ow for all questions answered "N". Not app been reported and calculated correctly? rithin the calibrated range of the instrument tion limits below the CRQL?	ication licable questions a ts? repo	2nd reviewe are Identified as "I rted with a positiv	r:Mn r:
	U = (0.0772766X21812170,033	Reported Concentration	Calculated Concentration	Accoptable
*	Sample ID	Analyte	(mg/Ut	(wh)	(Y/N)
		Total Alk	839	839	<u> </u>
	1	MA3 -K	0.537	0.527	
		BYt	4	Ι.Ψ	
		Toc (Avg)		7.5	
		<u> </u>	12800	1200	
		Consultinity (4MHes/an)	33100	33100	
		pH (cmits)	7.48	1.48	
			9.32	9,32	
		765	25900	4200	
		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	4200	N/ 1 1	
		Surfactorts Chlorita (VIV)	1.10	0/10	J J
		Church ( d/ )	<u>46,6</u>	766	
				<u> </u>	
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### Laboratory Data Consultants, Inc. Data Validation Report

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

Collection Date: June 1 through June 4, 2009

LDC Report Date: September 28, 2009

Matrix: Soil

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903051

### Sample Identification

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

Method number Method number Chlorate only

### Introduction

This data review covers 20 soil samples listed on the cover sheet. The analyses were per Standard Method 2320B for Alkalinity, EPA Method 350.1 for Ammonia as Nitrogen, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 353.2 for Nitrite as Nitrogen, EPA Method 300.1 for Chlorate, EPA SW 846 Method 9012A for Cyanide, EPA SW 846 Method 7199 for Hexavalent Chromium, EPA SW 846 Method 9045D for pH, Standard Method 5540C for Surfactants, EPA Method 314.0 for Perchlorate, EPA Method 365.1 for Total Phosphorus, and Lloyd/Kahn Method for Total Organic Carbon.

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

Field duplicates are summarized in Section X.

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. Calibration

Calibration verification frequency and analysis criteria were met for each method when applicable with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
6/5/09	ccv	Total organic carbon	89.1 (90-110)	RSA12-0.5B RSAI3-0.5B RSAJ5-0.5B RSAK5-0.5B SA76-0.5B SA76009-0.5B RSAL3-0.5B SA100-0.5B RSAM3-0.5B	J- (all detects) UJ (all non-detects)	Ρ
6/9/09	CCV beginning	Surfactants	112 (90-110)	SA189-0.5B SA88-0.5B SA152-0.5B SA152009-0.5B RSAJ2-0.5B RSAJ3-0.5B SA202-0.5B	J+ (all detects)	Ρ
6/9/09	CCV beginning	Surfactants	115 (90-110)	SA189-0.5B SA88-0.5B SA152-0.5B SA152009-0.5B RSAJ2-0.5B RSAJ3-0.5B SA202-0.5B	J+ (all detects)	Ρ

# III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Concentration	Associated Samples
МВ	Total phosphorus	1.9 mg/Kg	RSA12-0.5B

Method Blank ID	Analyte	Concentration	Associated Samples
MB	Total phosphorus	2.3 mg/Kg	RSAI3-0.5B RSAJ5-0.5B RSAK5-0.5B SA76-0.5B SA76009-0.5B RSAL3-0.5B RSAM3-0.5B RSAM3-0.5B SA189-0.5B SA189-0.5B SA152-0.5B SA152-0.5B RSAJ2-0.5B RSAJ2-0.5B RSAJ2-0.5B RSAJ2-0.5B RSAJ2-0.5B SA202-0.5B
ICB/CCB	Total phosphorus	0.0111 mg/L	RSA12-0.5B
ICB/CCB	Total phosphorus	0.0147 mg/L	RSAI3-0.5B RSAJ5-0.5B RSAK5-0.5B SA76-0.5B SA76009-0.5B RSAL3-0.5B RSAM3-0.5B RSAM3-0.5B RSAM2-0.5B SA189-0.5B SA189-0.5B SA152-0.5B SA152-0.5B RSAJ2-0.5B RSAJ2-0.5B RSAJ3-0.5B SA202-0.5B
MB	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Chloride Nitrate as N Surfactants	10 mg/Kg 10 mg/Kg 0.05 mg/Kg 9 mg/Kg 4.5 mg/Kg 1.3 mg/Kg	RSA12-0.5B RSA13-0.5B RSAJ5-0.5B RSAK5-0.5B SA76-0.5B SA76009-0.5B RSAL3-0.5B SA100-0.5B RSAM3-0.5B RSAM3-0.5B RSAM2-0.5B
ICB/CCB	Alkalinity, total Chloride Nitrate as N	1.0 mg/L 0.098 mg/L 0.046 mg/L	RSA12-0.5B RSAI3-0.5B RSAJ5-0.5B RSAK5-0.5B SA76-0.5B SA76009-0.5B RSAL3-0.5B SA100-0.5B RSAM3-0.5B RSAM3-0.5B RSAM2-0.5B

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Ammonia as N	0.0074 mg/L	RSA12-0.5B RSAI3-0.5B RSAJ5-0.5B RSAK5-0.5B
МВ	Alkalinity, total Alkalinity, bicarbonate	11 mg/Kg 11 mg/Kg	SA189-0.5B SA88-0.5B SA152-0.5B SA152009-0.5B RSAJ2-0.5B RSAJ3-0.5B SA202-0.5B
MB	Chloride	1.1 mg/Kg	SA152-0.5B SA152009-0.5B
MB	Chloride	0.94 mg/Kg	SA189-0.5B SA88-0.5B RSAJ2-0.5B RSAJ3-0.5B SA202-0.5B
ICB/CCB	Alkalinity, total Ammonia as N	1.0 mg/L 0.0051 mg/L	SA189-0.5B SA88-0.5B SA152-0.5B SA152009-0.5B RSAJ2-0.5B RSAJ3-0.5B SA202-0.5B
ICB/CCB	Chloride	1.1 mg/L	SA152-0.5B SA152009-0.5B
ICB/CCB	Chloride	0.94 mg/L	SA189-0.5B SA88-0.5B RSAJ2-0.5B RSAJ3-0.5B SA202-0.5B

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	Analyte	Reported Concentration	Modified Final Concentration
RSA12-0.5B	Ammonia as N Chloride Surfactants	0.52 mg/Kg 19 mg/Kg 0.9 mg/Kg	0.53U mg/Kg 21U mg/Kg 2.1U mg/Kg
RSAI3-0.5B	Surfactants	1.2 mg/Kg	2.1U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
RSAK5-0.5B	Ammonia as N	0.47 mg/Kg	0.54U mg/Kg
SA76-0.5B	Ammonia as N Surfactants	0.27 mg/Kg 1.4 mg/Kg	0.53U mg/Kg 2.1U mg/Kg
SA76009-0.5B	Ammonia as N Surfactants	0.49 mg/Kg 1.5 mg/Kg	0.54U mg/Kg 2.2U mg/Kg
RSAL3-0.5B	Ammonia as N Surfactants	0.17 mg/Kg 1.4 mg/Kg	0.52U mg/Kg 2.1U mg/Kg
SA100-0.5B	Ammonia as N	0.33 mg/Kg	0.51U mg/Kg
RSAM2-0.5B	Ammonia as N	0.37 mg/Kg	0.52U mg/Kg
SA152-0.5B	Ammonia as N	0.06 mg/Kg	0.52U mg/Kg
SA202-0.5B	Ammonia as N	0.16 mg/Kg	0.53U mg/Kg

Sample FB072109-SO (from SDG R0904016) was identified as a field blank. No contaminant concentrations were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
FB072109-SO	7/21/09	Ammonia as N Total organic carbon Chloride Nitrate as N pH Total phosphorus Sulfate Surfactants	0.191 mg/L 0.5 mg/L 9.7 mg/L 1.76 mg/L 3.36 mg/L 0.01 mg/L 5.5 mg/L 0.159 mg/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 with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
RSA12-0.5B	Ammonia as N	0.52 mg/Kg	0.53U mg/Kg
	Chloride	19 mg/Kg	21U mg/Kg
	Nitrate as N	5.6 mg/Kg	5.6J+ mg/Kg
	Sulfate	17 mg/Kg	21U mg/Kg
	Surfactants	0.9 mg/Kg	2.1U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
RSAI3-0.5B	Ammonia as N Chloride Nitrate as N Sulfate Surfactants	1.05 mg/Kg 67 mg/Kg 8.3 mg/Kg 51 mg/Kg	1.05J+ mg/Kg 67J+ mg/Kg 8.3J+ mg/Kg 51J+ mg/Kg
	Sunactants	1.2 mg/Kg	2.1U mg/Kg
RSAJ5-0.5B	Ammonia as N	0.59 mg/Kg	0.59J+ mg/Kg
	Chloride	55 mg/Kg	55J+ mg/Kg
	Nitrate as N	7.5 mg/Kg	7.5J+ mg/Kg
	Sulfate	236 mg/Kg	236J+ mg/Kg
RSAK5-0.5B	Ammonia as N	0.47 mg/Kg	0.54U mg/Kg
	Chloride	164 mg/Kg	164J+ mg/Kg
	Nitrate as N	11.1 mg/Kg	11.1J+ mg/Kg
	Sulfate	438 mg/Kg	438J+ mg/Kg
	Surfactants	2.2 mg/Kg	2.2J+ mg/Kg
SA76-0.5B	Ammonia as N	0.27 mg/Kg	0.53U mg/Kg
	Chloride	655 mg/Kg	655J+ mg/Kg
	Nitrate as N	41.8 mg/Kg	41.8J+ mg/Kg
	Surfactants	1.4 mg/Kg	2.1U mg/Kg
SA76009-0.5B	Ammonia as N	0.49 mg/Kg	0.54U mg/Kg
	Chloride	846 mg/Kg	846J+ mg/Kg
	Nitrate as N	52.2 mg/Kg	52.2J+ mg/Kg
	Surfactants	1.5 mg/Kg	2.2U mg/Kg
RSAL3-0.5B	Ammonia as N	0.17 mg/Kg	0.52U mg/Kg
	Chloride	24 mg/Kg	24J+ mg/Kg
	Nitrate as N	7.6 mg/Kg	7.6J+ mg/Kg
	Sulfate	66 mg/Kg	66J+ mg/Kg
	Surfactants	1.4 mg/Kg	2.1U mg/Kg
SA100-0.5B	Ammonia as N	0.33 mg/Kg	0.51U mg/Kg
	Chloride	30 mg/Kg	30J+ mg/Kg
	Nitrate as N	8.7 mg/Kg	8.7J+ mg/Kg
	Sulfate	46 mg/Kg	46J+ mg/Kg
	Surfactants	2.4 mg/Kg	2.4J+ mg/Kg
RSAM3-0.5B	Ammonia as N	1.72 mg/Kg	1.72J+ mg/Kg
	Chloride	756 mg/Kg	756J+ mg/Kg
	Nitrate as N	6.3 mg/Kg	6.3J+ mg/Kg
	Sulfate	48 mg/Kg	48J+ mg/Kg
RSAM2-0.5B	Ammonia as N	0.37 mg/Kg	0.52U mg/Kg
	Nitrate as N	14.0 mg/Kg	14.0J+ mg/Kg
	Sulfate	298 mg/Kg	298J+ mg/Kg
SA189-0.5B	Chloride	879 mg/Kg	879J+ mg/Kg
	Nitrate as N	14.2 mg/Kg	14.2J+ mg/Kg
	Sulfate	67.0 mg/Kg	67.0J+ mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA88-0.5B	Nitrate as N	29.2 mg/Kg	29.2J+ mg/Kg
	Surfactants	0.9 mg/Kg	2.1U mg/Kg
SA152-0.5B	Ammonia as N	0.06 mg/Kg	0.52U mg/Kg
	Chloride	5.8 mg/Kg	5.8J+ mg/Kg
	Nitrate as N	2.85 mg/Kg	2.85J+ mg/Kg
	Sulfate	26.9 mg/Kg	26.9J+ mg/Kg
SA152009-0.5B	Chloride	6.4 mg/Kg	6.4J+ mg/Kg
	Nitrate as N	3.18 mg/Kg	3.18J+ mg/Kg
	Sulfate	33.1 mg/Kg	33.1J+ mg/Kg
RSAJ2-0.5B	Ammonia as N	2.49 mg/Kg	2.49J+ mg/Kg
	Nitrate as N	26.6 mg/Kg	26.6J+ mg/Kg
RSAJ3-0.5B	Ammonia as N	4.22 mg/Kg	4.22J+ mg/Kg
	Nitrate as N	14.4 mg/Kg	14.4J+ mg/Kg
SA202-0.5B	Ammonia as N	0.16 mg/Kg	0.53U mg/Kg
	Nitrate as N	14.1 mg/Kg	14.1J+ mg/Kg
	Sulfate	396 mg/Kg	396J+ mg/Kg
	Surfactants	1.3 mg/Kg	2.1U mg/Kg

# IV. Matrix Spike/Matrix Spike Duplicates

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

### V. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (Limits)	Difference (Limits)	Flag	A or P
RSA12-0.5BDUP (All samples in SDG R0903051)	Chlorate	34 (≤20)	-	J (all detects) UJ (all non-detects)	A

# **VI. Laboratory Control Samples**

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

### VII. Surrogates

Surrogates were added to all samples and blanks as required by method 300.1. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Analyte	Flag	A or P
RSAJ3-0.5B	Dichloroacetate	72.4 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	Ρ

# VIII. Sample Result Verification and Project Quantitation Limit

The project quantitation limits were met with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
RSA12-0.5B RSAI3-0.5B RSAJ5-0.5B RSAK5-0.5B SA76-0.5B SA76009-0.5B RSAL3-0.5B SA100-0.5B RSAM3-0.5B RSAM3-0.5B	Nitrite as N	Laboratory reporting limit reported at 1.2 mg/Kg.	PQL should be reported at 0.1 mg/Kg per the QAPP.	None	Ρ

### All analytes reported below the PQL were qualified as follows:

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

Raw data were not reviewed for this SDG.

### IX. Overall Assessment

The overall assessment of data was acceptable with the following exceptions:

Sample	Analyte	
SA76-0.5B SA76009-0.5B SA100-0.5B SA189-0.5B SA88-0.5B	Cyanide analysis was not performed for these samples.	

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

# X. Field Duplicates

Samples SA76-0.5B and SA76009-0.5B and samples SA152-0.5B and SA152009-0.5B were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Concei	ntration				
Analyte	SA76-0.5B	SA76009-0.5B	RPD (Limits)	Difference (Limits)	Flag	A or P
Ammonia as N	0.27 mg/Kg	0.49 mg/Kg	-	0.22 (≤0.54)	-	-
Alkalinity, total	258 mg/Kg	323 mg/Kg	22 (≤50)	-	-	-
Alkalinity, Bicarbonate	253 mg/Kg	310 mg/Kg	20 (≤50)	-	-	-
Alkalinity, Carbonate	4 mg/Kg	13 mg/Kg	-	9 (≤22)	-	-
Chloride	655 mg/Kg	846 mg/Kg	25 (≤50)	-	-	-
Hexavalent chromium	0.46 mg/Kg	0.69 mg/Kg	-	0.23 (≤0.42)	-	-
Hexavalent chromium	0.49 mg/Kg	0.68 mg/Kg	-	0.19 (≤0.42)	-	-
Nitrate as N	41.8 mg/Kg	52.2 mg/Kg	22 (≤50)	-	-	-
Nitrite as N	1.3U mg/Kg	2.3 mg/Kg	-	1 (≤5.4)	-	-
рН	8.70 units	9.21 units	6 (≤50)	-	-	-
Sulfate	746 mg/Kg	815 mg/Kg	9 (≤50)	-	-	-
Surfactants	1.4 mg/Kg	1.5 mg/Kg	-	0.1 (≤2.2)	-	-
Total organic carbon	1870 mg/Kg	3580 mg/Kg	-	1710 (≤620)	J (all detects)	A
Total phosphorus	1110 mg/Kg	1140 mg/Kg	3 (≤50)	-	-	-
Chlorate	930000 ug/Kg	832000 ug/Kg	11 (≤50)	-	-	-
Perchlorate	329000 ug/Kg	305000 ug/Kg	8 (≤50)	-	-	-

	Conce	ntration				
Analyte	SA152-0.5B	SA152009-0.5B	RPD (Limits)	Difference (Limits)	Flag	A or P
Ammonia as N	0.06 mg/Kg	0.05U mg/Kg	-	0.01 (≤0.52)	-	-
Alkalinity, Total	466 mg/Kg	448 mg/Kg	4 (≤50)	-	-	-
Alkalinity, Bicarbonate	437 mg/Kg	419 mg/Kg	4 (≤50)	-	-	-
Alkalinity, Carbonate	29 mg/Kg	29 mg/Kg	-	0 (≤21)	-	-
Chloride	5.8 mg/Kg	6.4 mg/Kg	- · ·	0.6 (≤2.1)	-	-
Nitrate as N	2.85 mg/Kg	3.18 mg/Kg	11 (≤50)	-	-	-
рН	9.85 units	9.91 units	1 (≤50)	-	-	-
Sulfate	26.9 mg/Kg	33.1 mg/Kg	21 (≤50)	-	-	-
Total organic carbon	1750 mg/Kg	3270 mg/Kg	-	1520 (≤640)	J (all detects)	A
Total phosphorus	985 mg/Kg	854 mg/Kg	14 (≤50)	-	-	-
Chlorate	414 ug/Kg	366 ug/Kg	-	48 (≤210)	_	-
Perchlorate	352 ug/Kg	354 ug/Kg	1 (≤50)	-	-	-

# Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R0903051

SDG	Sample	Analyte	Flag	A or P	Reason
R0903051	RSA12-0.5B RSAJ5-0.5B RSAJ5-0.5B RSAK5-0.5B SA76-0.5B SA76009-0.5B RSAL3-0.5B SA100-0.5B RSAM3-0.5B	Total organic carbon	J- (all detects) UJ (all non-detects)	Ρ	Calibration (CCV %R) (c)
R0903051	SA189-0.5B SA88-0.5B SA152-0.5B SA152009-0.5B RSAJ2-0.5B RSAJ2-0.5B SA202-0.5B	Surfactants	J+ (all detects)	Ρ	Calibration (CCV %R) (c)
R0903051	RSA12-0.5B RSAJ3-0.5B RSAJ5-0.5B RSAK5-0.5B SA76-0.5B SA76009-0.5B RSAL3-0.5B RSAM3-0.5B RSAM3-0.5B RSAM2-0.5B SA189-0.5B SA189-0.5B SA152-0.5B SA152-0.5B RSAJ2-0.5B RSAJ2-0.5B RSAJ2-0.5B RSAJ3-0.5B SA202-0.5B	Chlorate	J (all detects) UJ (all non-detects)	A	Duplicate sample analysis (RPD) (Id)
R0903051	RSAJ3-0.5B	Chlorate	J- (all detects) UJ (all non-detects)	Ρ	Surrogate recovery (%R) (s)
R0903051	RSA12-0.5B RSAI3-0.5B RSAJ5-0.5B RSAK5-0.5B SA76-0.5B SA76009-0.5B RSAL3-0.5B RSAL3-0.5B RSAM3-0.5B RSAM3-0.5B	Nitrite as N	None	Ρ	Sample result verification

SDG	Sample	Analyte	Flag	A or P	Reason
R0903051	RSA12-0.5B RSA3-0.5B RSA45-0.5B RSAK5-0.5B SA76-0.5B SA76009-0.5B RSAL3-0.5B RSA13-0.5B RSAM3-0.5B RSAM2-0.5B SA189-0.5B SA189-0.5B SA152-0.5B SA152-0.5B RSAJ2-0.5B RSAJ2-0.5B RSAJ3-0.5B SA202-0.5B	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)
R0903051	SA76-0.5B SA76009-0.5B SA152-0.5B SA152009-0.5B	Total organic carbon	J (all detects) UJ (all non-detects)	A	Field duplicates (Difference) (fd)

# Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R0903051

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903051	RSA12-0.5B	Ammonia as N Chloride Surfactants	0.53U mg/Kg 21U mg/Kg 2.1U mg/Kg	A	Ы
R0903051	RSAI3-0.5B	Surfactants	2.1U mg/Kg	A	bl
R0903051	RSAK5-0.5B	Ammonia as N	0.54U mg/Kg	A	bl
R0903051	SA76-0.5B	Ammonia as N Surfactants	0.53U mg/Kg 2.1U mg/Kg	A	bl
R0903051	SA76009-0.5B	Ammonia as N Surfactants	0.54U mg/Kg 2.2U mg/Kg	A	bl
R0903051	RSAL3-0.5B	Ammonia as N Surfactants	0.52U mg/Kg 2.1U mg/Kg	A	bl
R0903051	SA100-0.5B	Ammonia as N	0.51U mg/Kg	A	bl
R0903051	RSAM2-0.5B	Ammonia as N	0.52U mg/Kg	A	bl

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903051	SA152-0.5B	Ammonia as N	0.52U mg/Kg	A	bl
R0903051	SA202-0.5B	Ammonia as N	0.53U mg/Kg	A	bl

# Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R0903051

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903051	RSA12-0.5B	Ammonia as N Chloride Nitrate as N Sulfate Surfactants	0.53U mg/Kg 21U mg/Kg 5.6J+ mg/Kg 21U mg/Kg 2.1U mg/Kg	A	bf
R0903051	RSAI3-0.5B	Ammonia as N Chloride Nitrate as N Sulfate Surfactants	1.05J+ mg/Kg 67J+ mg/Kg 8.3J+ mg/Kg 51J+ mg/Kg 2.1U mg/Kg	A	bf
R0903051	RSAJ5-0.5B	Ammonia as N Chloride Nitrate as N Sulfate	0.59J+ mg/Kg 55J+ mg/Kg 7.5J+ mg/Kg 236J+ mg/Kg	A	bf
R0903051	RSAK5-0.5B	Ammonia as N Chloride Nitrate as N Sulfate Surfactants	0.54U mg/Kg 164J+ mg/Kg 11.1J+ mg/Kg 438J+ mg/Kg 2.2J+ mg/Kg	A	bf
R0903051	SA76-0.5B	Ammonia as N Chloride Nitrate as N Surfactants	0.53U mg/Kg 655J+ mg/Kg 41.8J+ mg/Kg 2.1U mg/Kg	A	bf
R0903051	SA76009-0.5B	Ammonia as N Chloride Nitrate as N Surfactants	0.54U mg/Kg 846J+ mg/Kg 52.2J+ mg/Kg 2.2U mg/Kg	A	bf
R0903051	RSAL3-0.5B	Ammonia as N Chloride Nitrate as N Sulfate Surfactants	0.52U mg/Kg 24J+ mg/Kg 7.6J+ mg/Kg 66J+ mg/Kg 2.1U mg/Kg	A	bf

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SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903051	SA100-0.5B	Ammonia as N Chloride Nitrate as N Sulfate Surfactants	0.51U mg/Kg 30J+ mg/Kg 8.7J+ mg/Kg 46J+ mg/Kg 2.4J+ mg/Kg	A	bf
R0903051	RSAM3-0.5B	Ammonia as N Chloride Nitrate as N Sulfate	1.72J+ mg/Kg 756J+ mg/Kg 6.3J+ mg/Kg 48J+ mg/Kg	A	bf
R0903051	RSAM2-0.5B	Ammonia as N Nitrate as N Sulfate	0.52U mg/Kg 14.0J+ mg/Kg 298J+ mg/Kg	A	bf
R0903051	SA189-0.5B	Chloride Nitrate as N Sulfate	879J+ mg/Kg 14.2J+ mg/Kg 67.0J+ mg/Kg	A	bf
R0903051	SA88-0.5B	Nitrate as N Surfactants	29.2J+ mg/Kg 2.1U mg/Kg	A	bf
R0903051	SA152-0.5B	Ammonia as N Chloride Nitrate as N Sulfate	0.52U mg/Kg 5.8J+ mg/Kg 2.85J+ mg/Kg 26.9J+ mg/Kg	A	bf
R0903051	SA152009-0.5B	Chloride Nitrate as N Sulfate	6.4J+ mg/Kg 3.18J+ mg/Kg 33.1J+ mg/Kg	A	bf
R0903051	RSAJ2-0.5B	Ammonia as N Nitrate as N	2.49J+ mg/Kg 26.6J+ mg/Kg	A	bf
R0903051	RSAJ3-0.5B	Ammonia as N Nitrate as N	4.22J+ mg/Kg 14.4J+ mg/Kg	A	bf
R0903051	SA202-0.5B	Ammonia as N Nitrate as N Sulfate Surfactants	0.53U mg/Kg 14.1J+ mg/Kg 396J+ mg/Kg 2.1U mg/Kg	A	bf

Tro	nox Nor	thgate Henderson	1			
LDC #: 21495C6 VALIDATIO	N COMF	PLETENESS WORKSHEET	Date: <u>9/20/-1</u>			
SDG #: <u>R0903051</u>	S	Stage 2B	Page:/			
Laboratory: Columbia Analytical Services		1	Reviewer:			
	1300-		2nd Reviewer:			
METHOD: (Analyte) Alkalinity (SM2320B), Amj	<u>fnonia-N (E</u>	EPA Method 350.1), Bromide, Chloride,	Nitrate-N, Nitrite-N, Sulfate			
(EPA SW846 Method 9056), Chlorate (EPA S	W846 ME	thod 9056M), Cyanide (EPA SW846 I	Method 9012A), Dissolved			
-Hexavalent Chromium (EPA-Method 218.6), He	exavalent	Chromium (EPA SW846 Method 7199)	, pH (EPA SW846 Method			
9040B/9045D), Surfactants (SM5540C), Perch	lorate (EF	PA Method 314.0), Total Phosphorus (	EPA Method 365.1), TOC			
(Lloyd/Kahn / EPA SW846 Method 9060), TDS	(SM25400	S), TSS (SM2540D) N: that I as	V (ZPA 353,2)			
The samples listed below were reviewed for ea						
validation findings worksheets.		<b>U</b>	C .			
Validation Area		Comments				
L Technical holding times	6	Sampling dates: \$/1/09 - 6/4/09				

	Validation Area		Comments
Ι.	Technical holding times	b	Sampling dates: $b/1/09 - b/4/09$
lla.	Initial calibration	12	
IIb.	Calibration verification	5w	
	Blanks	SW	
<u>ıv</u>	Matrix Spike/Matrix Spike Duplicates	ASW	
V	Duplicates	5W	
Vľ.	Laboratory control samples	A	LCS
VII.	Sample result verification	SON	
VIII.	Overall assessment of data	SW	
IX.	Field duplicates	SW	(5,6) $(13,14)$
L_x	Field blanks	sw	FR = FB 072109-50 (Smy Rog 04016)

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 س

è

Validated Samples:

Note:

1	RSA12-0.5B	11	SA189-0.5B	21	SA189=0.5BMS	31	RSAKE-O.JBMS
2	RSAI3-0.5B	12	SA88-0.5B	22	J pup	32	1 pup
3	RSAJ5-0.5B	13	SA152-0.5B	23	RSAI3-05BMS	33	RSAM3-0. JBMS
4	RSAK5-0.5B	14	SA152009-0.5B	24	1 pup	84	1 pup
5	SA76-0.5B	15	RSAJ2-0.5B	25	54202 -0.5BM	35	MB
6	SA76009-0.5B	16	RSAJ3-0.5B	26	I sup	36	
7	RSAL3-0.5B	17	SA202-0.5B	27	RGAJ5-a JR Jup	37	
8	SA100-0.5B	18	RSA12-0.5BMS	28	SA76-0. FB Dup	38	ſ
9	RSAM3-0.5B	19	RSA12-0.5BMSD	29	RSALZED. JBKIS	39	mn
10	RSAM2-0.5B	20	RSA12-0.5BDUP	30	J puy	40	

# VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page:	_of
Reviewer:	ú
2nd reviewer:	ų.

All circled methods are applicable to each sample.

Sample ID	<u>Matrix</u>	Parameter
1-17	50;)	(Alk pH Br CI NO, NO, SO, NH, TOC) CHARTER T-P MBAS) TDS TSS Cond (CIO, CIO,)
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond CIO3 CIO4
1-4,7,910,1	3-17 50:1	Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr ⁵⁺ T-P MBAS TDS TSS Cond CIO3 CIO4
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁵⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond CIO3 CIQ4
18-20	50:	Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond CIO2 CHO
18,00		Alk pH Br CI NO, NO, SO (NH3) TOC CN Cr + T-PMBAS TDS TSS Cond CIO3 CIO4
v	k	Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond CIO3 CIO4
3.vf		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
15.16		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN (Cr ⁶⁺ ) T-P MBAS TDS TSS Cond ClO3 ClO4
rower	Ire	Alk OH) Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
29.30		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
31.32		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
33,34	d	Alk pH (Br CI) NO3 NO2 SO4 NH3 TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ^{$6+$} T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄ Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄ Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄ Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond CIO ₃ CIO ₄
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr ⁸⁺ T-P MBAS TDS TSS Cond CIO3 CIO4

Comments:_____

Feb cour LDC #: >14956 SDG #:

# VALIDATION FINDINGS WORKSHEET Calibration

_____ £ Reviewer:___ Page: 2nd Reviewer:

METHOD: Inorganics, EPA Method_

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 all instruments calibrated daily, each set-up time, and were the proper number of standards used? Were all initial and continuing calibration verification percent recoveries (%R) within the control limits of 90-110% ? Are all correlation coefficients <u>></u>0.995 ?

LEVEL IV/D ONLY:

Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recaluculation Worksheet for recalulations. Was a balance check conducted prior to the TDS analysis.? Was the titrant normality checked? Y N MA

Y N N/A

Qualifications	J-/4T/P (c)			JA 17/P (C)	/	$\rightarrow$															
Associated Samples	1-9 XX XX	/		11-17	-	$\overline{}$															
%R	89-1			112		115															
Analyte	Toc		the	Suntacturts	-	2															
Calibration ID	ccV		cw	(been more )	() <b>7</b> )	cul	( due Nu/	$\left(\begin{array}{c} q \end{array}\right)$													
# Date	0		2.69.4			7														Communities :	JIIII CIIIS.
<u>[</u>	<u> </u>	I	L	L	L	1	1	<u>.</u>	1	1	 1	 1	ال	1	1	1	1	1	1	5 IL	5

CAL6

SDG #: See Cover LDC #: 21495C6

# VALIDATION FINDINGS WORKSHEET

<u>Blanks</u>



Reason Code: bl

METHOD: Inorganics, Method See Cover

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

NNA Were all samples associated with a given method blank?
 NNA Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.

Conc. units: mg/Kg

Associated Samples: T-P*1: 1, T-P*2:2-17 (>RL)

Analyte	Blank ID Maximum	Maximum	Blank	Sample Identification
	MB	ICB/CCB (mg/L)	Action Limit	
T-P*1	1.9	0.0111		
<u>1-</u> P*2	23	0.0147		

Conc. units: mg/Kg

Associated Samples: 1-10 except ICB/CCB: NH3-N: 1-4

Analyte	Blank ID	Maximum ICB/CCB	Blank Action Limit					Sample Identification	ntification			
	MB	(mg/L)		<b>-</b>	2	4	5	9	7	ω	10	
Total AIK	10	1.0										
Bicarb. AlK	10											
NH3-N	0.05	0.0074		0.52 / 0.53		0.47 / 0.54	0.27 / 0.53	0.47 / 0.54 0.27 / 0.53 0.49 / 0.54 0.17 / 0.52 0.33 / 0.51 0.37 / 0.52	0.17 / 0.52	0.33 / 0.51	0.37 / 0.52	
Ū	6	0.098		19/21								
NO3-N	4.5	0.046										
Surfactants	1.3			0.9/2.1	1.2/2.1		1.4/2.1	1.5/2.2	1.4/2.1			

21495C6MB.wpd

SDG #: See Cover LDC #: 21495C6

# VALIDATION FINDINGS WORKSHEET <u>Blanks</u>

Page: Yof Y Reviewer: 2nd Reviewer:

METHOD: Inorganics, Method See Cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Reason Code: bl N N/A Were all samples associated with a given method blank? N N/A Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.

Conc. units: mg/Kg

Associated Samples: <u>11-17 except CI*1: ICB/CCB: 13,14, CI*2:11,12,15-17</u>

Analyte	Blank ID	Maximum ICB/CCB	Blank Maximum Blank ID ICB/CCB Action Limit			Sample Identification	cation	
	MB	(mg/L)		13	17			
Total AIK	11	1.0						
Bicarb. AIK	11							
CI*1	1.1	0.112						
CI*2	0.94	0.098						
NH3-N		0.0051		0.06 / 0.52 0.16 / 0.53	0.16 / 0.53			

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LDC #: 21495C6 SDG #: See Cover

# VALIDATION FINDINGS WORKSHEET <u>Field Blanks</u>

Reviewer: Page:  $\int of \frac{\lambda}{\lambda}$ Q 2nd Reviewer:

METHOD: Inorganics, MethodSee CoverNIAWere field blanks identified in this SDG?NIAWere target analytes detected in the field blanks?NIAWere target analytes detected in the field blanks?NIAWere target analytes detected in the field blanks?Sampling date:7/21/09Field blank type: (circle one)Field Blank / Rinsate / Other. FB

Associated Samples: All SM

Reason Code: bf

Analyte	Biank ID					Sample	Sample Identification				
	FB072109-SO	Action Level	1	2	3	4	5	Q	7	ω	5
Ammonia as N	0.191	19.1	0.52 / 0.53	1.05 J+	0.59 74	0.47 / 0.54	0.27 / 0.53	0.49 / 0.54	0.17 / 0.52	0.33 / 0.51	1.72 J+
TOC (average)	0.5										
ō	9.7	970	19/21	67 J+	55 J+	164 J+	655 J+	846 J+	24 J+	30 J+	756 J+
Nitrate as N	1.76	176	5.6 J+	8.3 J+	7.5 J+	11.1 J+	41.8 J+	52.2 J+	7.6 J+	8.7 J+	6.3 J+
pH (pH Units)	3.36										
Total Phosphorus	0.01										
Sulfate	5.5	550	17/21	51 J+	236 J+	438 J+			+C 99	46 J+	48 J+
Surfactants	0.159	15.9	0.9 / 2.1	1.2/2.1		2.2 J+	1.4/2.1	1.5/2.2	1.4/2.1	2.4 J+	

Analyte	Blank ID					Sample I	Sample Identification				
	FB072109-SO	Action Level	10	11	12	13	14	15	16	17	
Ammonia as N	0.191	19.1	0.37 / 0.52			0.06 / 0.52		2.49 J+	4.22 J+	0.16 / 0.53	
TOC (average)	0.5	_									
G	9.7	970		879 J+		5.8 J+	6.4 J+				
Nitrate as N	1.76	176	14.0 J+	14.2 J+	29.2 J+	2.85 J+	3.18 J+	26.6 J+	14.4 J+	14.1 J+	
pH (pH Units)	3.36										
Total Phosphorus	0.01										
Sulfate	5.5	550	298 J+	67.0 J+		26.9 J+	33.1 J+			396 J+	
Surfactants	0.159	15.9			0.9 / 2.1					1.3/2.1	

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# VALIDATION FINDINDS WORKSHEET Surrogate Recovery

Page: _ of_ Reviewer:

METHOD: Chlorate (EPA 300.1)

Are surrogates required by the method? Yes  $\sqrt{}$  or No Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A"  $\sqrt{}$  N/A Were surrogates spiked into all samples and blanks?

			Τ	Τ	Т	T	Τ		Ţ	Τ	1	Τ	Τ	T	Τ	Τ	Т	Τ	Ī	T	T	1	Τ	1			T
-	Qualifications	T_/ ( < )																							Comments		
	Associated Samples																								Recovery QC Limits (Water)		
5	%R (Limits)	12.4 ( ao -112 )		( )	( )		( )	( )	( )	( )		( )	( )			( )	)	( )	( )	( )	( )	( )	( )	( )	Recovery QC Limits (Soil) Re		
et the QC limits?	Surrogate Compound	A																							Recovery		
ries (%R) me	Column	Ŕ																		[					compound		
Did all surrogate recoveries (%R) meet the QC lim	Lab ID/Reference	٩١																							Surrogate Compound	Dichloroacetate	
	Date La																								Letter Designation	A	В
Y (N) N/A	#	4																									

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3 249506 LDC #: SDG #:

# VALIDATION FINDINGS WORKSHEET **Duplicate Analysis**

Z 2 Page: Reviewer: 2nd Reviewer:

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

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

Y^tN)N/A

Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤ <del>35%</del> for soil samples? If no, see qualifications below. A control limit of ±R.L. (±2X R.L for soil) was used for sample values that were <5X the R.L., including the case when only one of the duplicate sample values was <5X R.L. If field blanks were used for laboratory duplicates, note in the Overall Assessment. LEVEL IV ONLY: Y N NA

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$\frac{1}{2} \frac{1}{2} \frac{1}$		Matrix	Analyte	RPD (Limits)	Difference (1 Imite)	Assaststad Camelana	
		( نوك	ceat			Associated Samples	<u> []</u>
						I H	7
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LDC #: 1149566

VALIDATION FINDINGS WORKSHEET Sample Result Verification

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Page: of A Reviewer: MM 2nd Reviewer

METHOD: Inorganics, Method _______

#	Sample (D	Analyte	Labl	ALL CUMICS) LING		Quaiffications
_	1-10/11 500-1-1	N-20N	1.2 47/2	o. War	let their sample hit we 10	phint we 10
			8 1			17
			-			
$\frac{1}{2}$	A M A	V2-rov		~1/2- ch 0		}
	-					
Comr	Comments:					

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LDC #: Y	SDG #:

VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Reviewer: WH 2nd Reviewer: ٩ ٩ Page:

METHOD: Inorganics, Method ______

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

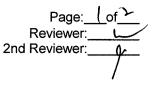
All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

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

	T	1	T T	1	T	r	1	- í	1	 	 _	 1
Qualifications	Test.											
Associated Samples		france										
Finding	cN was not quely	Jue hu a leborite										
Sample ID	516,8,11,12											
Date												ls:
#												 Comments:

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#### VALIDATION FINDINGS WORKSHEET Field Duplicates



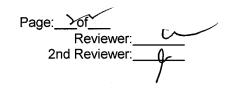
Inorganics, Method See Cover

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

Concentration (mg/Kg) Qualification Analyte RPD (≤50) Difference Limits (Parent only) 5 6 Ammonia as N 0.27 0.49 0.22 (≤0.54) Total Alkalinity 258 323 22 **Bicarbonate Alkalinity** 253 310 20 Carbonate Alkalinity 4 9 13 (≤22) Chloride 655 846 25 Hexavalent Chromium 0.46 0.69 0.23 (≤0.42) Hexavalent Chromium 0.49 0.68 0.19 (≤0.42) Nitrate as N 41.8 52.2 22 Nitrite as N 1.3U 2.3 1 (≤5.4) pH (pH Units) 8.70 9.21 6 Sulfate 746 815 9 Surfactants 1.4 1.5 0.1 (≤2.2) тос 3580 1870 1710 (≤620) J det / A (fd) Total Phosphorus 1110 1140 3 Chlorate (ug/Kg) 930000 832000 11 Perchlorate (ug/Kg) 329000 305000 8

	Concentrati	on (mg/Kg)				Qualification
Analyte	13	14	RPD (≤50)	Difference	Limits	(Parent only)
Ammonia as N	0.06	0.05U		0.01	(≤0.52)	

#### VALIDATION FINDINGS WORKSHEET **Field Duplicates**



Inorganics, Method See Cover

<u>MN NA</u>

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

	Concentrati	on (mg/Kg)				
Analyte	13	14	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Total Alkalinity	466	448	4			
Bicarbonate Alkalinity	437	419	4			
Carbonate Alkalinity	29	29		0	(≤21)	
Chloride	5.8	6.4		0.6	(≤2.1)	-
Nitrate as N	2.85	3.18	11			
pH (pH Units)	9.85	9.91	1			
Sulfate	26.9	33.1	21			
тос	1750	3270		1520	(≤640)	J det / A (fd)
Total Phosphorus	985	854	14			
Chlorate (ug/Kg)	414	366		48	(≤210)	
Perchlorate (ug/Kg)	352	354	1			

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# Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada

Collection Date: June 9 through June 16, 2009

LDC Report Date: September 29, 2009

Matrix: Water

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903243

#### Sample Identification

H-28AB AW-BW-02B M-142B M-130B M-29B

#### Introduction

This data review covers 5 water samples listed on the cover sheet. The analyses were per Standard Method 2320B for Alkalinity, EPA Method 350.1 for Ammonia as Nitrogen, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 353.2 for Nitrite as Nitrogen, EPA 300.1 for Chlorate, EPA Method 120.1 for Conductivity, EPA SW 846 Method 9012A for Cyanide, EPA Method 218.6 for Dissolved Hexavalent Chromium, EPA SW 846 Method 9040B for pH, Standard Method 5540C for Surfactants, EPA Method 314.0 for Perchlorate, EPA Method 365.1 for Total Phosphorus, Standard Method 2540C for Total Dissolved Solids, Standard Method 2540D for Total suspended Solids, and EPA SW 846 Method 9060 for Total Organic Carbon.

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

Field duplicates are summarized in Section X.

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.

All samples were received in good condition with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
H-28AB	Cyanide	Analysis was performed on unpreserved sample (pH was 10 units).	Analysis must be performed on a preserved aliquot at ≥12 pH units.	J- (all detects) R (all non-detects)	Р

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

# II. Calibration

Calibration verification frequency and analysis criteria were met for each method when applicable with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
7/2/09	CCV (22:09)	Bromide	174 (90-110)	M-29B	R (all detects)	Ρ
6/13/09	CCV beginning	Surfactants	114 (90-110)	M-142B	J+ (all detects)	Р
6/13/09	CCV closing	Surfactants	114 (90-110)	M-142B	J+ (all detects)	Р
6/17/09	CCV closing	Surfactants	89 (90-110)	M-29B	J- (all detects) UJ (all non-detects)	Р

### III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Concentration	Associated Samples
МВ	Alkalinity, total Alkalinity, bicarbonate	1.0 mg/L 1.0 mg/L	All samples in SDG R0903243
ICB/CCB	Alkalinity, total	1.0 mg/L	All samples in SDG R0903243

Method Blank ID	Analista		
	Analyte	Concentration	Associated Samples
МВ	Bromide	0.08 mg/L	Н-28АВ
МВ	Bromide	0.06 mg/L	M-29B
МВ	Total phosphorus	0.011 mg/L	H-28AB AW-BW-02B M-142B M-130B
МВ	Total phosphorus	0.013 mg/L	M-29B
ICB/CCB	Total phosphorus	0.011 mg/L	H-28AB AW-BW-02B M-142B M-130B
ICB/CCB	Total phosphorus	0.013 mg/L	M-29B
МВ	Chloride	0.1 mg/L	M-142B M-130B
ICB/CCB	Chloride	0.097 mg/L	M-142B M-130B
МВ	Nitrate as N	0.066 mg/L	M-130B
МВ	Chloride	0.1 mg/L	M-29B

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	Analyte	Reported Concentration	Modified Final Concentration
H-28AB	Bromide	0.9 mg/L	1.0U mg/L
M-29B	Bromide	1 mg/L	1.0U mg/L

Sample FB060409 (from SDG R0903006) was identified as a field blank. No contaminant concentrations were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
FB060409	6/4/09	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Total organic carbon Conductivity pH Total phosphorus	1.9 mg/L 1.9 mg/L 0.102 mg/L 0.4 mg/L 1.81 umhos/cm 6.08 units 0.020 mg/L	H-28AB AW-BW-02B M-142B M-130B

Sample MC-3B-FILT (from SDG R0902886) was identified as a filter blank. No contaminant concentrations were found in this blank.

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

Sample	Analyte	Reported Concentration	Modified Final Concentration
H-28AB	Ammonia as N	0.325 mg/L	0.325J+ mg/L
AW-BW-02B	Ammonia as N	0.015 mg/L	0.050U mg/L
M-142B	Ammonia as N	0.097 mg/L	0.097J+ mg/L
M-130B	Ammonia as N	0.709 mg/L	0.709J+ mg/L

### IV. Matrix Spike/Matrix Spike Duplicates

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

### V. Duplicates

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

### VI. Laboratory Control Samples

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

# VII. Surrogates

Surrogates were added to all samples and blanks as required by method 300.1. All surrogate recoveries (%R) were within QC limits.

# VIII. Sample Result Verification and Project Quantitation Limit

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903243	All analytes reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

### IX. Overall Assessment

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

# X. Field Duplicates

No field duplicates were identified in this SDG.

# Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R0903243

SDG	Sample	Analyte	Flag	A or P	Reason
R0903243	H-28AB	Cyanide	J- (all detects) R (all non-detects)	Р	Sample condition (preservation) (pH)
R0903243	M-29B	Bromide	R (all detects)	Р	Calibration (CCV %R) (c)
R0903243	M-142B	Surfactants	J+ (all detects)	Р	Calibration (CCV %R) (c)
R0903243	M-29B	Surfactants	J- (all detects) UJ (all non-detects)	Р	Calibration (CCV %R) (c)
R0903243	H-28AB AW-BW-02B M-142B M-130B M-29B	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)

# Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R0903243

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903243	H-28AB	Bromide	1.0U mg/L	А	bl
R0903243	M-29B	Bromide	1.0U mg/L	A	bl

# Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R0903243

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903243	H-28AB	Ammonia as N	0.325J+ mg/L	A	bf
R0903243	AW-BW-02B	Ammonia as N	0.050U mg/L	A	bf
R0903243	M-142B	Ammonia as N	0.097J+ mg/L	A	bf
R0903243	M-130B	Ammonia as N	0.709J+ mg/L	A	bf

LDC #:_	21495D6	
SDG #:	R0903243	

# Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date:	9/2/15
Page:_	
Reviewer:	ń
2nd Reviewer:	

Laboratory: Columbia Analytical Services

METHOD: (Analyte) Alkalinity (SM2320B), Ammonia-N (EPA Method 350.1), Bromide, Chloride, Nitrate-N, Sulfate (EPA SW846 Method 9056), Nitrite-N (EPA Method 353.2), Chlorate (EPA Method 300.1), Conductivity (EPA Method 120.1), Cyanide (EPA SW846 Method 9012A), Dissolved Hexavalent Chromium (EPA Method 218.6), pH (EPA SW846 Method 9040B), Surfactants (SM5540C), Perchlorate (EPA Method 314.0), Total Phosphorus (EPA Method 365.1), TDS (SM2540D), TOC (EPA SW846 Method 9060), Cation-Anion Balance Difference, Calculated TDS/EC Ratio, Measured TDS/EC Ratio, Conductivity Ratie, TDS Ratio (SM1030E)

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

		T	
<b> </b>	Validation Area		Comments
<u> </u>	Technical holding times	Signal	Sampling dates: 6/9/09 -6/16/09
lla.	Initial calibration	A	
llb.	Calibration verification	50	
	Blanks	SW	
IV	Surrogate	A	
	Matrix Spike/Matrix Spike Duplicates	N	3 Client specifies
<u>VI.</u>	Duplicates	Ŵ	
<u></u>	Laboratory control samples	A-	Les
<u></u>	Sample result verification	N	·
IX.	Overall assessment of data	A	·
Х.	Field duplicates	N	
XI.	Field blanks	SV	Filter Blank=MC-3B-FILT (R0902886), FB=FB060409 (R0903006)

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	H-28AB	11	MB	21	31	
2	AW-BW-02B	12		22	32	
3	M-142B	13		23	33	
4	M-130B	14		24	34	
5	M-29B	15		25	35	
6		16		26	36	
7		17	······································	27	37	
8		18		28	38	
9		19		29	39	
10		20		30	40	

Notes:

LDC #: 214950 SDG #:_ see

# VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page:_	
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2nd reviewer:	

All circled methods are applicable to each sample.

T		
Sample ID	Matrix	Parameter
1-5	As-	Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN CK+(T-P MBAS TDS TSS Cond CIO3 CIO4)
1-4		
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN( $Cr^{\circ}$ ) T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond CIO ₃ CIO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond CIO ₃ CIO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond CIO ₃ CIO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
		CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
		CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
		CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
		CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
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		CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio

Comments:

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

Page:___of___ Reviewer:_____ 2nd reviewer:_____

Method:		9012A	ble to each met dation criteria?				1
Parameters:		CN		<u> </u>			
echnical holding t	ime:						+
Sample ID	Sampling date	Analysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier
		pH = 10	(212)				J-/k/p
, 							
							<u> </u>
·····						······································	
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LDC #	SDG #:

VALIDATION FINDINGS WORKSHEET Calibration

Page: | of M Reviewer: 2nd Reviewer:

METHOD: Inorganics, EPA Method_

See com

 $\frac{Please}{Y \text{ N N/A}}$ Were all instruments calibrated daily, each set-up time, and were the proper number of standards used?  $\frac{Y \text{ N N/A}}{Y \text{ N N/A}}$ Were all initial and continuing calibration verification percent recoveries (%R) within the control limits of 90-110% ?

Y (<u>N N/A</u> Were all initial and continuing calibration <u>(Y)N N/A</u> Are all correlation coefficients <u>></u>0.395 ? LEVEL IX(D ONLY:

Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recaluculation Worksheet for recalulations. Was a balance check conducted prior to the TDS analysis.? Was the titrant normality checked? A X N X

NA

ΥN

Y N NK

Qyalifications	k T p (c)	24 17 6 C					J-147/0 CC)							
Associated Samples	L\ ★ }	7									\$*			
%R	441	11.57			ナ11		6 t 89							
Analyte	81	44 1	mere		3		1 Swhit							
Calibration ID	(porr) 100	· · ·		hand and	cer color	4	cel i clern							
Date	90/216		ho15119		(1210)		6/11/001							
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Comments:

CAL6

SDG #: See Cover LDC #: 21495D6

## VALIDATION FINDINGS WORKSHEET Blanks

Page: of A Reviewer: 2nd Reviewer:

METHOD: Inorganics, Method See Cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Reason Code: bl <u>Y</u> N N/A Were all samples associated with a given method blank? <u>Y</u> N N/A Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.

Conc. units: mg/L	ts: mg/L			Associated Samples: <u>All (&gt;RL)</u>
Analyte	Blank ID Maximum	Maximum	Blank	Sample Identification
	MB	ICB/CCB	Action Limit	
Total Alk	1.0	1.0		

**IBicar Alk** 

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Br*3

Conc. units: mg/L			Associated Samples: T-P*1:1-4, T-P*2:5 (ND or >RL)
Analyte Blank ID Maximum	Maximum	Blank	Sample Identification
MB	ICB/CCB	ICB/CCB Action Limit	
0.011	0.011		
0.013	0 013		

Conc. units: mg/l

Associated Samples: 3,4 (>RL)

Sample Identification		
Blank	Action Limit	
Maximum		0.097
Blank ID	MB	0.1
Analyte		Ū

SDG #: See Cover LDC #: 21495D6

# VALIDATION FINDINGS WORKSHEET

<u>Blanks</u>



METHOD: Inorganics, Method See Cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Reason Code: bl <u>A N NA</u> Were all samples associated with a given method blank? <u>AN N/A</u> Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.

Conc. units: mg/L	s: mg/L			Associated Samples: <u>4 (&gt;10X)</u>
Analyte	Blank ID	Maximum	Blank	Sample Identification
	MB	ICB/CCB	Action Limit	
NO3-N	0 066		0.66	

Conc. units: mg/L

Associated Samples: 5 (>RL)

Analida	CI Anela	Z	100	
Allalyte				
		I ICB/CCB	Action Limit	
	MB			
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21495D6MB.wpd

LDC #: 21495D6 SDG #: See Cover

# VALIDATION FINDINGS WORKSHEET

**Field Blanks** 

Page: Lof Reviewer:___ 2nd Reviewer:

> Were target analytes detected in the field blanks? Y N N/AWere field blanks identified in this SDG?Y N N/AWere target analytes detected in the field blanksBlank units:mg/LAssociated sample units:Blank units:mg/LAssociated sample units:Sampling date:6/4/09Soil factor appliedField blank type:(circle one) Field Blank / Rinsate / Other: FB METHOD: Inorganics, Method See Cover Y N N/A Were field blanks identified in this SDG?

Associated Samples: 1-4

Reason Code: bf

Analyte	Blank ID					Sample Identification	ation		
	FB060409	Action Level	<b>~</b>	2	ю	4			
Total Alkalinity	1.9								
Bicarbonate Alkalinity	1.9								
Ammonia as N	0.102	1.02	0.325 J+	0.015 / 0.050	0.097 J+	0.709 J+			
TOC (average)	0.4								
Conductivity (umhos/cm)	1.81								
pH (pH Units)	6.08								
Total Phosphorus	0.020								

## Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	Tronox LLC Facility,	2009	Phase	В	Investigation,
	Henderson, Nevada				0

Collection Date: June 17 through June 24, 2009

LDC Report Date: September 28, 2009

Matrix: Water

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903404

## Sample Identification

M-78B M-128B H-38B M-19B M-19BRE M-34B M-34BRE M-34BRE M-125B M-125B M-125BMS M-125BDUP M-125BTRP

### Introduction

This data review covers 13 water samples listed on the cover sheet. The analyses were per Standard Method 2320B for Alkalinity, EPA Method 350.1 for Ammonia as Nitrogen, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 353.2 for Nitrite as Nitrogen, EPA 300.1 for Chlorate, EPA Method 120.1 for Conductivity, EPA SW 846 Method 9012A for Cyanide, EPA Method 218.6 for Dissolved Hexavalent Chromium, EPA SW 846 Method 9040B for pH, Standard Method 5540C for Surfactants, EPA Method 314.0 for Perchlorate, EPA Method 365.1 for Total Phosphorus, Standard Method 2540C Total Dissolved Solids, Standard Method 2540D for Total Suspended Solids, and EPA SW 846 Method 9060 for Total Organic Carbon.

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

Field duplicates are summarized in Section X.

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

Sample	Analyte	Total Time From Sample Collection Until Analysis	Required Holding Time From Sample Collection Until Analysis	Flag	A or P
M-19BRE	Nitrate as N	53 hours	48 hours	J- (all detects) UJ (all non-detects)	A
M-34BRE	Nitrate as N	48.75 hours	48 hours	J- (all detects) UJ (all non-detects)	A
H-38B	Hexavalent chromium	24.5 hours	24 hours	J- (all detects) UJ (all non-detects)	Р
M-19B	Hexavalent chromium	75.25 hours	24 hours	J- (all detects) R (all non-detects)	Р
M-34B	Hexavalent chromium	72.5 hours	24 hours	J- (all detects) R (all non-detects)	Р

All technical holding time requirements were met with the following exceptions:

All samples were received in good condition with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
M-125B	Cyanide	Analysis was performed on unpreserved sample (pH was 7 units).	Analysis must be performed on a preserved aliquot at ≥12 pH units.	J- (all detects) R (all non-detects)	Р

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

## II. Calibration

Calibration verification frequency and analysis criteria were met for each method when applicable with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
7/2/09	CCV (22:09)	Bromide	174 (90-110)	M-19B	R (all detects)	Р
6/25/09	CCV beginning	Surfactants	112 (90-110)	M-22AB M-17AB	J+ (all detects)	Р

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
6/25/09	CCV closing	Surfactants	112 (90-110)	M-22AB M-17AB	J+ (all detects)	Р

## III. Blanks

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Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Concentration	Associated Samples
МВ	Alkalinity, total Alkalinity, bicarbonate	1.0 mg/L 1.0 mg/L	M-78B
ICB/CCB	Alkalinity, total	1.0 mg/L	M-78B M-128B H-38B M-19B M-34B M-125B M-22AB M-17AB
МВ	Total dissolved solids	7 mg/L	M-78B M-128B H-38B M-19B M-34B
МВ	Total phosphorus	0.013 mg/L	M-78B M-128B H-38B
МВ	Total phosphorus	0.008 mg/L	M-19B M-34B M-125B M-22AB M-17AB
ICB/CCB	Total phosphorus	0.013 mg/L	M-78B M-128B H-38B
ICB/CCB	Total phosphorus	0.008 mg/L	M-19B M-34B M-125B M-22AB M-17AB

Method Blank ID	Analyte	Concentration	Associated Samples
МВ	Chloride Nitrate as N	0.1 mg/L 0.063 mg/L	M-78B
МВ	Bromide	0.06 mg/L	M-19B
МВ	Chloride	0.1 mg/L	M-19B M-34B
ICB/CCB	Chloride	0.1 mg/L	M-19B M-34B
ICB/CCB	Nitrate as N	0.062 mg/L	M-19BRE M-34BRE
ICB/CCB	Chloride	0.095 mg/L	M-125B

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	Analyte	Reported Concentration	Modified Final Concentration
M-78B	Total phosphorus	0.032 mg/L	0.050U mg/L
M-19B	Total phosphorus Bromide	0.022 mg/L 0.9 mg/L	0.050U mg/L 1.0U mg/L
M-34B	Total phosphorus	0.032 mg/L	0.050U mg/L
M-125B	Total phosphorus	0.032 mg/L	0.050U mg/L
M-22AB	Total phosphorus	0.044 mg/L	0.050U mg/L
M-17AB	Total phosphorus	0.037 mg/L	0.050U mg/L

Sample FB060409 (from SDG R0903006) was identified as a field blank. No contaminant concentrations were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
FB060409	6/4/09	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Total organic carbon Conductivity pH Total phosphorus	1.9 mg/L 1.9 mg/L 0.102 mg/L 0.4 mg/L 1.81 umhos/cm 6.08 units 0.020 mg/L	M-78B M-128B H-38B M-125B

Sample MC-3B-FILT was identified as a filter blank. No contaminant concentrations were found in this blank.

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

Sample	Analyte	Reported Concentration	Modified Final Concentration
M-78B	Total phosphorus	0.032 mg/L	0.050U mg/L
M-128B	Ammonia as N	0.047 mg/L	0.050U mg/L
H-38B	Ammonia as N	0.090 mg/L	0.090J+ mg/L
M-125B	Ammonia as N Total organic carbon Total phosphorus	0.008 mg/L 0.8 mg/L 0.032 mg/L	0.050U mg/L 1.0U mg/L 0.050U mg/L

## IV. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) analyses were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	%R (Limits)	Flag	A or P
M-125BMS (M-78B M-128B H-38B M-125B)	Total organic carbon	69 (75-125)	J- (all detects) UJ (all non-detects)	A
M-125BMS (M-78B M-128B H-38B M-125B)	Cyanide	0 (75-125)	J- (all detects) R (all non-detects)	A

## V. Duplicates/Triplicates

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

## VI. Laboratory Control Samples

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

## VII. Surrogates

Surrogates were added to all samples and blanks as required by method 300.1. All surrogate recoveries (%R) were within QC limits.

## VIII. Sample Result Verification and Project Quantitation Limit

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903404	All analytes reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

## IX. Overall Assessment

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
M-19BRE M-34BRE	Nitrate as N	x	A

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

## X. Field Duplicates

No field duplicates were identified in this SDG.

## Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R0903404

SDG	Sample	Analyte	Flag	A or P	Reason
R0903404	M-19BRE M-34BRE	Nitrate as N	J- (all detects) UJ (all non-detects)	A	Technical holding times (h)
R0903404	H-38B	Hexavalent chromium	J- (all detects) UJ (all non-detects)	Р	Technical holding times (h)
R0903404	M-19B M-34B	Hexavalent chromium	J- (all detects) R (all non-detects)	Р	Technical holding times (h)
R0903404	M-125B	Cyanide	J- (all detects) R (all non-detects)	P	Sample condition (preservation) (ph)
R0903404	M-19B	Bromide	R (all detects)	Р	Calibration (CCV %R) (c)
R0903404	M-22AB M-17AB	Surfactants	J+ (all detects)	Р	Calibration (CCV %R) (c)
R0903404	M-78B M-128B H-38B M-125B	Total organic carbon	J- (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R) (m)
R0903404	M-78B M-128B H-38B M-125B	Cyanide	J- (all detects) R (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R) (m)
R0903404	M-78B M-128B H-38B M-19B M-19BRE M-34B M-34BRE M-34BRE M-125B M-22AB M-17AB	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)
R0903404	M-19BRE M-34BRE	Nitrate as N	X	A	Overall assessment of data (o)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R0903404

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903404	M-78B	Total phosphorus	0.050U mg/L	A	bl
R0903404	M-19B	Total phosphorus Bromide	0.050U mg/L 1.0U mg/L	A	bl
R0903404	M-34B	Total phosphorus	0.050U mg/L	A	bl
R0903404	M-125B	Total phosphorus	0.050U mg/L	A	bl
R0903404	M-22AB	Total phosphorus	0.050U mg/L	A	bl
R0903404	M-17AB	Total phosphorus	0.050U mg/L	A	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R0903404

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903404	M-78B	Total phosphorus	0.050U mg/L	A	bf
R0903404	M-128B	Ammonia as N	0.050U mg/L	A	bf
R0903404	H-38B	Ammonia as N	0.090J+ mg/L	A	bf
R0903404	M-125B	Ammonia as N Total organic carbon Total phosphorus	0.050U mg/L 1.0U mg/L 0.050U mg/L	A	bf

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## **Tronox Northgate Henderson** VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date:	9/26109
Page:_ :Reviewer	
2nd Reviewer:	Ĩ.

SDG #: R0903404 Laboratory: Columbia Analytical Services

METHOD: (Analyte) Alkalinity (SM2320B), Ammonia-N (EPA Method 350.1), Bromide, Chloride, Nitrate-N, Sulfate (EPA SW846 Method 9056), Nitrite-N (EPA Method 353.2), Chlorate (EPA Method 300.1), Conductivity (EPA Method 120.1), Cyanide (EPA SW846 Method 9012A), Dissolved Hexavalent Chromium (EPA Method 218.6), pH (EPA SW846 Method 9040B), Surfactants (SM5540C), Perchlorate (EPA Method 314.0), Total Phosphorus (EPA Method 365.1), TDS (SM2540C), TSS (SM2540D), TOC (EPA SW846 Method 9060), Cation-Anion Balance Difference, Calculated TDS/EC Ratio, Measured TDS/EC-Ratio, Conductivity Ratio, TDS Ratio (SM1030E)

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

	Validation Area		Comments
<u> </u>	Technical holding times	5~	Sampling dates: \$/17/09 - \$/r4h 9
lla.	Initial calibration	A	
IIb.	Calibration verification	ŚW	
<u> </u>	Blanks	SW	
IV	Surrogate	A	
V	Matrix Spike/Matrix Spike Duplicates	SW	2MS/ Dup Think easters
VI.	Duplicates	A	S Pop: 7-p 202 pr Liffer 2kg
VII.	Laboratory control samples	A	Lecy
VIII.	Sample result verification	JUF N	
IX.	Overall assessment of data	SW	
<b>X</b> .	Field duplicates	N	
XI.	Field blanks	50	Filter Blank=MC-3B-FILT (R0902886), FB=FB060409 (R0903006)

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: b2

	<b>1 ∕</b>	M-78B	11	M-125BMS	21	him	31
4	2 1	M-128B	12	M-125BDUP	22	.)	32
	3 🗸	H-38B	13	M-125BTRP	23		33
$\overline{\mathbf{A}}$	4	M-19B	14		24		34
	5	M-19BIX RE	15		25		35
₹	<i>6</i>	M-34B	16		26		36
	7	M-34BOLRE	17		27		37
	8 /	M-125B	18		28		38
	9	M-22AB	19		29		39
l	10	M-17AB	20		30		40

Notes:

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## VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page:_	<u></u>
Reviewer:	~~~
2nd reviewer:_	$\nu$
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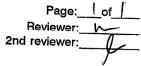
All circled methods are applicable to each sample.

Sample ID	Matrix	Poremeter
1-468-10	1.	
5.7	Az	(Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄ ) Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄ )
	•••••••••••••••••••••••••••••••••••••••	Alk pH Br $CI(NO_3) NO_2 SO_4 NH_3 TOC CN Cr6+ T-P MBAS TDS TSS Cond CIO_3 CIO_4$
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
~11,1V	p	Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
1 11	1	Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
tr		(AIK) PH Br CI NO3 NO2 SO4 NH3 (TOC CN Cr ⁶⁺ (T-BMBAS TDS TSS Cond CIO3 CIO4
V 13	1	(All (pH) Br CI NO3 NO2 SO4 NH3 (TOG CN Cr ⁶⁺ (T-F) MBAS TDS TSS Cond CIO3 CIO4
		Alk 6H Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond CIO3 CIO4
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
		CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
		CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
		CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
		CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
		CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
	11	CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
	1	CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
	11	CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
	11	CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
	H II	CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio

Comments:_____

LDC #: M. 495 26 SDG #: <u>cu co</u>m

## VALIDATION FINDINGS WORKSHEET Technical Holding Times

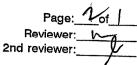


All circled dates have ex <u>Y N/N/A</u> Were al <u>Y N N/A</u> Were al	xceeded the tec I samples presei I cooler tempera	<u>Ved as annlicat</u>	la ta acah mul	hod ?			er:	
Method:		9056		218.6	T	[	1	Ē
Parameters:		Nº3-N		CV67				
<u>Technical holding ti</u>	me:	48m			( Not preserve	1		
Sample ID	Sampling date	Analysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier	
5	6/19/09 910	6/20/09	(53h	)			J-/1J/A	71
<u></u>	6/19/27	6/07/-9	(48,75		· .		3740/4	1
	<u> </u>	1223	[ 40, ]8	[m]			J J	l (n
~	bliciog							
3	6/18/09			6/19/29	(14-8.76)	th)	J-/1.J/p	CI
4	b/19/09			6polig	(11-8-10)			
	6/19/09			PH	-842 (	75xth)	J-/r/p	()
66	<u>bjen</u> 11-10			6/27/19 1214 pp	8.76 (7	2 (m)		]
		······						
· · · · · · · · · · · · · · · · · · ·								

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LDC #: 149561 SDG #: See on

## VALIDATION FINDINGS WORKSHEET Technical Holding Times



(pb)

All circled dates have ex <u>X N N/A</u> Were al <u>Y N N/A</u> Were al	xceeded the tech Il samples presen Il cooler temperat	Ved as annlicat	hla ta agah ma	thod ?			<u>-</u>
Method:		9012A		T	T	T	T
Parameters:		CN CN				1	
Technical holding ti	me:			+	1		+
Sample ID	Sampling date	Analysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier
8	6/23/09	PH=7(2			1	Mule	J-/p /p
		· · · · · · · · · · · · · · · · · · ·	<u> </u>	1	1.		1-1/P/P
				1	<u> </u>		
					1		
				1	<u> </u>	1	+
				1	<u> </u>	1	+
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				1		+	
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VALIDATION FINDINGS WORKSHEET Calibration

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Swy METHOD: Inorganics, EPA Method_

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Y N N/A Were all instruments calibrated daily, each set-up time, and were the proper number of standards used? Y N N/A Were all initial and continuing calibration verification percent recoveries (%R) within the control limits of 90-110% ? N N/A Are all correlation coefficients ≥0.395 ? LEVEL IV/D ONLY:

Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recaluculation Worksheet for recalulations. Was a balance check conducted prior to the TDS analysis.? Was the titrant normality checked? Y N NA V N NA

#	Date	Calibration ID	Analyte	%R	Associated Samples	Qualifications
	648105		12-201			3 have ter
+						
4	30/31/9 -	ccV( KJP)		89.3	À	)
~	6/20/20	1 CW (N43) -+		81.1	4.6	
	-					
1			8	841 8		
		H				•
	12109	(prof) (	8~	194	4	10
1						
1	612435	cer thechin	) curtertet	112	9,00	J+ 4+/0 (c)
4	╀					
2		L (Jaw)	7	42 M	1	2
1		0				
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SDG #: See Cover LDC #: 21495E6

## VALIDATION FINDINGS WORKSHEET **Blanks**

-| { |] Page: Reviewer: 2nd Reviewer:

METHOD: Inorganics, Method See Cover

 $\cancel{0}$  N N/A Were all samples associated with a given method blank?  $\cancel{0}$  N N/A Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below. Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Reason Code: bl

## Sample Identification Associated Samples: <u>MB:1, ICB/CCB:1-4,6,8-10 (>RL)</u> Blank Action Limit Maximum ICB/CCB 1.0 Blank ID Conc. units: mg/L MB 1.0 Analyte Total Alk

9

**Bicar Alk** 

Associated Samples: 1-4,6 (>RL)	Sample Identification	
	Blank Action Limit	
	Maximum ICB/CCB	
s: mg/L	Blank ID MB	
Conc. units: mg/l	Analyte	

Associated Samples: T-P*1:1-3, T-P*2: 4.6.8-10	
٦	ſ

Conc. units: mg/

<u>IDS</u>

Analyte	Blank ID M	aximum	Blank					Sample Identification	ntification		
	MB	ICB/CCB	Action Limit	L.	4	ω	ω	თ	10		
	0.013	0.013		0.032 / 0.050							
	0.008	0.008			0.022 / 0.050	050 0.032 / 0.050	0.032 / 0.050 0 044 / 0 050 0	0.044 / 0.050	0.037 / 0.050	 	
								20010 1 1 2 12	1000.0 1 100.0	_	

Conc. units: mg/L

Associated Samples: 1 (>RL)

	-	_	
Sample Identification			
n Blank			
Blank ID	MB	0.1	0.063
Analyte		Ū	NO3-N

SDG #: See Cover LDC #: 21495E6

## VALIDATION FINDINGS WORKSHEET **Blanks**

Page: 20f 2nd Reviewer: Reviewer:_

METHOD: Inorganics, Method See Cover

N N/A Were all samples associated with a given method blank? Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Reason Code: bl

Associated Samples: 4		ICB/CCB Action Limit 4	
	Maximum	ICB/CCB Ac	
its: mg/L	Blank ID	MB	ч Ч С
Conc. units: mg/L	Analyte		Br

## Conc. units: mg/l

# Associated Samples: CI: 4,6, NO3-N:5,7 (>RL or 1X)

Analyte	Blank ID	Maximum	Blank	Sample Identification
	MB	ICB/CCB	Action Limit	
CI	0.1	0.1		
NO3-N		0.062	0.062	

## Conc. units: mg/L

## Associated Samples: 8 (>RL)

Analyte	Blank ID	Maximum	Blank	Sample Identification
	MB	ICB/CCB	Action Limit	
0		0 005		

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LDC #: 21495E6 SDG #: See Cover

## VALIDATION FINDINGS WORKSHEET Field Blanks

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Page: <u>of /</u> Reviewer: <u>``</u> 2nd Reviewer: <u>``</u>

 METHOD: Inorganics, Method See Cover

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

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

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

 Sampling date:
 6/4/09
 Soil factor applied

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

Associated Samples: 1-3,8

Reason Code: bf

Analyte	Blank ID					Sample Identification	ation	
	FB060409	Action Level	+	2	ю	ω		
Total Alkalinity	1.9							
Bicarbonate Alkalinity	1.9							
Ammonia as N	0.102	1.02		0.047 / 0.050	0.090 J+	0.008 / 0.050		
TOC (average)	0.4					0.8 / 1.0		
Conductivity (umhos/cm)	1.81							
pH (pH Units)	6.08							
Total Phosphorus	0.020		0.032 / 0.050			0.032 / 0.050		

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## VALIDATION FINDINGS WORKSHEET **Matrix Spike Analysis**

3 Page: 1 of 2nd Reviewer: Reviewer:

METHOD: Inorganics, Method

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Were matrix spike percent recoveries (%R) within the control limits of 75-125 (85-115% for Method 300.0)? If the sample concentration exceeded the spike Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A" <u>V N/A</u> Was a matrix spike analyzed for each matrix in this SDG? <u>V N/A</u> Were matrix spike percent recoveries (%R) within the control limits of 75-125 (85-115% for Metho concentration by a factor of 4 or more, no action was taken.

Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations. LEVEL IV ONLY: Y N NA

Į	~					
#	# Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
		A	700	69		$\overline{3-h_{T}/A}$ (m)
t			$c_N$	0	<b>`</b>	J-1/2/14 1/
L						
5	Commente:					
5				وموارخ والمارين والمارين والمعالم معرامات والمعالم والمتعالي المتعالم والمارين المحالي والمحاول والمحالي والمحالية والم		

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DG #: <

VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Q اح ا Reviewer: WH 2nd Reviewer: Page:

METHOD: Inorganics, Method _______

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.

 $(\overrightarrow{Y})$  N N/A. Was the overall quality and usability of the data acceptable?

		Commo	Finding	Associated Samples	Qualifications
*	Date		11		
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t			carpine . The for engand and	andyan.	
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Ē	Comments:	والمتحفظ والمحمد والمتراجب والمناخب والمتعادين والمتراجب والمحمول والمتعاد والمحمد والمحمد والمحمد والمحمد والمحمد			

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## Laboratory Data Consultants, Inc. Data Validation Report

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

Collection Date: June 5 through June 11, 2009

Soil

LDC Report Date: September 28, 2009

Matrix:

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

## Sample Delivery Group (SDG): R0903184

### Sample Identification

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

### Introduction

This data review covers 20 soil samples listed on the cover sheet. The analyses were per Standard Method 2320B for Alkalinity, EPA Method 350.1 for Ammonia as Nitrogen, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 353.2 for Nitrite as Nitrogen, EPA 300.1 for Chlorate, EPA SW 846 Method 9012A for Cyanide, EPA SW 846 Method 7199 for Hexavalent Chromium, EPA SW 846 Method 9045D for pH, Standard Method 5540C for Surfactants, EPA Method 314.0 for Perchlorate, EPA Method 365.1 for Total Phosphorus, and Lloyd/Kahn Method for Total Organic Carbon.

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

Field duplicates are summarized in Section X.

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. Calibration

Calibration verification frequency and analysis criteria were met for each method when applicable with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
6/10/09	ccv	Total organic carbon	89.1 (90-110)	SA127-0.5B RSAJ6-0.5B RSAK6-0.5B RSAK8-0.5B RSAL7-0.5B RSAL8-0.5B SA127-0.5BMS SA127-0.5BDUP	J- (all detects) UJ (all non-detects)	Ρ
6/12/09	CCV	Total organic carbon	86.4 (90-110)	SA35-0.5B SA55-0.5B SA56-0.5B SA176-0.5B RSAO3-0.5B	J- (all detects) UJ (all non-detects)	Ρ
6/18/09	ccv	Total organic carbon	88.0 (90-110)	SA182-0.5B SA201-0.5B SA166-0.5B RSAK4-0.5B RSAK4009-0.5B SA134-0.5B	J- (all detects) UJ (all non-detects)	Ρ

## III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Concentration	Associated Samples
МВ	Alkalinity, total Alkalinity, bicarbonate Chloride Nitrate as N Total organic carbon	16 mg/Kg 16 mg/Kg 1.0 mg/Kg 0.47 mg/Kg 40 mg/Kg	SA127-0.5B RSAJ6-0.5B RSAK6-0.5B RSAK8-0.5B RSAL7-0.5B RSAL8-0.5B

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Alkalinity, total	1.0 mg/L	SA127-0.5B RSAJ6-0.5B RSAK6-0.5B RSAK8-0.5B RSAL7-0.5B RSAL8-0.5B
MB	Alkalinity, total Alkalinity, bicarbonate Chloride Nitrate as N Sulfate	11 mg/Kg 11 mg/Kg 1 mg/Kg 0.47 mg/Kg 1.8 mg/Kg	SA35-0.5B SA55-0.5B SA56-0.5B SA176-0.5B RSAO3-0.5B SA182-0.5B SA201-0.5B SA166-0.5B RSAK4-0.5B RSAK4009-0.5B SA134-0.5B
МВ	Total organic carbon	40 mg/Kg	SA35-0.5B SA55-0.5B SA56-0.5B SA176-0.5B RSAO3-0.5B
МВ	Total organic carbon	50 mg/Kg	SA182-0.5B SA201-0.5B SA166-0.5B RSAK4-0.5B RSAK4009-0.5B SA134-0.5B
ICB/CCB	Alkalinity, total	1.0 mg/L	SA35-0.5B SA55-0.5B SA56-0.5B SA176-0.5B RSAO3-0.5B SA182-0.5B SA201-0.5B SA166-0.5B RSAK4-0.5B RSAK4009-0.5B SA134-0.5B
МВ	Total, phosphorus	2.3 mg/Kg	SA127-0.5B RSAJ6-0.5B RSAK6-0.5B RSAK8-0.5B
МВ	Total, phosphorus	2.2 mg/Kg	RSAL7-0.5B RSAL8-0.5B

Method Blank ID	Analyte	Concentration	Associated Samples
МВ	Total, phosphorus	1.7 mg/Kg	SA35-0.5B SA55-0.5B SA56-0.5B SA176-0.5B RSA03-0.5B SA182-0.5B SA201-0.5B SA166-0.5B RSAK4-0.5B RSAK4009-0.5B SA134-0.5B
ICB/CCB	Total, phosphorus	0.0147 mg/L	SA127-0.5B RSAJ6-0.5B RSAK6-0.5B RSAK8-0.5B
ICB/CCB	Total, phosphorus	0.0147 mg/L	RSAL7-0.5B RSAL8-0.5B
ICB/CCB	Total, phosphorus	0.0107 mg/L	SA35-0.5B SA55-0.5B SA56-0.5B SA176-0.5B RSAO3-0.5B SA182-0.5B SA201-0.5B SA166-0.5B RSAK4-0.5B RSAK4-0.5B RSAK4009-0.5B SA134-0.5B
ICB/CCB	Chloride	0.122 mg/L	SA127-0.5B RSAK6-0.5B RSAK8-0.5B RSAL7-0.5B RSAL8-0.5B
ICB/CCB	Chloride	0.098 mg/L	RSAJ6-0.5B
ICB/CCB	Chloride	0.095 mg/L	SA35-0.5B SA55-0.5B RSAO3-0.5B
ICB/CCB	Chloride	0.104 mg/L	RSAK4-0.5B RSAK4009-0.5B
ICB/CCB	Chloride	0.100 mg/L	SA56-0.5B SA182-0.5B SA166-0.5B
ICB/CCB	Chloride	0.106 mg/L	SA134-0.5B

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Chloride	0.098 mg/L	SA176-0.5B

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	Analyte	Reported Concentration	Modified Final Concentration
SA35-0.5B	Chloride	1.1 mg/Kg	2.1U mg/Kg
	Sulfate	2.0 mg/Kg	2.1U mg/Kg

Sample FB072109-SO (from SDG R0904016) was identified as a field blank. No contaminant concentrations were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
FB072109-SO	7/21/09	Ammonia as N Total organic carbon Chloride Nitrate as N pH Total phosphorus Sulfate Surfactants	0.191 mg/L 0.5 mg/L 9.7 mg/L 1.76 mg/L 3.36 mg/L 0.01 mg/L 5.5 mg/L 0.159 mg/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 with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA127-0.5B	Chloride	62.6 mg/Kg	62.6J+ mg/Kg
	Nitrate as N	5.99 mg/Kg	5.99J+ mg/Kg
	Sulfate	102 mg/Kg	102J+ mg/Kg
RSAJ6-0.5B	Nitrate as N	34.7 mg/Kg	34.7J+ mg/Kg
	Surfactants	2.5 mg/Kg	2.5J+ mg/Kg
RSAK6-0.5B	Chloride	18.6 mg/Kg	18.6J+ mg/Kg
	Nitrate as N	5.27 mg/Kg	5.27J+ mg/Kg
	Sulfate	162 mg/Kg	162J+ mg/Kg
	Surfactants	0.8 mg/Kg	2.1U mg/Kg
RSAK8-0.5B	Chloride	37.2 mg/Kg	37.2J+ mg/Kg
	Nitrate as N	4.42 mg/Kg	4.42J+ mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
RSAL7-0.5B	Chloride	5.0 mg/Kg	5.0J+ mg/Kg
	Nitrate as N	1.26 mg/Kg	1.26J+ mg/Kg
	Sulfate	22.8 mg/Kg	22.8J+ mg/Kg
	Surfactants	1.2 mg/Kg	2.1U mg/Kg
RSAL8-0.5B	Chloride	37.0 mg/Kg	37.0J+ mg/Kg
	Nitrate as N	3.44 mg/Kg	3.44J+ mg/Kg
	Surfactants	1.1 mg/Kg	2.1U mg/Kg
SA35-0.5B	Chloride	1.1 mg/Kg	2.1U mg/Kg
	Nitrate as N	0.81 mg/Kg	0.81J+ mg/Kg
	Sulfate	2.0 mg/Kg	2.1U mg/Kg
SA55-0.5B	Chloride	31.5 mg/Kg	31.5J+ mg/Kg
	Nitrate as N	3.96 mg/Kg	3.96J+ mg/Kg
	Sulfate	84.1 mg/Kg	84.1J+ mg/Kg
SA56-0.5B	Ammonia as N	0.09 mg/Kg	0.52U mg/Kg
	Chloride	406 mg/Kg	406J+ mg/Kg
	Nitrate as N	64.7 mg/Kg	64.7J+ mg/Kg
	Surfactants	2.5 mg/Kg	2.5J+ mg/Kg
SA176-0.5B	Nitrate as N	67.2 mg/Kg	67.2J+ mg/Kg
RSAO3-0.5B	Chloride	14.6 mg/Kg	14.6J+ mg/Kg
	Nitrate as N	2.89 mg/Kg	2.89J+ mg/Kg
	Sulfate	68.5 mg/Kg	68.5J+ mg/Kg
SA182-0.5B	Ammonia as N	0.19 mg/Kg	0.60U mg/Kg
	Nitrate as N	28.9 mg/Kg	28.9J+ mg/Kg
	Sulfate	189 mg/Kg	189J+ mg/Kg
SA201-0.5B	Chloride	439 mg/Kg	439J+ mg/Kg
	Nitrate as N	4.42 mg/Kg	4.42J+ mg/Kg
	Sulfate	200 mg/Kg	200J+ mg/Kg
SA166-0.5B	Chloride	267 mg/Kg	267J+ mg/Kg
	Nitrate as N	17.4 mg/Kg	17.4J+ mg/Kg
RSAK4-0.5B	Chloride	15.1 mg/Kg	15.1J+ mg/Kg
	Nitrate as N	2.38 mg/Kg	2.38J+ mg/Kg
	Sulfate	37.5 mg/Kg	37.5J+ mg/Kg
RSAK4009-0.5B	Chloride	14.0 mg/Kg	14.0J+ mg/Kg
	Nitrate as N	2.24 mg/Kg	2.24J+ mg/Kg
	Sulfate	36.9 mg/Kg	36.9J+ mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA134-0.5B	Ammonia as N	0.09 mg/Kg	0.52U mg/Kg
	Chloride	762 mg/Kg	762J+ mg/Kg
	Nitrate as N	51.1 mg/Kg	51.1J+ mg/Kg
	Sulfate	499 mg/Kg	499J+ mg/Kg
	Surfactants	0.25 mg/Kg	0.25J+ mg/Kg

## IV. Matrix Spike/Matrix Spike Duplicates

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

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
SA127-0.5BMS (All samples in SDG R0903184)	Surfactants	48 (75-125)	-	-	J- (all detects) UJ (all non-detects)	A

## V. Duplicates

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

## VI. Laboratory Control Samples

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

LCS ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
LCS	Bromide	111 (90-110)	RSAK6-0.5B RSAK8-0.5B RSAL7-0.5B RSAL8-0.5B	J+ (all detects)	Ρ

## VII. Surrogates

Surrogates were added to all samples and blanks as required by method 300.1. All surrogate recoveries (%R) were within QC limits.

## VIII. Sample Result Verification and Project Quantitation Limit

All analytes reported below the PQL were qualified as follows:

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

Raw data were not reviewed for this SDG.

## IX. Overall Assessment

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

## X. Field Duplicates

Samples RSAK4-0.5B and RSAK4009-0.5B were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Conce	ntration				
Analyte	RSAK4-0.5B	RSAK4009-0.5B	RPD (Limits)	Difference (Limits)	Flag	A or P
Alkalinity, total	714 mg/Kg	725 mg/Kg	2 (≤50)	-	-	-
Alkalinity, bicarbonate	669 mg/Kg	690 mg/Kg	3 (≤50)	-	-	-
Alkalinity, carbonate	44 mg/Kg	35 mg/Kg	-	9 (≤21)	-	-
Chloride	15.1 mg/Kg	14.0 mg/Kg	8 (≤50)	-	-	-
Nitrate as N	2.38 mg/Kg	2.24 mg/Kg	-	0.14 (≤0.51)	-	-
рН	10.00 units	9.85 units	2 (≤50)	-	-	-
Sulfate	37.5 mg/Kg	36.9 mg/Kg	2 (≤50)	-	-	-
Total organic carbon	1660 mg/Kg	960 mg/Kg	-	700 (≤300)	J (all detects)	A
Total phosphorus	910 mg/Kg	981 mg/Kg	8 (≤50)	-	-	-
Chlorate	270 ug/Kg	291 ug/Kg	-	21 (≤210)	-	-
Perchlorate	649 ug/Kg	663 ug/Kg	2 (≤50)	-	-	-

## Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R0903184

SDG	Sample	Analyte	Flag	A or P	Reason
R0903184	SA127-0.5B RSAJ6-0.5B RSAK6-0.5B RSAK8-0.5B RSAL7-0.5B RSAL8-0.5B SA35-0.5B SA55-0.5B SA56-0.5B SA176-0.5B RSAO3-0.5B SA182-0.5B SA201-0.5B SA201-0.5B RSAK4-0.5B RSAK4-0.5B RSAK4009-0.5B SA134-0.5B	Total organic carbon	J- (all detects) UJ (all non-detects)	Ρ	Calibration (CCV %R) (c)
R0903184	SA127-0.5B RSAJ6-0.5B RSAK6-0.5B RSAK8-0.5B RSAL7-0.5B RSAL8-0.5B SA35-0.5B SA55-0.5B SA56-0.5B SA176-0.5B RSAO3-0.5B SA176-0.5B SA182-0.5B SA201-0.5B SA201-0.5B RSAK4-0.5B RSAK4-0.5B RSAK4009-0.5B SA134-0.5B	Surfactants	J- (all detects) UJ (all non-detects)	Α	Matrix spike/Matrix spike duplicates (%R) (m)
R0903184	RSAK6-0.5B RSAK8-0.5B RSAL7-0.5B RSAL8-0.5B	Bromide	J+ (all detects)	Ρ	Laboratory control samples (%R) (I)

SDG	Sample	Analyte	Flag	A or P	Reason
R0903184	SA127-0.5B RSAJ6-0.5B RSAK6-0.5B RSAK8-0.5B RSAL7-0.5B RSAL8-0.5B SA35-0.5B SA56-0.5B SA56-0.5B SA176-0.5B RSAO3-0.5B SA176-0.5B SA106-0.5B RSAC1-0.5B RSAK4-0.5B RSAK4009-0.5B SA134-0.5B	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)
R0903184	RSAK4-0.5B RSAK4009-0.5B	Total organic carbon	J (all detects)	A	Field duplicates (Difference) (fd)

## Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R0903184

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903184	SA35-0.5B	Chloride Sulfate	2.1U mg/Kg 2.1U mg/Kg	A	bl

## Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R0903184

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903184	SA127-0.5B	Chloride Nitrate as N Sulfate	62.6J+ mg/Kg 5.99J+ mg/Kg 102J+ mg/Kg	A	bf
R0903184	RSAJ6-0.5B	Nitrate as N Surfactants	34.7J+ mg/Kg 2.5J+ mg/Kg	A	bf
R0903184	RSAK6-0.5B	Chloride Nitrate as N Sulfate Surfactants	18.6J+ mg/Kg 5.27J+ mg/Kg 162J+ mg/Kg 2.1U mg/Kg	A	bf
R0903184	RSAK8-0.5B	Chloride Nitrate as N	37.2J+ mg/Kg 4.42J+ mg/Kg	A	bf

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903184	RSAL7-0.5B	Chloride Nitrate as N Sulfate Surfactants	5.0J+ mg/Kg 1.26J+ mg/Kg 22.8J+ mg/Kg 2.1U mg/Kg	A	bf
R0903184	RSAL8-0.5B	Chloride Nitrate as N Surfactants	37.0J+ mg/Kg 3.44J+ mg/Kg 2.1U mg/Kg	A	bf
R0903184	SA35-0.5B	Chloride Nitrate as N Sulfate	2.1U mg/Kg 0.81J+ mg/Kg 2.1U mg/Kg	A	bf
R0903184	SA55-0.5B	Chloride Nitrate as N Sulfate	31.5J+ mg/Kg 3.96J+ mg/Kg 84.1J+ mg/Kg	A	bf
R0903184	SA56-0.5B	Ammonia as N Chloride Nitrate as N Surfactants	0.52U mg/Kg 406J+ mg/Kg 64.7J+ mg/Kg 2.5J+ mg/Kg	A	bf
R0903184	SA176-0.5B	Nitrate as N	67.2J+ mg/Kg	A	bf
R0903184	RSAO3-0.5B	Chloride Nitrate as N Sulfate	14.6J+ mg/Kg 2.89J+ mg/Kg 68.5J+ mg/Kg	A	bf
R0903184	SA182-0.5B	Ammonia as N Nitrate as N Sulfate	0.60U mg/Kg 28.9J+ mg/Kg 189J+ mg/Kg	A	bf
R0903184	SA201-0.5B	Chloride Nitrate as N Sulfate	439J+ mg/Kg 4.42J+ mg/Kg 200J+ mg/Kg	A	bf
R0903184	SA166-0.5B	Chloride Nitrate as N	267J+ mg/Kg 17.4J+ mg/Kg	A	bf
R0903184	RSAK4-0.5B	Chloride Nitrate as N Sulfate	15.1J+ mg/Kg 2.38J+ mg/Kg 37.5J+ mg/Kg	A	bf
R0903184	RSAK4009-0.5B	Chloride Nitrate as N Sulfate	14.0J+ mg/Kg 2.24J+ mg/Kg 36.9J+ mg/Kg	A	bf

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SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903184	SA134-0.5B	Ammonia as N Chloride Nitrate as N Sulfate Surfactants	0.52U mg/Kg 762J+ mg/Kg 51.1J+ mg/Kg 499J+ mg/Kg 0.25J+ mg/Kg	A	bf

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14	K3AJ0-0.3B	12	13A102-0.3D		52
3	RSAK6-0.5B	13	SA201-0.5B	23	33
4	RSAK8-0.5B	14	SA166-0.5B	24	34
5	RSAL7-0.5B	15	RSAK4-0.5B	25	35
6.	RSAL8-0.5B	16	RSAK4009-0.5B	26	36
7	SA35-0.5B	17	SA134-0.5B	27	37
8	SA55-0.5B	18	SA127-0.5BMS	28	38
ø	SA56-0.5B	19	SA127-0.5BMSD	29	39
10	SA176-0.5B	20	SA127-0.5BDUP	30	40
Note	s: surrogete =	A			
1.000					

N = Not provided/applicable

ND = No compounds detected R = Rinsate

FB = Field blank

21

D = Duplicate TB = Trip blank EB = Equipment blank

31

MB

6	VALIDATION COMPLETENESS WORKSHEET
34	Stage 2B
mhia A	nalytical Services

(EPA Method 314.0), Total Phosphorus (EPA Method 365.1), TOC (Lloyd/Kahn)

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RSA#3-0.5B

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#: <u>21495F6</u>	VALI	
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METHOD: (Analyte) Alkalinity (SM2320B), Ammonia-N (EPA Method 350.1), Bromide, Chloride, Nitrate-N, Sulfate (EPA SW846 Method 9056), Nitrite-N (EPA Method 353.2), Chlorate (EPA Method 300.1), Cyanide (EPA SW846 Method 9012A), Hexavalent Chromium (EPA SW846 Method 7199), pH (EPA SW846 Method 9045D), Surfactants (SM5540C), Perchlorate

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

**Tronox Northgate Henderson** 

SDG #: R09	03184		
Laboratory:	Columbia	Analytical	Service

validation findings worksheets.

LDC

Field blanks A = Acceptable

SW = See worksheet

Validated Samples: 50.

SA127-0.5B

Note:

,				
		Validation Area		Comments
	١.	Technical holding times	A	Sampling dates: 6/5/.9 - 6/11/09
	lla.	Initial calibration	H	
	lib.	Calibration verification	5~	
	111.	Blanks	SW	
0	IV	Matrix Spike/Matrix Spike Duplicates	SW	3 ms/mix/oup
	V	Duplicates	A	\$ / / <b>B</b>
	Vł.	Laboratory control samples	SW	Les
	VII.	Sample result verification	N	,
	VIII.	Overall assessment of data	A	
	IX.	Field duplicates	52	(5,16)
	x	Field blanks	5~	FB= FB072109-50 (S14R0904016)

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2nd reviewer:	q

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1-17	(sei)	(Alk pH Br CI NO3 NO2 SO4 NH3 TOC) (Cr5+ T-P MBAS) TDS TSS Cond (CIO3 CIO4)
	,	Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO3 ClO4
1-17	501	Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC (CN )Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
,,		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
nr	(ioi	AL DHIBICINO, NO, SO, NH, TOC CN CP (T-PIMBAS)TDS TSS COND (0) (10)
18		All pH (Br) CI (NO3 (NO) SO2 (NH) TOC) CN (POT-P) (IBAS) TDS TSS Cond (CIO3 CIO2
19	V	Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond CIO3 CIO4
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁸⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO₄
	2	Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond CIO ₃ CIO ₄
17. 17.		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁸⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond CIO ₃ CIO ₄

Comments:_____

శ కి న LDC #: 214956 SDG #:

## VALIDATION FINDINGS WORKSHEET Calibration

đ Z Page:___ Reviewer: 2nd Reviewer:

Je con METHOD: Inorganics, EPA Method_ Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Were all instruments calibrated daily, each set-up time, and were the proper number of standards used? Were all initial and continuing calibration verification percent recoveries (%R) within the control limits of 90-110% ? Are all correlation coefficients <u>></u>0.595 ? Y N N/A

YN NA

LEVEL IV/D ONLY:

Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recaluculation Worksheet for recalulations. Was a balance check conducted prior to the TDS analysis.? Was the titrant normality checked? Y N NA Y N N/A

CAL6

ht: See Cover
SDG #

## VALIDATION FINDINGS WORKSHEET **Blanks**



Reason Code: bl

METHOD: Inorganics, Method See Cover

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

X N/A Were all samples associated with a given method blank? V N/A Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.

Conc. units: mg/Kg	s: mg/Kg	******		Associated Samples: 1-6 (>RL)
Analyte	Blank ID	Maximum		Sample Identification
	MB	ICB/CCB (mg/L)	Action Limit	
Total AIK	16	1.0		
Bicarb AIK	16			
Ū				
NO3-N	0.47			
TOC	40			

Conc. units: mg/Kg	mg/Kg			Associated Samples: 7-17 except TOC*1: 7-11, TOC*2: 12-17	
Analyte	Blank ID	Maximum ICB/CCB	Blank Action	Sample Identification	
	MB	(mg/L)			
Total AlK	1	1.0			
Bicarb. AlK	11				
Ū	-			1.1/2.1	
NO3-N	0.47				
SO4	1.8			2.0/2.1	
TOC*1	40				
T0C*2	50				

SDG #: See Cover LDC #: 21495F6

## VALIDATION FINDINGS WORKSHEET

**Blanks** 

Page: Vof Y Reviewer:_ 2nd Reviewer:

METHOD: Inorganics, Method See Cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Reason Code: bl N N/A Were all samples associated with a given method blank?

### Associated Samples: <u>T-P*1: 1-4, T-P*2: 5,6, T-P*3: 7-17 (>RL</u>) Sample Identification Action Limit Blank Maximum ICB/CCB (mg/L) 0.0147 0.0147 0.0107 Blank ID Conc. units: mg/Kg ШB 2.3 2.2 1.7 Analyte T-P*3 1-P*1 T-P*2

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# Associated Samples: CI*1: 1.3-6, CI*3: 2, CI*3:7,8,11, CI*4:15,16, CI*5:9.12-14, CI*6:17, CI*7:10

Conc. units: mg/Kg	mg/hg			Associated Satisfies. Or 1: 1,0-0, OI 2: 2, 20 0: 1,01 0: 01 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0: 00 0:	
Analyte	Blank	Maximum ICB/CCB	Blank Action Limit	Sample Identification	
	MB	(mg/L)			
CI*1		0.122			
CI*2		0.098			
CI*3		0.095		1.1/2.1	
CI*4		0.104			
CI*5		0.100			
CI*6		0.106			
CI*7		0.098			

LDC #: 21495F6 SDG #: See Cover

## VALIDATION FINDINGS WORKSHEET

**Field Blanks** 

Page: 1 of Reviewer: 2nd Reviewer: 2

 
 METHOD:
 Inorganics, Method
 See Cover

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

 Y
 N
 N/A
 Were target analytes detected in the field blanks?
 Blank units: <u>mg/L</u> Associated sample units: <u>mg/Kg</u> Sampling date: <u>7/21/09</u> Soil factor applied <u>10X</u> Field blank type: (circle one) Field Blank / Rinsate / Other: <u>FB</u>

Associated Samples: All

Reason Code: bf

Analvte	Blank ID					Sample	Sample Identification				
	Q	Action Level	-	2	3	4	5	9	7	œ	თ
Ammonia as N	0.191	19.1									0.09 / 0.52
TOC (average)	0.5										
ō	9.7	026	62.6 J+		18.6 J+	37.2 J+	5.0 J+	37.0 J+	1.1/2.1	31.5 J+	406 J+
Nitrate as N	1.76	176	5.99 J+	34.7 J+	5.27 J+	4.42 J+	1.26 J+	3.44 J+	0.81 J+	3.96 J+	64.7 J+
pH (pH Units)	3.36										
Total Phosphorus	0.01										
Sulfate	5.5	550	102 J+		162 J+		22.8 J+		2.0/2.1	84.1 J+	
Surfactants	0.159	15.9		2.5 J+	0.8/2.1		1.2/2.1	1.1/2.1			2.5 J+

Analyte	Blank ID					Sample I	Sample Identification				
	FB072109-SO Action Level	Action Level	10	11	12	13	14	15	16	17	
Ammonia as N	0.191	19.1			0.19 / 0.60					0.09 / 0.52	
TOC (average)	0.5										
σ	9.7	026		14.6 J+		439 J+	267 J+	15.1 J+	14.0 J+	762 J+	
Nitrate as N	1.76	176	67.2 J+	2.89 J+	28.9 J+	4.42 J+	17.4 J+	2.38 J+	2.24 J+	51.1 J+	
pH (pH Units)	3.36										
Total Phosphorus	0.01										
Sulfate	5.5	550		68.5 J+	189 J+	200 J+		37.5 J+	36.9 J+	499 J+	
Surfactants	0.159	15.9								0.25 J+	

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LDC #: 2	SDG #:

## VALIDATION FINDINGS WORKSHEET **Matrix Spike Analysis**

<u>}</u> Page: | of | 2nd Reviewer: Reviewer:___

<u>ک</u> METHOD: Inorganics, Method

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". <u>N N/A</u> Was a matrix spike analyzed for each matrix in this SDG?

1225

V N N/A

Were matrix spike percent recoveries (%R) within the control limits of 75-125 (85-115% for Method 300.0)? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations. Y N NA WE WE

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
	18	( ز هې	Surta tracto	44	~ += 6 A11	F/uT/A (m)
$\frac{1}{1}$						
		:				
	Commonte.					

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LDC #: 21495 76 SDG #: Let cover METHOD: Inorganics, Method_

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

2nd Reviewer: Page: Reviewer:

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". <u>Y N N/A</u> Was a laboratory control sample (LCS) analyzed for each matrix in this SDG? <u>Y (N N/A</u> Were all LCS percent recoveries (%R) within the control limits of 80-120% (85-115% for Method 300.0)? LEVEL <u>IV</u> ONLY:

Care

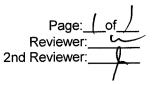
Ł

Were recalculated results acceptable? See Level IV Recalculation Worksheet for récalculations. ⊗ z ≻

Comments:	ments:	nents:	nents:	ments:

LCS.8

### VALIDATION FINDINGS WORKSHEET Field Duplicates



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Inorganics, Method See Cover



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

Concentration (mg/Kg) Qualification Limits (Parent only) RPD (≤50) Difference Analyte 16 15 Total Alkalinity 714 725 2 3 669 690 **Bicarbonate Alkalinity** 35 9 (≤21) Carbonate Alkalinity 44 14.0 8 Chloride 15.1 0.14 (≤0.51) 2.38 2.24 Nitrate as N 2 pH (pH Units) 10.00 9.85 2 Sulfate 37.5 36.9 J det / A (fd) 960 700 (≤300) тос 1660 910 981 8 **Total Phosphorus** 21 (≤210) 270 291 Chlorate (ug/Kg) 2 Perchlorate (ug/Kg) 649 663

V:\FIELD DUPLICATES\FD_inorganic\21495F6.wpd

### Laboratory Data Consultants, Inc. Data Validation Report

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

Collection Date: June 19 through June 24, 2009

LDC Report Date: September 29, 2009

Matrix: Soil

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

### Sample Delivery Group (SDG): R0903443

### Sample Identification

SA197-0.5B SA198-0.5B SA64-0.5B	SA150-0.5BMSD SA150-0.5BDUP RSAN5-0.5BMS
SA104-0.5B	RSAN5-0.5BDUP
SA129-0.5B	
SA70-0.5B	
SA60-0.5B	
SA150-0.5B	
RSAN5-0.5B	
SA53-0.5B	
SA201-10B	
SA201-28B	
SA201009-28B	
SA43009-0.5B	
SA40-0.5B	
SA200-0.5B	
RSAO6-0.5B	
SA51-0.5B	
SA43-0.5B	
SA150-0.5BMS	

### Introduction

This data review covers 24 soil samples listed on the cover sheet. The analyses were per Standard Method 2320B for Alkalinity, EPA Method 350.1 for Ammonia as Nitrogen, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 353.2 for Nitrite as Nitrogen, EPA 300.1 for Chlorate, EPA SW 846 Method 9012A for Cyanide, EPA SW 846 Method 7199 for Hexavalent Chromium, EPA SW 846 Method 9045D for pH, Standard Method 5540C for Surfactants, EPA Method 314.0 for Perchlorate, EPA Method 365.1 for Total Phosphorus, and Lloyd/Kahn Method for Total Organic Carbon.

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

Field duplicates are summarized in Section X.

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.

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### I. Technical Holding Times

All technical holding time requirements were met.

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

### II. Calibration

Calibration verification frequency and analysis criteria were met for each method when applicable with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
6/30/09	ccv	Total organic carbon	89.3 (90-110)	SA201-10B SA201-28B SA201009-28B SA40-0.5B SA200-0.5B RSAO6-0.5B SA51-0.5B SA43-0.5B	J- (all detects) UJ (all non-detects)	Ρ

### III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Concentration	Associated Samples
МВ	Alkalinity, total Alkalinity, bicarbonate Ammonia as N Chloride Nitrate as N	20 mg/Kg 20 mg/Kg 0.18 mg/Kg 0.9 mg/Kg 0.45 mg/Kg	SA197-0.5B SA198-0.5B SA64-0.5B SA104-0.5B SA129-0.5B SA70-0.5B
ICB/CCB	Alkalinity, total	1.1 mg/L	SA197-0.5B SA198-0.5B SA64-0.5B SA104-0.5B SA129-0.5B SA70-0.5B
MB	Alkalinity, total Alkalinity, bicarbonate Chloride Nitrate as N	10 mg/Kg 10 mg/Kg 0.9 mg/Kg 0.45 mg/Kg	SA60-0.5B SA150-0.5B RSAN5-0.5B SA53-0.5B

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Alkalinity, total	0.5 mg/L	SA60-0.5B SA150-0.5B RSAN5-0.5B SA53-0.5B
MB	Alkalinity, total Alkalinity, bicarbonate Chloride	15 mg/L 15 mg/L 1 mg/L	SA201-10B SA201-28B SA201009-28B SA43009-0.5B SA40-0.5B SA200-0.5B RSA06-0.5B SA51-0.5B SA51-0.5B SA43-0.5B
ICB/CCB	Ammonia as N	0.0094 mg/L	SA60-0.5B SA150-0.5B RSAN5-0.5B SA53-0.5B SA201-10B SA201-28B SA201009-28B SA43009-0.5B SA40-0.5B SA200-0.5B SA200-0.5B RSAO6-0.5B SA43-0.5B
ICB/CCB	Alkalinity, total	0.5 mg/L	SA201-10B SA201-28B SA201009-28B SA43009-0.5B SA40-0.5B SA200-0.5B
ICB/CCB	Alkalinity, total	1.0 mg/L	RSAO6-0.5B SA51-0.5B SA43-0.5B
MB	Total phosphorus	1.3 mg/Kg	All samples in SDG R0903443
MB	Total organic carbon	60 mg/Kg	SA197-0.5B SA198-0.5B SA64-0.5B SA104-0.5B SA129-0.5B SA70-0.5B SA60-0.5B SA150-0.5B RSAN5-0.5B SA53-0.5B

Method Blank ID	Analyte	Concentration	Associated Samples
MB	Total organic carbon	50 mg/Kg	SA201-10B SA201-28B SA201009-28B SA40-0.5B SA200-0.5B RSAO6-0.5B SA51-0.5B SA43-0.5B
MB	Total organic carbon	50 mg/Kg	SA43009-0.5B
ICB/CCB	Total organic carbon	45.0 mg/Kg	SA197-0.5B SA198-0.5B SA64-0.5B SA104-0.5B SA129-0.5B SA70-0.5B SA60-0.5B SA60-0.5B SA150-0.5B RSAN5-0.5B SA53-0.5B
ICB/CCB	Total organic carbon	58.1 mg/Kg	SA43009-0.5B
ICB/CCB	Chloride	0.153 mg/L	SA197-0.5B SA198-0.5B SA64-0.5B SA104-0.5B
ICB/CCB	Chloride	0.097 mg/L	SA129-0.5B SA70-0.5B
ICB/CCB	Chloride	0.099 mg/L	SA60-0.5B SA150-0.5B RSAN5-0.5B SA53-0.5B
ICB/CCB	Chloride	0.169 mg/L	SA201-10B SA43009-0.5B SA40-0.5B RSA06-0.5B SA43-0.5B
ICB/CCB	Chloride	0.109 mg/L	SA201-28B SA201009-28B SA200-0.5B SA51-0.5B
ICB/CCB	Bromide	0.052 mg/L	SA197-0.5B SA198-0.5B SA64-0.5B SA104-0.5B SA129-0.5B SA70-0.5B

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Bromide	0.045 mg/L	SA60-0.5B SA150-0.5B RSAN5-0.5B SA53-0.5B
ICB/CCB	Bromide	0.064 mg/L	SA201-10B SA201-28B SA201009-28B SA43009-0.5B SA40-0.5B SA200-0.5B RSAO6-0.5B

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	Analyte	Reported Concentration	Modified Final Concentration
SA197-0.5B	Ammonia as N Chloride	0.13 mg/Kg 2.0 mg/Kg	0.54U mg/Kg 2.2U mg/Kg
SA64-0.5B	Ammonia as N	0.08 mg/Kg	0.53U mg/Kg
SA201-10B	Ammonia as N	0.11 mg/Kg	0.54U mg/Kg
SA201-28B	Total organic carbon	270 mg/Kg	290U mg/Kg
SA201009-28B	Total organic carbon	270 mg/Kg	290U mg/Kg
SA200-0.5B	Bromide	0.3 mg/Kg	1.1U mg/Kg

Sample FB072109-SO (from SDG R0904016) was identified as a field blank. No contaminant concentrations were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
FB072109-SO	7/21/09	Ammonia as N Total organic carbon Chloride Nitrate as N pH Total phosphorus Sulfate Surfactants	0.191 mg/L 0.5 mg/L 9.7 mg/L 1.76 mg/L 3.36 mg/L 0.01 mg/L 5.5 mg/L 0.159 mg/L	SA201-10B SA201-28B SA201009-28B

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

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA201-10B	Ammonia as N	0.11 mg/Kg	0.54U mg/Kg
	Chloride	62.2 mg/Kg	62.2J+ mg/Kg
	Nitrate as N	173 mg/Kg	173J+ mg/Kg
	Sulfate	103 mg/Kg	103J+ mg/Kg
	Surfactants	2.5 mg/Kg	2.5J+ mg/Kg
SA201-28B	Ammonia as N	0.91 mg/Kg	0.91J+ mg/Kg
	Total organic carbon	270 mg/Kg	290U mg/Kg
	Chloride	128 mg/Kg	128J+ mg/Kg
	Sulfate	465 mg/Kg	465J+ mg/Kg
	Surfactants	1.4 mg/Kg	2.5U mg/Kg
SA201009-28B	Ammonia as N	0.82 mg/Kg	0.82J+ mg/Kg
	Total organic carbon	270 mg/Kg	290U mg/Kg
	Chloride	123 mg/Kg	123J+ mg/Kg
	Sulfate	483 mg/Kg	483J+ mg/Kg

### IV. Matrix Spike/Matrix Spike Duplicates

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

### V. Duplicates

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

### VI. Laboratory Control Samples

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

### VII. Surrogates

Surrogates were added to all samples and blanks as required by method 300.1. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Analyte	Flag	A or P
SA70-0.5B	Dichloroacetate	76 (90-115)	Chlorate	J- (all detects) UJ (all non-detects)	A

### VIII. Sample Result Verification and Project Quantitation Limit

All analytes reported below the PQL were qualified as follows:

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

Raw data were not reviewed for this SDG.

### IX. Overall Assessment

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

### X. Field Duplicates

Samples SA201-28B and SA201009-28B and samples SA43009-0.5B and SA43-0.5B were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Conce	ntration				
Analyte	SA201-28B	SA201009-28B	RPD (Limits)	Difference (Limits)	Flag	A or P
Ammonia as N	0.91 mg/Kg	0.82 mg/Kg	-	0.09 (≤0.64)	-	-
Alkalinity, total	685 mg/Kg	739 mg/Kg	8 (≤50)	-	-	-
Alkalinity, bicarbonate	675 mg/Kg	725 mg/Kg	7 (≤50)	-	-	-
Alkalinity, carbonate	10 mg/Kg	13 mg/Kg	-	3 (≤25)	-	-
Chloride	128 mg/Kg	123 mg/Kg	4 (≤50)	-	-	-
Nitrate as N	213 mg/Kg	212 mg/Kg	0 (≤50)	-	-	-
Nitrite as N	1.56 mg/Kg	1.62 mg/Kg	4 (≤50)	-	-	-
рН	8.33 units	8.37 units	0 (≤50)	-	-	-
Sulfate	465 mg/Kg	483 mg/Kg	4 (≤50)	-	-	-
Surfactants	1.4 mg/Kg	0.7U mg/Kg	-	0.7 (≤2.5)	-	-

	Concentration					
Analyte	SA201-28B	SA201009-28B	RPD (Limits)	Difference (Limits)	Flag	A or P
Total organic carbon	270 mg/Kg	270 mg/Kg	-	0 (≤290)	-	-
Total phosphorus	606 mg/Kg	650 mg/Kg	7 (≤50)	-	-	-
Chlorate	2610 ug/Kg	2920 ug/Kg	11 (≤50)	-	-	-
Perchlorate	63500 ug/Kg	72800 ug/Kg	14 (≤50)	-	-	-

	Conce	ntration				Γ
Analyte	SA43009-0.5B	SA43-0.5B	RPD (Limits)	Difference (Limits)	Flag	A or P
Alkalinity, total	1510 mg/Kg	434 mg/Kg	111 (≤50)	-	J (all detects)	A
Alkalinity, bicarbonate	1430 mg/Kg	427 mg/Kg	108 (≤50)	-	J (all detects)	A
Alkalinity, carbonate	82 mg/Kg	7 mg/Kg	-	75 (≤22)	J (all detects)	A
Chloride	37.8 mg/Kg	37.3 mg/Kg	1 (≤50)	-	-	-
Hexavalent chromium	0.34 mg/Kg	0.19U mg/Kg	-	0.15 (≤0.43)	-	-
Hexavalent chromium	0.31 mg/Kg	0.19U mg/Kg	-	0.12 (≤0.43)	-	-
Nitrate as N	7.49 mg/Kg	7.01 mg/Kg	7 (≤50)	′ (≤50)		-
рН	9.50 units	9.49 units	0 (≤50)	-	-	-
Sulfate	350 mg/Kg	329 mg/Kg	6 (≤50)	-	-	-
Surfactants	1.9 mg/Kg	2.4 mg/Kg	-	0.5 (≤2.2)	-	-
Total organic carbon	7600 mg/Kg	25300 mg/Kg	-	17700 (≤2100)	J (all detects)	A
Total phosphorus	413 mg/Kg	514 mg/Kg	22 (≤50)	-	-	-
Chlorate	2080 ug/Kg	2040 ug/Kg	2 (≤50)	-	-	-
Perchlorate	4410 ug/Kg	4230 ug/Kg	4 (≤50)	-	-	-

### Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R0903443

SDG	Sample	Analyte	Flag	A or P	Reason	
R0903443	SA201-10B SA201-28B SA201009-28B SA40-0.5B SA200-0.5B RSAO6-0.5B SA51-0.5B SA51-0.5B SA43-0.5B	Total organic carbon	J- (all detects) UJ (all non-detects)	Ρ	Calibration (CCV %R) (c)	
R0903443	SA70-0.5B	Chiorate	J- (all detects) UJ (all non-detects)	A	Surrogate recovery (%R) (s)	
R0903443	SA197-0.5B SA198-0.5B SA64-0.5B SA104-0.5B SA129-0.5B SA70-0.5B SA50-0.5B SA50-0.5B SA53-0.5B SA201-10B SA201-28B SA201-28B SA201009-28B SA43009-0.5B SA40-0.5B SA200-0.5B SA200-0.5B SA51-0.5B SA43-0.5B	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)	
R0903443	SA43009-0.5B SA43-0.5B	Alkalinity, total Alkalinity, bicarbonate	J (all detects) J (all detects)	A	Field duplicates (RPD) (fd)	
R0903443	SA43009-0.5B SA43-0.5B	Alkalinity, carbonate Total organic carbon	J (all detects) J (all detects)	A	Field duplicates (Difference) (fd)	

### Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R0903443

SDG	Sample	Analyte	Modified Final Concentration				
R093443	SA197-0.5B	Ammonia as N Chloride	0.54U mg/Kg 2.2U mg/Kg	A	bl		
R093443	SA64-0.5B	Ammonia as N	0.53U mg/Kg	A	bl		

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R093443	SA201-10B	Ammonia as N	0.54U mg/Kg	A	bl
R093443	SA201-28B	Total organic carbon	290U mg/Kg	A	bl
R093443	SA201009-28B	Total organic carbon	290U mg/Kg	A	bl
R093443	SA200-0.5B	Bromide	1.1U mg/Kg	A	bl

### Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R0903443

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903443	SA201-10B	Ammonia as N Chloride Nitrate as N Sulfate Surfactants	0.54U mg/Kg 62.2J+ mg/Kg 173J+ mg/Kg 103J+ mg/Kg 2.5J+ mg/Kg	A	bf
R0903443	SA201-28B	Ammonia as N Total organic carbon Chloride Sulfate Surfactants	0.91J+ mg/Kg 290U mg/Kg 128J+ mg/Kg 465J+ mg/Kg 2.5U mg/Kg	A	bf
R0903443	SA201009-28B	Ammonia as N Total organic carbon Chloride Sulfate	0.82J+ mg/Kg 290U mg/Kg 123J+ mg/Kg 483J+ mg/Kg	A	bf

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Stage 2B

SDG #: <u>R0903443</u> Laboratory: <u>Columbia Analytical Services</u>

LDC #: 21495G6

Date: <u>9/24</u> Page: <u>of</u> Reviewer: <u>2</u> 2nd Reviewer: <u>9</u>

**METHOD:** (Analyte) Alkalinity (SM2320B), Ammonia-N (EPA Method 350.1), Bromide, Chloride, Nitrate-N, Sulfate (EPA SW846 Method 9056), Nitrite-N (EPA Method 353.2), Chlorate (EPA Method 300.1), Cyanide (EPA SW846 Method 9012A), Hexavalent Chromium (EPA SW846 Method 7199), pH (EPA SW846 Method 9045D), Surfactants (SM5540C), Perchlorate (EPA Method 314.0), Total Phosphorus (EPA Method 365.1), TOC (Lloyd/Kahn)

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
١.	Technical holding times	A	Sampling dates: 6/19/09 - 6/24/05
lla.	Initial calibration	R	
lib.	Calibration verification	42	
111.	Blanks	SW	
١٧	Surrogate	5~	
v	Matrix Spike/Matrix Spike Duplicates	A	) mis/map/ vpp
VI.	Duplicates	A	> // /··
VII.	Laboratory control samples	A	Log
VIII.	Sample result verification	Ň	
IX.	Overall assessment of data	A	(
<u>X.</u>	Field duplicates	SV	(12, 13) $(14, 19)$
xı	Field blanks	42	FB=FB072109-SO (SDG: 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:

	<u> </u>						
1	SA197-0.5B	11	SA201-10B	21	SA150-0.5BMSD	31	MRS
2	SA198-0.5B	12	SA201-28B	22	SA150-0.5BDUP	32	
3	SA64-0.5B	13	SA201009-28B	23	RSAN5-0.5BMS	33	
4	SA104-0.5B	14	SA43009-0.5B	24	RSAN5-0.5BDUP	34	
5	SA129-0.5B	15	SA40-0.5B	25		35	
6	SA70-0.5B	16	SA200-0.5B	26		36	
7	SA60-0.5B	17	RSAO6-0.5B	27		37	
8	SA150-0.5B	18	SA51-0.5B	28		38	
9	RSAN5-0.5B	19	SA43-0.5B	29		39	
10	SA53-0.5B	20	SA150-0.5BMS	30		40	

Notes:

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All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1-19	(soi)	
	/	(Alk pH Br CI NO3 NO3 SOA NH3 TOC) CA (Cr ⁶⁺ T-P MBAS) TDS TSS Cond (CIO3 CIO4)
1.0 15		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
1-13, 15	Soj )	Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond (CIO4)
VL70-22	50;)	Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond CIO2 (CIO4)
22		(Ally pH Br CI/NO, NO, SO, NH, TOO (CN Crot T-P (MBAS) TDS TSS Cond CIO, CIO,
n		AIK pH Br CI NO3 NO2 SO4 NH3 TOC CN (Cr) T-P MBAS TDS TSS Cond CIO3 CIO4
20	J	All pH Br CI NO3 NO SO NH TOC CN Cre THEAS TDS TSS Cond CIO3 CIO4
$\checkmark$		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN (Cra) T-P MBAS TDS TSS Cond CIO3 CIO4
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond CIO ₃ CIO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄ Alk pH Br CI NO NO SO NH TOC CN $Cr^{6+}$ T P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄

Comments:

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LDC #: 21	SDG #:

### VALIDATION FINDINGS WORKSHEET Calibration

of _ M Page: 2nd Reviewer: Reviewer:

METHOD: Inorganics, EPA Method_

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

Were all instruments calibrated daily, each set-up time, and were the proper number of standards used? (Y)N N/A

Were all initial and continuing calibration verification percent recoveries (%R) within the control limits of 90-110% ?

Are all correlation coefficients >0.595 ? Y N N/A

EVEL IV/D ONLY:

Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recaluculation Worksheet for recalulations. Was a balance check conducted prior to the TDS analysis.? X N N X X N N X X N N X

Was the titrant normality checked?

		TT	Τ	Π	Π	Π	Т	T	T	T	Т	٦	Π	Τ	T	Т	Τ	٦	ł
Qualifications	J-/40/P(c)	3- 42/2 (2)																	
Associated Samples	61-12,61-11	9.8.9 10 20 22																	
%R	89.3	£3	80	00															
Analyte	1.0	N=-N		>															
Calibration ID	cel	cod cism)	./ (11.24.24	ac 1 200															
Date	6 30 05	61261-9-1		11															<u> </u>
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SDG #: See Cover LDC #: 21495G6

## VALIDATION FINDINGS WORKSHEET **Blanks**

Page: 1_of 3 ٩ 2nd Reviewer: Reviewer:__

METHOD: Inorganics, Method See Cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Reason Code: bl  $\underline{O}$  N N/A. Were all samples associated with a given method blank? Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.

Conc. units: mg/Kg	s: mg/Kg				Associated Samples: 1-6	Samples:	1-6				
Analyte	Blank ID	Maximum	Blank					Sample Identification	ntification		
	MB	ICB/CCB (mg/L)	Action Limit	-	3						
Total AIK	20	1.1	200								
Bicarb. AlK	20		200								
NH3-N	0.18			0.13 / 0.54 0.08 / 0	0.08 / 0.53		-				
ō	0.9			2.0/2.2							
NO3-N	0.45										

Conc. units: mg/Kg

Associated Samples: 7-10 (>RL)

Analyte	Blank ID	Maximum ICB/CCB	Blank Action	Sample Identification
	MB	(mg/L)	Limit	
Total AIK	10	0.5		
Bicarb. AIK	10			
Ū	0.9			
NO3-N	0.45			

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SDG #: See Cover LDC #: 21495G6

## VALIDATION FINDINGS WORKSHEET Blanks

Page: 2013 2nd Reviewer: Reviewer:__

METHOD: Inorganics, Method See Cover

Prease see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Reason Code: bl X N N/A Were all samples associated with a given method blank? X N N/A Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.

Conc. units: <u>mg/Kg</u>	mg/Kg			Associated Samples: <u>11-19 except Total Alk*1:</u> 11-16, Total Alk*2: 17-19, NH3-N: 7-17,19	19
Analyte	Blank ID	Maximum ICB/CCB	Blank Action Limit		
	MB	(mg/L)		1	
Total AIK*1	15	0.5			
Total AIK*2		1.0			
Bicarb. AlK	15				
Ū	-				
NH3-N		0.0094		0.11 / 0.54	

Conc. units: mg/Kg	mg/Kg				Associated Samples: <u>T-P</u> : All, TOC*1: 1-10, TOC*2:11-13, 15-19, TOC*3:14	Samples:	T-P: All, TOC	*1: 1-10, TO(	C*2:11-13, 15	-19, TOC*3:1	4	
Analyte	Blank ID	Maximum ICB/CCB	Blank Maximum Blank ID ICB/CCB Action Limit					Sample Ide	Sample Identification			
	MB	(mg/L)		12	13							
Т-Р	1.3											
TOC*1	60	60 45.0 mg/Kg										
TOC*2	50			270 / 290	270 / 290							
TOC*3	50	50 58.1 mg/Kg										

IC #: 21495G6	IG #: See Cover
ГРС	SDG

## VALIDATION FINDINGS WORKSHEET <u>Blanks</u>

Page: _____of__ 2nd Reviewer:____ Reviewer:

METHOD: Inorganics, Method See Cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Reason Code: bl N N/A Were all samples associated with a given method blank? N N/A Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.

### Associated Samples: CI*1:1-4,CI*2: 5,6,CI*3:7-10, CI*4:11,14,15,17,19, CI*5:12,13,16,18 Sample Identification 2.0/2.2 Action Limit Blank Maximum ICB/CCB (mg/L) 0.169 0.109 0.153 0.099 0.097 Blank ID Conc. units: mg/Kg MB Analyte Cl*3 CI*4 CI*5 Cl*2 CI*1

Conc. units: mg/Kg

Associated Samples: Br*1:1-6, Br*2:7-10,Br*3:11-17

Analyte	Blank ID	Maximum ICB/CCB	Maximum Blank ICB/CCB Action Limit	k Limit
	MB	(mg/L)		16
Br*1		0.052		
Br*2		0.045		
Br*3		0.064		0.3/1.1

LDC #: 21495G6 SDG #: See Cover

## VALIDATION FINDINGS WORKSHEET <u>Field Blanks</u>

Y Page: Lof 2nd Reviewer: Reviewer:___

METHOD: Inorganics, MethodSee CoverYN/AWere field blanks identified in this SDG?N/AWere target analytes detected in the field blanks?N/AWere target analytes detected in the field blanks?Blank units:mg/LSampling date:7/21/09Field blank type: (circle one) Field Blank / Rinsate / Other. FB

Reason Code: bf

Associated Samples: 11-13

Analyte	Blank ID					Sample Ide	Sample Identification		
	FB072109-SO	Action Level	11	12	13				
Ammonia as N	0.191	19.1	0.11 / 0.54	0.91 J+	0.82 J+				
TOC (average)	0.5			270 / 290	270 / 290			 	
G	9.7	970	62.2 J+	128 J+	123 J+				
Nitrate as N	1.76	176	173 J+						
pH (pH Units)	3.36								
Total Phosphorus	0.01							 	
Sulfate	5.5	550	103 J+	465 J+	483 J+				
Surfactants	0.159	15.9	2.5 J+	1.4 / 2.5					

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## VALIDATION FINDINDS WORKSHEET **Surrogate Recovery**

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

**METHOD:** Chlorate (EPA <u>300.1)</u> Are surrogates required by the method? Yes  $\sqrt{}$  or No Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

<u>Y'N'N'A</u>	Did all surrogate recoveries (%R) meet the QC limits?	'eries (%R) m	eet the QC limits'	č		
# Date	Lab ID/Reference	Column	Surrogate Compound	%R (Limits)	Associated Samples	Qualifications
18/02	4		V BCA-A	76 (90-115		T/r/A (2)
				)		(menu)
				)		
				)		
				)	(	
				)		
				)	(	
				)		
				)	(	
				)		
				)	(	
				)	(	
				)	(	
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				_		
				)	(	
					(	
				)	(	
				)	(	
				)	(	
				)		
Letter Designation		Surrogate Compound	Recovery	Recovery QC Limits (Soil)	Recovery QC Limits (Water)	Comments
A )	/ Dichloroacetate	ate				
B						

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### VALIDATION FINDINGS WORKSHEET Field Duplicates

Page: _____ of ____ Reviewer: ______ 2nd Reviewer: ______

Inorganics, Method<u>See Cover</u>



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

	Concentrati	on (mg/Kg)				Qualification
Analyte	12	13	RPD (≤50)	Difference	Limits	(Parent only)
Ammonia as N	0.91	0.82		0.09	(≤0.64)	
Total Alkalinity	685	739	8			
Bicarbonate Alkalinity	675	725	7			
Carbonate Alkalinity	10	13		3	(≤25)	
Chloride	128	123	4			
Nitrate as N	213	212	0			
Nitrite as N	1.56	1.62	4			
pH (pH Units)	8.33	8.37	0			
Sulfate	465	483	4			
Surfactants	1.4	0.7U		0.7	(≤2.5)	
тос	270	270		0	(≤290)	
Total Phosphorus	606	650	7			
Chlorate (ug/Kg)	2610	2920	11			
Perchlorate (ug/Kg)	63500	72800	14			

	Concentrat	ion (mg/Kg)				Occulture
Analyte	14	19	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Total Alkalinity	1510	434	111			J det / A (fd)
Bicarbonate Alkalinity	1430	427	108			J det / A (fd)
Carbonate Alkalinity	82	7		75	(≤22)	J det / A (fd)

### VALIDATION FINDINGS WORKSHEET **Field Duplicates**

Page: 2 Reviewer: 2nd Reviewer:

Inorganics, Method_See Cover____

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

Y N NA

	Concentrati	on (mg/Kg)				Qualification
Analyte	14	19	RPD (≤50)	Difference	Limits	(Parent only)
Chloride	37.8	37.3	1			
Hexavalent Chromium	0.34	0.19U		0.15	(≤0.43)	
Hexavalent Chromium	0.31	0.19U		0.12	(≤0.43)	
Nitrate as N	7.49	7.01	7			
pH (pH Units)	9.50	9.49	0			
Sulfate	350	329	6			
Surfactants	1.9	2.4		0.5	(≤2.2)	
тос	7600	25300		17700	(≤2100)	J det / A (fd)
Total Phosphorus	413	514	22			
Chlorate (ug/Kg)	2080	2040	2			
Perchlorate (ug/Kg)	4410	4230	4			

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LDC#: 21495G6 SDG#: See Cover

### Laboratory Data Consultants, Inc. Data Validation Report

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

Collection Date: June 29 through June 30, 2009

LDC Report Date: October 5, 2009

Matrix: Soil

Parameters: Wet Chemistry

- Validation Level: Stage 2B
- Laboratory:

Columbia Analytical Services, Inc.

### Sample Delivery Group (SDG): R0903615

### Sample Identification

SA45-0.5B SA106-0.5BREDUP SA452009-0.5B SA187-0.5B SA153-0.5B SA186-0.5B SA185-0.5B **RSAO5-0.5B** SA152-10B SA152-20B SA152-34B SA50-0.5B SA54-0.5B SA106-0.5B SA106-0.5BRE SA102-0.5B SA109-0.5B SA106-0.5BMS SA106-0.5BMSD SA106-0.5BDUP SA106-0.5BREMS

### Introduction

This data review covers 21 soil samples listed on the cover sheet. The analyses were per Standard Method 2320B for Alkalinity, EPA Method 350.1 for Ammonia as Nitrogen, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 353.2 for Nitrite as Nitrogen, EPA 300.1 for Chlorate, EPA SW 846 Method 9012A for Cyanide, EPA SW 846 Method 7199 for Hexavalent Chromium, EPA SW 846 Method 9045D for pH, Standard Method 5540C for Surfactants, EPA Method 314.0 for Perchlorate, EPA Method 365.1 for Total Phosphorus, and Lloyd/Kahn Method for Total Organic Carbon.

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

Field duplicates are summarized in Section X.

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. Calibration

Calibration verification frequency and analysis criteria were met for each method when applicable with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
7/9/09	ccv	Total organic carbon	85.6 (90-110)	SA152-34B SA50-0.5B SA54-0.5B SA106-0.5B SA102-0.5B SA109-0.5B SA106-0.5BMS SA106-0.5BDUP	J- (all detects) UJ (all non-detects)	Ρ
7/7/09	ccv	Surfactants	114 (90-110)	SA45-0.5B SA452009-0.5B SA187-0.5B SA185-0.5B SA186-0.5B SA185-0.5B RSA05-0.5B SA152-10B SA152-20B SA152-34B	J+ (all detects)	Ρ
7/7/09	CCV	Surfactants	112 (90-110)	SA45-0.5B SA452009-0.5B SA187-0.5B SA185-0.5B SA186-0.5B SA185-0.5B RSA05-0.5B SA152-10B SA152-20B SA152-34B	J+ (all detects)	Ρ

### III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Concentration	Associated Samples
MB	Alkalinity, total Alkalinity, bicarbonate Chloride	12 mg/Kg 12 mg/Kg 0.9 mg/Kg	SA45-0.5B SA452009-0.5B SA187-0.5B SA153-0.5B SA186-0.5B SA185-0.5B RSAO5-0.5B SA152-10B SA152-20B SA152-34B
ICB/CCB	Alkalinity, total	1.0 mg/L	SA45-0.5B SA452009-0.5B SA187-0.5B SA153-0.5B SA186-0.5B SA185-0.5B RSA05-0.5B SA152-10B SA152-20B SA152-20B SA152-34B SA50-0.5B SA54-0.5B
MB	Total phosphorus	1.3 mg/Kg	SA45-0.5B SA452009-0.5B
MB	Total phosphorus	1.6 mg/Kg	SA187-0.5B SA153-0.5B SA153-0.5B SA186-0.5B SA185-0.5B RSA05-0.5B SA152-10B SA152-20B SA152-20B SA152-34B SA50-0.5B SA54-0.5B SA106-0.5B SA102-0.5B SA109-0.5B
MB	Total organic carbon	120 mg/Kg	SA45-0.5B SA452009-0.5B SA187-0.5B SA153-0.5B SA186-0.5B SA185-0.5B RSA05-0.5B SA152-10B SA152-20B
MB	Total organic carbon	130 mg/Kg	SA152-34B SA50-0.5B SA54-0.5B SA106-0.5B SA102-0.5B SA102-0.5B SA109-0.5B

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Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Total organic carbon	76.3 mg/Kg	SA45-0.5B SA452009-0.5B SA187-0.5B SA153-0.5B SA186-0.5B SA185-0.5B RSA05-0.5B SA152-10B SA152-20B
ICB/CCB	Total organic carbon	143 mg/Kg	SA152-34B SA50-0.5B SA54-0.5B SA106-0.5B SA102-0.5B SA109-0.5B
МВ	Alkalinity, total Alkalinity, bicarbonate Chloride Nitrate as N	15 mg/Kg 15 mg/Kg 1.1 mg/Kg 0.45 mg/Kg	SA50-0.5B SA54-0.5B SA106-0.5B SA102-0.5B SA109-0.5B
ICB/CCB	Alkalinity, total	0.9 mg/L	SA106-0.5B SA102-0.5B SA109-0.5B
ICB/CCB	Chloride	0.098 mg/L	SA185-0.5B
ICB/CCB	Chloride	0.106 mg/L	SA54-0.5B SA109-0.5B
ICB/CCB	Chloride	0.130 mg/L	SA45-0.5B SA452009-0.5B SA187-0.5B SA186-0.5B
ICB/CCB	Chloride	0.137 mg/L	RSAO5-0.5B SA152-10B SA152-34B SA50-0.5B SA106-0.5B
ICB/CCB	Chloride	0.131 mg/L	SA153-0.5B SA152-20B
ICB/CCB	Chloride	0.139 mg/L	SA102-0.5B

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 contaminant concentrations were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
FB072109-SO	7/21/09	Ammonia as N Total organic carbon Chloride Nitrate as N pH Total phosphorus Sulfate Surfactants	0.191 mg/L 0.5 mg/L 9.7 mg/L 1.76 mg/L 3.36 mg/L 0.01 mg/L 5.5 mg/L 0.159 mg/L	SA152-10B SA152-20B SA152-34B

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

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA152-10B	Chloride	257 mg/Kg	257J+ mg/Kg
	Nitrate as N	5.13 mg/Kg	5.13J+ mg/Kg
	Sulfate	110 mg/Kg	110J+ mg/Kg
	Surfactants	1.5 mg/Kg	2.2U mg/Kg
SA152-20B	Chloride	395 mg/Kg	395J+ mg/Kg
	Nitrate as N	1.12 mg/Kg	1.12J+ mg/Kg
	Sulfate	121 mg/Kg	121J+ mg/Kg
	Surfactants	1.4 mg/Kg	2.1U mg/Kg
SA152-34B	Nitrate as N	1.47 mg/Kg	1.47J+ mg/Kg
	Surfactants	1.8 mg/Kg	3.0U mg/Kg

### IV. Matrix Spike/Matrix Spike Duplicates

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

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
SA106-0.5BMS (SA45-0.5B SA452009-0.5B SA187-0.5B SA185-0.5B SA185-0.5B RSA05-0.5B SA50-0.5B SA50-0.5B SA50-0.5B SA54-0.5B SA106-0.5B SA102-0.5B SA109-0.5B)	Cyanide	0 (75-125)	-	-	J- (all detects) R (all non-detects)	A
SA106-0.5BMS (SA45-0.5B SA452009-0.5B SA187-0.5B SA187-0.5B SA186-0.5B SA186-0.5B SA185-0.5B RSAO5-0.5B SA50-0.5B SA50-0.5B SA106-0.5B SA102-0.5B SA109-0.5B)	Total phosphorus	72 (75-125)	-	-	J- (all detects) UJ (all non-detects)	A
SA106-0.5BMS (SA106-0.5B)	Hexavalent chromium (7/16/09 12:04) Hexavalent chromium (7/16/09 11:54)	132 (75-125) 136 (75-125)	- -	- -	J+ (all detects) J+ (all detects)	А

### V. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (Limits)	Difference (Limits)	Flag	A or P
SA106-0.5BDUP (SA106-0.5B)	Hexavalent chromium (7/16/09 10:10)	33 (≤20)	-	J (all detects) UJ (all non-detects)	A
	Hexavalent chromium (7/16/09 10:20)	34 (≤20)	-	J (all detects) UJ (all non-detects)	

### VI. Laboratory Control Samples

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

LCS ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
LCS2	Bromide	111 (90-110)	SA50-0.5B SA54-0.5B SA106-0.5B SA102-0.5B SA109-0.5B	J+ (all detects)	Р

### VII. Surrogates

Surrogates were added to all samples and blanks as required by method 300.1. All surrogate recoveries (%R) were within QC limits.

### VIII. Sample Result Verification and Project Quantitation Limit

All analytes reported below the PQL were qualified as follows:

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

Raw data were not reviewed for this SDG.

### IX. Overall Assessment

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
SA106-0.5B	Hexavalent chromium	Х	A

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

### X. Field Duplicates

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

	Conce	ntration				
Analyte	SA45-0.5B	SA452009-0.5B	RPD (Limits)	Difference (Limits)	Flag	A or P
Ammonia as N	2.53 mg/Kg	2.42 mg/Kg	-	0.11 (≤0.53)	-	-
Alkalinity, total	147 mg/Kg	134 mg/Kg	9 (≤50)	-	-	-
Alkalinity, bicarbonate	147 mg/Kg	134 mg/Kg	9 (≤50)	-	-	-
Chloride	2960 mg/Kg	2860 mg/Kg	3 (≤50)	-	-	-
Hexavalent chromium	0.78 mg/Kg	2.93 mg/Kg	-	2.15 (≤0.42)	J (all detects)	A
Hexavalent chromium	0.82 mg/Kg	3.34 mg/Kg	-	2.52 (≤0.42)	J (all detects)	А
Nitrate as N	40.6 mg/Kg	41.1 mg/Kg	1 (≤50)	-	-	-
Nitrite as N	0.14 mg/Kg	0.15 mg/Kg	ter	0.01 (≤0.11)	-	-
рН	8.17 units	8.11 units	1 (≤50)	-	-	-
Sulfate	6190 mg/Kg	6250 mg/Kg	1 (≤50)	-	-	-
Surfactants	8.5 mg/Kg	6.0 mg/Kg	34 (≤50)	-	-	-
Total cyanide	0.42U mg/Kg	0.7 mg/Kg	-	0.28 (≤1.0)	-	-
Total organic carbon	5400 mg/Kg	4800 mg/Kg	-	600 (≤1700)	-	-
Total phosphorus	856 mg/Kg	956 mg/Kg	11 (≤50)	-	-	-
Chlorate	8720000 ug/Kg	8010000 ug/Kg	8 (≤50)	-	-	-
Perchlorate	481000 ug/Kg	450000 ug/Kg	7 (≤50)	-	-	-

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### Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R0903615

SDG	Sample	Analyte	Flag	A or P	Reason
R0903615	SA152-34B SA50-0.5B SA54-0.5B SA106-0.5B SA102-0.5B SA109-0.5B	Total organic carbon	J- (all detects) UJ (all non-detects)	Р	Calibration (CCV %R) (c)
R0903615	SA45-0.5B SA452009-0.5B SA187-0.5B SA153-0.5B SA186-0.5B SA185-0.5B RSA05-0.5B SA152-10B SA152-20B SA152-34B	Surfactants	J+ (all detects)	Ρ	Calibration (CCV %R) (c)
R0903615	SA45-0.5B SA452009-0.5B SA187-0.5B SA185-0.5B SA185-0.5B RSA05-0.5B SA50-0.5B SA50-0.5B SA54-0.5B SA106-0.5B SA102-0.5B SA109-0.5B	Cyanide	J- (all detects) R (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R) (m)
R0903615	SA45-0.5B SA452009-0.5B SA187-0.5B SA153-0.5B SA186-0.5B SA185-0.5B RSAO5-0.5B SA50-0.5B SA50-0.5B SA54-0.5B SA106-0.5B SA102-0.5B SA109-0.5B	Total phosphorus	J- (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R) (m)
R0903615	SA106-0.5B	Hexavalent chromium (7/16/09 12:04) Hexavalent chromium (7/16/09 11:54)	J+ (all detects) J+ (all detects)	A	Matrix spike/Matrix spike duplicates (%R) (m)
R0903615	SA106-0.5B	Hexavalent chromium (7/16/09 10:10) Hexavalent chromium (7/16/09 10:20)	J (all detects) UJ (all non-detects) J (all detects) UJ (all non-detects)	A	Duplicate sample analysis (RPD) (Id)

SDG	Sample	Analyte	Flag	A or P	Reason
R0903615	SA50-0.5B SA54-0.5B SA106-0.5B SA102-0.5B SA109-0.5B	Bromide	J+ (all detects)	Ρ	Laboratory control samples (%R) (I)
R0903615	SA45-0.5B SA452009-0.5B SA187-0.5B SA153-0.5B SA186-0.5B SA185-0.5B SA185-0.5B SA152-10B SA152-34B SA52-0.5B SA54-0.5B SA54-0.5B SA106-0.5B SA106-0.5B SA106-0.5B SA102-0.5B SA109-0.5B	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)
R0903615	SA106-0.5B	Hexavalent chromium	х	A	Overall assessment of data (o)
R0903615	SA45-0.5B SA452009-0.5B	Hexavalent chromium	J (all detects)	A	Field duplicates (Difference) (fd)

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R0903615

No Sample Data Qualified in this SDG

### Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R0903615

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903615	SA152-10B	Chloride Nitrate as N Sulfate Surfactants	257J+ mg/Kg 5.13J+ mg/Kg 110J+ mg/Kg 2.2U mg/Kg	A	bf
R0903615	SA152-20B	Chloride Nitrate as N Sulfate Surfactants	395J+ mg/Kg 1.12J+ mg/Kg 121J+ mg/Kg 2.1U mg/Kg	A	bf

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903615	SA152-34B	Nitrate as N Surfactants	1.47J+ mg/Kg 3.0U mg/Kg	A	bf

Tronox Northgate Henderson
ALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: 21495H6 SDG #: R0903615

### Laboratory: Columbia Analytical Services

Date:_	9/23/
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METHOD: (Analyte) Alkalinity (SM2320B), Ammonia-N (EPA Method 350.1), Bromide, Chloride, Nitrate-N, Sulfate (EPA SW846 Method 9056), Nitrite-N (EPA Method 353.2), Chlorate (EPA Method 300.1), Cyanide (EPA SW846 Method 9012A), Hexavalent Chromium (EPA SW846 Method 7199), pH (EPA SW846 Method 9045D), Surfactants (SM5540C), Perchlorate (EPA Method 314.0), Total Phosphorus (EPA Method 365.1), TOC (Lloyd/Kahn)

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

	Validatio	on Area	L				Comm	ents		· · · · · · · · · · · · · · · · · · ·
1.	Technical holding times			A	Sampling c	ates: 6/29/	096	30/	۰ ۲	
lla	Initial calibration			A.					/	
llb	. Calibration verification			5~						
.	Blanks			Sw						
	Matrix Spike/Matrix Spike	Duplicat	tes	5W	JMS	1450/1000				
v	Duplicates			Sweet	3	/ / /				
VI.	Laboratory control sample	es	1 1 1 1 1 1 1 1	SW	Les					
VII	. Sample result verification	)		N J	/					
VIII	. Overall assessment of da	ata		SWA STO	1					
IX.	Field duplicates			Św	(1,2)					
Lx	Eield blanks			gn/	EB=FB072	109-SO (SDG: R0	904016)			
Valida	N = Not provided/applica SW = See worksheet ited Samples: ၄၀ ၊	ble	R = Rin FB = Fi	sate eld blank		TB = Trip EB = Equi	blank pment blan	k		
1	SA45-0.5B	11	SA50-0.5B		21	SA 106-05	3RERp	31	MUS	
2	SA452009-0.5B	12	SA54-0.5B		22	5A106-0.51	SREMS	32		
3	SA187-0.5 B	13	SA106-0.5B		23	J J	1 víp	33		
4	SA153-0.5B	14	SA106-0.5BR	E	24			34		
5	SA186-0.5B	15	SA102-0.5B		25			35		
6	SA185-0.5B	16	SA109-0.5B		26			36		
7	RSA05-0.5B	17	SA106-0.5BN	15	27			37		
8	SA152-10B	18	SA106-0.5BN	ISD	28			38		
9	SA152-20B	19	SA106-0.5BD	UP	29			39		
10	SA152-34B	20		eps-	30	· · · ·		40		
Note	s: <u>Gunnozit 2 f</u>	<u>}</u>								

Page:__ Reviewer: 2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1-13.15.16		(Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS) TDS TSS Cond (CIO3 CIO4)
14	J	Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $(Cr^{6+})$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄ Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
~17-19	ς.;]	Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁵⁺ T-P MBAS TDS TSS Cond $\overline{ClO_3}$ $\overline{ClO_4}$
frest		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $(M_{1})^{-1}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
19		Alk pH B(C/NO3 NO) SO2 NH3 TOC CN CP T-P(MBAS) TDS TSS Cond CIO3 CIO4
J'n		$\begin{array}{c} \text{Alk} \text{ pr} (G(NO_3 (NO_2 (SO_4 (NH_3 (OC (CN (CP (T-P) (NBAS TDS TSS Cond CIO_3 CIO_4 (CIO_4 (CIO_3 CIO_4 (CIO_4 (C$
mez	-V	
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $C^{\text{s}+}$ T-P MBAS TDS TSS Cond CIO ₃ CIO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond CIO ₃ CIO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{s+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄

Comments:_____

Sel can LDC #: >149546 SDG #:

VALIDATION FINDINGS WORKSHEET **Calibration** 

\$ o Z Page: Reviewer: 2nd Reviewer:

Ler court METHOD: Inorganics, EPA Method_ Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Were all instruments calibrated daily, each set-up time, and were the proper number of standards used? Were all initial and continuing calibration verification percent recoveries (%R) within the control limits of 90-110% ?

Are all correlation coefficients >0.995 ? Y N N/A V N/A

CEVEL IV/D ONLY:

Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recaluculation Worksheet for recalulations. Was a balance check conducted prior to the TDS analysis.? Was the titrant normality checked? Y N/N/À

Y N NY

Qualifications	J-1m2/0 (c)		Juty Cc)	2									
Associated Samples	10-13, 15, 16, 11, 19		01-10	7									
%Β	85.6		カリ	7									
Analyte	100	-	Succestenta	5									
Calibration ID	ced		1/1/09 eer Sadowtart										
Date	601614		10/4/4	7									ients:
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### VALIDATION FINDINGS WORKSHEET **Blanks**

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METHOD: Inorganics, Method See Cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Reason Code: bl <u>Y N N/A</u> Were all samples associated with a given method blank? <u>Y N N/A</u> Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.

Associated Samples: MB: 1-10, ICB/CCB: 1-12 (>RL)

Conc. units: mg/Kg

Analyte	Blank ID	Maximum	Blank	Sample Identification
	MB	ICB/CCB (mg/L)	Action Limit	
Total AIK	12	1.0		
Bicarb. AIK	12			
G	0.9			
Conc. units: <u>mg/Kg</u>	:: mg/Kg			Associated Samples: T-P*1:1,2[T-P*2:3-13,15,16,TOC*1:1-9, TOC*2: 10-13,15,16 (>RL),
Analyte	Blank ID	Maximum	Blank	Sample Identification
	MB	ICB/CCB (mg/L)	Action Limit	
T-P*1	1.3			
T-P*2	1.6		r	
T0C*1	120	76.3 mg/Kg		
TOC*2	130	143 mg/Kg		
Conc. units: mg/Kg	:: mg/Kg			Associated Samples: <u>MB:11-13,15,16, ICB/CCB: 13, 15,16 (&gt;RL</u> )
Analyte	Blank ID	Maximum ICB/CCB	Blank Action	Sample Identification
	MB	(mg/L)	Limit	

21495H6MB.wpd

0.45

NO3-N

0.9

15 15 :-

Bicarb. AIK Total AIK

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SDG #: See Cover	Cover			Blanks	Reviewer:
METHOD: Inorganics, Method See Cover	norganics,	, Method _	See Cover		Znd Keviewer.
Please see (	qualificatic Nere all s	ons below t amples as	for all questic sociated with	Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". <u>M N/A</u> . Were all samples associated with a given method blank?	Reason Code: bl
N N/A /	Were any	inorganic (	contaminant	<u>ØN N/A</u> Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.	cations below.
Conc. units: mg/Kg	: mg/Kg			Associated Samples: <u>CI*1:6, CI*2:12,16, CI*3:1,2,3,5, CI*4:7,8,10,11,13</u> CI*5:4,9, CI*6:15 (>RL)	0,11,13 CI*5:4,9, CI*6:15 (>RL)
Analyte	Blank ID	Maximum ICB/CCB	Blank Action Limit	Sample Identification	
	MB	(mg/L)			
CI*1		0.098			
CI*2		0.106			

0.139

0.131

CI*5

CI*4

CI*6

0.137

0.130

CI*3

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# VALIDATION FINDINGS WORKSHEET

LDC #: 21495H6

Page: <u>Vof Y</u> Reviewer: U

LDC #: 21495H6 SDG #: See Cover

### VALIDATION FINDINGS WORKSHEET <u>Field Blanks</u>

Page: _____of___ 2nd Reviewer:__ Reviewer:__

 METHOD: Inorganics, Method
 See Cover

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

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

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

 Sampling date:
 7/21/09

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

Reason Code: bf

Associated Samples: 8-10

Analyte	Blank ID					Sample Identification		
	FB072109-SO	Action Level	8	6	10			
Ammonia as N	0.191	19.1						
TOC (average)	0.5							
C	9.7	970	257 J+	395 J+				
Nitrate as N	1.76	176	5.13 J+	1.12 J+	1.47 J+			
pH (pH Units)	3.36							
Total Phosphorus	0.01							
Sulfate	5.5	550	110 J+	121 J+				
Surfactants	0.159	15.9	1.5/2.2	1.4/2.1	1.8/3.0			

214957Hb	Let Com
LDC #:	SDG #:

### VALIDATION FINDINGS WORKSHEET **Matrix Spike Analysis**

3 Page: | of 2nd Reviewer: Reviewer:

**METHOD:** Inorganics, Method

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Ptease see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". <u>Y N N/A</u> Was a matrix spike analyzed for each matrix in this SDG?

Were matrix spike percent recoveries (%R) within the control limits of 75-125 (85-115% for Method 300.0)? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken. Y N N/A X/N N/A

Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations. Y N (N/A)

#	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
	861	50%		0	10	11-13 1516 [J-/k /A (m)
F			9.4 9.4	12.		4
			Lyth 1	132 # + (9/16/1	+ 11 A (tail	N
				136 ** (7/6/04 11	Itre ( Itre	
						-
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VALIDATION FINDINGS WORKSHEET **Duplicate Analysis** 

Page: Reviewer: 2nd Reviewer;

**METHOD:** Inorganics, Method

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A", Was a duplicate sample analyzed for each matrix in this SDG? YN NA YNNA

Were all duplicate sample relative percent differences (RPD) ≤ 20% for water and ≤ 35% for soil samples (≤ 10% for Method 300.0)? If no, see qualification below. A control limit of ±CRDL (±2X CRDL for soil) was used for samples that were ≤5X the CRDL, including when only one of the duplicate sample values were ≤5X the CRDL. If field blanks were used for laboratory duplicates, see overall assessment.

Ware recalculate LEVEL IV ONLY: Y N KIA

DUP.6

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<del>ار</del> :#	#: #
D	BOG

## VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

٩ Reviewer: MH Page: 2nd Reviewer:

Le con METHOD: Inorganics, Method_

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". <u>Y N N/A</u> Was a laboratory control sample (LCS) analyzed for each matrix in this SDG? <u>Y N N/A</u> Were all LCS percent recoveries (%R) within the control limits of 80-120% (85-115% for Method 300.0)? *QuL Cum*. YNNNA War YNNNA Wer LEVEL IV ONLY: YN KIA Wer

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

		(3) 1/24 10	- / ·																							
Associated Samples	1-12 12 12	9,10,12																					-			
%R (limits)	(c11-0b) 11)																									
Matrix	505																									
	100																								im ante:	1
	Mairtx Analyte %R (limits) Associated Samples	$\frac{1}{1} \frac{1}{1} \frac{1}$	LCS ID Matrix Analys LCS 2 Co. BY	LCS ID Matrix Analyte %R (limite) Associated Samples $LC5 > \zeta_{o1}$ [3 $\sqrt{11}$ ( $qo-1 ^{o}$ ) $1 -13$ , 1 $5$ , 1 $6$	LCS ID Matrix Analyte %R (limite) Associated Samples $Lc5 \ge c_{o_1}$ By [1] ( $q_{o-1} _{o}$ ) $(1-13, 15, 16$	LCS ID Matrix Analyte %R (limite) Associated Samples $LcS \ge \zeta_{0;}$ By [1] ( $qo-1 o$ ) $1 -13, 15, 16$	LCS ID Matrix Analyte <u>xR (limite)</u> Associated Samples $LCS > S_{o_1}$ By $ 1 $ ( $q_{o-1} _{0}$ ) $1 -13$ , $ 5$ , $lb$	LCS ID Matrix Analyte %R (limite) Associated Samples $LcS > \zeta_{o_i}$ By [1] ( $q_{o-1} _{o}$ ) 1]-13, 15, 16	LCS D Matrix Analytie %R (limite) Associated Samples LCS $\sum_{soi}  g_{s}  -  g_{s}    (q_{o} -  g_{o} ) -  g_{s}    S,  b $	Les D Matrix Analyte %R (limite) Associated Samples Les $\sum_{s_0:} B_{s_1} B_{s_2}$ [1] ( $q_0-1 p$ ) $1 -13, 15, 16$	Les D Matrix Analytie %R (limite) Associated Samples Les $\sum_{s_{0}} \sum_{s_{0}}  g_{y}   (q_{0} -  l^{0})  l- 3,  5, l6 $	Les D Matrix Analyte %R (limite) Associated Samples Les $\sum_{s_{0}:j}$ By 11 ( $q_{0}-1 _{0}$ ) 11-13, 15, 16	Les in Matrix Analytic SR (limites) Associated Samples Les $\sum_{i=1}^{1} \sum_{j=1}^{1} \sum_{i=1}^{1} \sum_{i=1}^{1} \sum_{i=1}^{1} \sum_{j=1}^{1} \sum_{i=1}^{1} \sum_{i=1}^{1} \sum_{j=1}^{1} \sum_{i=1}^{1} \sum_{i=$	Les to Matrix Analytia with Millel Associated Samiles Les to $\int_{S_2} \int_{S_2} \int_{S_2$	Les to Matrix Analytic SR (limite) Associated Samples LeS > Co; P > Co; P > (1 + 12, 15, 16) Le > 1 + 13, 15, 16	LCS ID Matrix Analytic XR (IIIIte) Associated Samiles LCS $C_{0;}$ $B_{y}$ $[1]$ $(9 - 1 _{0})$ $1 _{-1}S_{r}1S_{r}U_{0}$ $1 _{-1}S_{r}1S_{r}U_{0}$	LCS ID Matrix Analyte "R. (line) Associated Samples LCS $S_{0}$ $B_{V}$ $[1]$ $(9 - 1/2)$ $1 - 13$ , $15$ , $16$ $1 - 13$ , $15$ , $16$ $1 - 13$ , $15$ , $16$ $1 - 13$ , $15$ , $16$ $1 - 13$ , $15$ , $16$ $1 - 13$ , $15$ , $16$ $1 - 13$ , $12$ , $16$ $1 - 13$ , $12$ , $16$ $1 - 13$ , $12$ , $16$ $1 - 13$ , $12$ , $16$ $1 - 13$ , $12$ , $16$ $1 - 13$ , $12$ , $16$ $1 - 13$ , $12$ , $16$ $1 - 13$ , $12$ , $16$ $1 - 13$ , $12$ , $16$ $1 - 13$ , $12$ , $16$ $1 - 13$ , $12$ , $16$ $1 - 13$ , $15$ , $16$ $1 - 13$ , $15$ , $16$ $1 - 13$ , $15$ , $16$ $1 - 13$ , $15$ , $16$ $1 - 13$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$ , $12$	ICS IDMatrixAnalyo%R (limita)Associated Samples $L \in S > C_{0,j}$ $B_Y$ $(1)$ $(qo - 1/e)$ $(1-13, 15, 16)$ $(1)$ $(1)$ $(qo - 1/e)$ $(1-13, 15, 16)$ $(1-13, 15, 16)$ $(1)$ $(1)$ $(qo - 1/e)$ $(1-13, 15, 16)$ $(1)$ $(1)$ $(qo - 1/e)$ $(1-13, 15, 16)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ <td>LCS IDMatrixAnalyo%R (linta)Associated Samples$L C S &gt; S_{0,1}$$S &gt; 1$$S &gt; 1$$I = 13, 15, 16$$L C S &gt; S_{0,1}$$S &gt; 1 = 13, 15, 16$$I = 13, 15, 16$$I = 1 = 1, 12, 15, 16$$I = 13, 15, 16$$I = 1 = 1, 12, 15, 16$$I = 13, 15, 16$$I = 1 = 1, 12, 15, 16$$I = 13, 15, 16$$I = 1 = 1, 12, 15, 16$$I = 13, 15, 16$$I = 1 = 1, 12, 15, 16$$I = 13, 15, 16$$I = 1 = 1, 12, 15, 16$$I = 13, 15, 16$$I = 1 = 1, 12, 15, 16$$I = 13, 15, 16$$I = 1 = 1, 12, 12, 12, 12$$I = 13, 15, 16$$I = 1 = 1, 12, 12, 12, 12$$I = 13, 15, 16$$I = 1 = 1, 12, 12, 12, 12$$I = 13, 15, 16$$I = 1 = 1, 12, 12, 12, 12$$I = 13, 15, 16$$I = 1 = 1, 12, 12, 12, 12$$I = 13, 12, 12, 12$$I = 1, 12, 12, 12, 12, 12, 12, 12, 13, 12, 12, 12, 13, 12, 12, 12, 12, 13, 12, 12, 12, 12, 12, 12, 12, 12, 12, 12$</td> <td>LCS IDMatrixAnalyta%R (limite)Associated Samples$L \subset S &gt; \zeta_{0;1}$$B_Y$$(1)$$(7 \circ - 1) \circ$$(1 - 1) S_r$$L C$$L \subset S$$C_{0;1}$$B_Y$$(1)$$(7 \circ - 1) \circ$$(1 - 1) S_r$$L C$$L \subset S$$C_{0;1}$$B_Y$$(1)$$(7 \circ - 1) \circ$$(1 - 1) S_r$$L C$$L \subset S$$C_{0;1}$$B_Y$$(1)$$(7 \circ - 1) \circ$$(1 - 1) S_r$$L C$$L \subset S$$C_{0;1}$$B_Y$$(1)$$(7 \circ - 1) \circ$$(1 - 1) S_r$$L C$$L \subset S$$C_{0;1}$$B_Y$$(1)$$(7 \circ - 1) \circ$$(1 - 1) S_r$$L C$$L \subset S$$C_{0;1}$$B_Y$$(1)$$(7 \circ - 1) \circ$$(1 - 1) S_r$$L C$$H \subset S$$(1 - 1) S_r$$(1 - 1) S_r$$(1 - 1) S_r$$(1 - 1) S_r$$(1 - 1) S_r$$H \subset S$$(1 - 1) S_r$$(1 - 1) S_r$$(1 - 1) S_r$$(1 - 1) S_r$$(1 - 1) S_r$$H \subset S$$(1 - 1) S_r$$(1 - 1) S_r$$(1 - 1) S_r$$(1 - 1) S_r$$(1 - 1) S_r$$H \subset S$$(1 - 1) S_r$$(1 - 1) S_r$$(1 - 1) S_r$$(1 - 1) S_r$$(1 - 1) S_r$$H \subset S$$(1 - 1) S_r$$(1 - 1) S_r$$(1 - 1) S_r$$(1 - 1) S_r$$(1 - 1) S_r$$H \subset S$$(1 - 1) S_r$$(1 - 1) S_r$$(1 - 1) S_r$$(1 - 1) S_r$$(1 - 1) S_r$$H \subset S$$(1 - 1) S_r$$(1 - 1) S_r$$(1 - 1) S_r$$(1 - 1) S_r$$(1 - 1) S_r$$H \subset S$$(1 - 1) S_r$$(1 - 1) S_r$$(1 - 1) S_r$<t< td=""><td>LCS IDMatrixAnalyo%R (linte)Associated Samples$L \subset S \supset$$S_{O_1}$$B_Y$$(1)$$(\mathcal{P} \circ - 1/2)$$(1-1)_{\mathcal{F}}$$L_G$$L \subset S \supset$$S_{O_1}$$B_Y$$(1)$$(\mathcal{P} \circ - 1/2)$$(1-1)_{\mathcal{F}}$$L_G$$L \subset S \supset$$S_O_1$$B_Y$$(1)$$(\mathcal{P} \circ - 1/2)$$(1-1)_{\mathcal{F}}$$L_G$$L \subset S \supset$$S_O_1$$B_Y$$(1)$$(1)$$(1)$$(2)$$(1)$$L \subset S$$S_O_1$$(1)$$(1)$$(1)$$(1)$$(1)$$(1)$$L \subset S$$S_O_1$$(1)$$(1)$$(1)$$(2)$$(1)$$(1)$$L \subset S$$(1)$$(1)$$(1)$$(1)$$(1)$$(1)$$(1)$$L \subset S$$(2)$$(1)$$(2)$$(1)$$(1)$$(1)$$(1)$$L \subset S$$(1)$$(1)$$(1)$$(2)$$(1)$$(1)$$(1)$$(1)$$(1)$$(1)$$(1)$$(1)$$(2)$$(1)$$(1)$<t< td=""><td>LCS ID     Matrix     Analytic     SR (limite)     Associated Samples       $L \circ S &gt; \zeta_{0;}$ $S Y$ $[1]$ $(q \circ -1  \circ)$ $1[-1]_{s}$ $IS_{s}$ $P \circ S &gt; \zeta_{0;}$ $S Y$ $[1]$ $(q \circ -1  \circ)$ $1[-1]_{s}$ $IS_{s}$ $P \circ S &gt; \zeta_{0;}$ $S Y$ $[1]$ $(q \circ -1  \circ)$ $1[-1]_{s}$ $IS_{s}$ $P \circ S &gt; \zeta_{0;}$ $S Y$ $[1]$ $(q \circ -1  \circ)$ $1[-1]_{s}$ $IS_{s}$ $P \circ S &gt; \zeta_{0;}$ $S Y$ $[1]$ $(q \circ -1  \circ)$ $1[-1]_{s}$ $IS_{s}$ $P \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $[1]$ $[1]$ $P \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $[1]$ $[1]$ $P \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $[1]$ $[1]$ $[1]$ $P \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $[1]$ $[1]$ $[1]$ $P \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $[1]$ $[1]$ $[1]$ $P \circ S &gt; \zeta_{0;}$ $[1]$ $[1]$ $[1]$ $P \circ S &gt; \zeta_{0;}$ $[1]$ $[1]$ $[1]$ $P \circ S &gt; \zeta_{0;}$ $[1]$ $[1]$ $[1]$</td><td>LCSID     Mntx     Analya     SR (limita)     Associated Samples       $LCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $(11 ( q_0 - 1 ^o))$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $(11 ( q_0 - 1 ^o))$ $(11 ( q_0 - 1 ^o))$ $(11 ( q_0 - 1 ^o))$</td></t<><td>LCS ID     Matrix     Analytic     SR filmite)     Associated Samples       $LCS &gt; Cor)$ $By$ $[1]$ $(7o - 1/2)$ $1/-13$, $1S$, $1G$ $LCS &gt; Cor)$ $By$ $[1]$ $(7o - 1/2)$ $1/-13$, $1S$, $1G$ $LCS &gt; Cor)$ $By$ $[1]$ $(7o - 1/2)$ $1/-13$, $1S$, $1G$ $LCS &gt; Cor)$ $By$ $[1]$ $(7o - 1/2)$ $1/-13$, $1S$, $1G$ $I_1 = 13$ $I_2 = 10$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 13$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 10$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 10$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 10$ $I_1 = 10$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 10$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 10$, $I_1 = 10$, $I_1 = 10$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 10$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 10$, $I_2$ $I_1 = 10$, $I_2$ $I_1$</td><td>$\begin{array}{ c c c c c c c c c c c c c c c c c c c$</td><td>LCS D         Matrix         Analytic         Stantine         Associated Samples           LCS -         $\zeta_3$ $\hat{B}_1$ $(11 \ (7 \circ - 1)^2)$ $11 - 13_1 \ (5, 16)$ $11 - 13_1 \ (5, 16)$           Provide         Provide         Provide         Provide         Provide         Provide           Provide         Provide         Provide         Provide         Provide         Provide         Provide           Provide         Provide         Provide         Provide         Provide         Provide         Provide         Provide         Provide</td></td></t<></td>	LCS IDMatrixAnalyo%R (linta)Associated Samples $L C S > S_{0,1}$ $S > 1$ $S > 1$ $I = 13, 15, 16$ $L C S > S_{0,1}$ $S > 1 = 13, 15, 16$ $I = 13, 15, 16$ $I = 1 = 1, 12, 15, 16$ $I = 13, 15, 16$ $I = 1 = 1, 12, 15, 16$ $I = 13, 15, 16$ $I = 1 = 1, 12, 15, 16$ $I = 13, 15, 16$ $I = 1 = 1, 12, 15, 16$ $I = 13, 15, 16$ $I = 1 = 1, 12, 15, 16$ $I = 13, 15, 16$ $I = 1 = 1, 12, 15, 16$ $I = 13, 15, 16$ $I = 1 = 1, 12, 15, 16$ $I = 13, 15, 16$ $I = 1 = 1, 12, 12, 12, 12$ $I = 13, 15, 16$ $I = 1 = 1, 12, 12, 12, 12$ $I = 13, 15, 16$ $I = 1 = 1, 12, 12, 12, 12$ $I = 13, 15, 16$ $I = 1 = 1, 12, 12, 12, 12$ $I = 13, 15, 16$ $I = 1 = 1, 12, 12, 12, 12$ $I = 13, 12, 12, 12$ $I = 1, 12, 12, 12, 12, 12, 12, 12, 13, 12, 12, 12, 13, 12, 12, 12, 12, 13, 12, 12, 12, 12, 12, 12, 12, 12, 12, 12$	LCS IDMatrixAnalyta%R (limite)Associated Samples $L \subset S > \zeta_{0;1}$ $B_Y$ $(1)$ $(7 \circ - 1) \circ$ $(1 - 1) S_r$ $L C $ $L \subset S$ $C_{0;1}$ $B_Y$ $(1)$ $(7 \circ - 1) \circ$ $(1 - 1) S_r$ $L C $ $L \subset S$ $C_{0;1}$ $B_Y$ $(1)$ $(7 \circ - 1) \circ$ $(1 - 1) S_r$ $L C $ $L \subset S$ $C_{0;1}$ $B_Y$ $(1)$ $(7 \circ - 1) \circ$ $(1 - 1) S_r$ $L C $ $L \subset S$ $C_{0;1}$ $B_Y$ $(1)$ $(7 \circ - 1) \circ$ $(1 - 1) S_r$ $L C $ $L \subset S$ $C_{0;1}$ $B_Y$ $(1)$ $(7 \circ - 1) \circ$ $(1 - 1) S_r$ $L C $ $L \subset S$ $C_{0;1}$ $B_Y$ $(1)$ $(7 \circ - 1) \circ$ $(1 - 1) S_r$ $L C $ $H \subset S$ $(1 - 1) S_r$ $H \subset S$ $(1 - 1) S_r$ $H \subset S$ $(1 - 1) S_r$ $H \subset S$ $(1 - 1) S_r$ $H \subset S$ $(1 - 1) S_r$ $H \subset S$ $(1 - 1) S_r$ $H \subset S$ $(1 - 1) S_r$ $H \subset S$ $(1 - 1) S_r$ $(1 - 1) S_r$ $(1 - 1) S_r$ <t< td=""><td>LCS IDMatrixAnalyo%R (linte)Associated Samples$L \subset S \supset$$S_{O_1}$$B_Y$$(1)$$(\mathcal{P} \circ - 1/2)$$(1-1)_{\mathcal{F}}$$L_G$$L \subset S \supset$$S_{O_1}$$B_Y$$(1)$$(\mathcal{P} \circ - 1/2)$$(1-1)_{\mathcal{F}}$$L_G$$L \subset S \supset$$S_O_1$$B_Y$$(1)$$(\mathcal{P} \circ - 1/2)$$(1-1)_{\mathcal{F}}$$L_G$$L \subset S \supset$$S_O_1$$B_Y$$(1)$$(1)$$(1)$$(2)$$(1)$$L \subset S$$S_O_1$$(1)$$(1)$$(1)$$(1)$$(1)$$(1)$$L \subset S$$S_O_1$$(1)$$(1)$$(1)$$(2)$$(1)$$(1)$$L \subset S$$(1)$$(1)$$(1)$$(1)$$(1)$$(1)$$(1)$$L \subset S$$(2)$$(1)$$(2)$$(1)$$(1)$$(1)$$(1)$$L \subset S$$(1)$$(1)$$(1)$$(2)$$(1)$$(1)$$(1)$$(1)$$(1)$$(1)$$(1)$$(1)$$(2)$$(1)$$(1)$<t< td=""><td>LCS ID     Matrix     Analytic     SR (limite)     Associated Samples       $L \circ S &gt; \zeta_{0;}$ $S Y$ $[1]$ $(q \circ -1  \circ)$ $1[-1]_{s}$ $IS_{s}$ $P \circ S &gt; \zeta_{0;}$ $S Y$ $[1]$ $(q \circ -1  \circ)$ $1[-1]_{s}$ $IS_{s}$ $P \circ S &gt; \zeta_{0;}$ $S Y$ $[1]$ $(q \circ -1  \circ)$ $1[-1]_{s}$ $IS_{s}$ $P \circ S &gt; \zeta_{0;}$ $S Y$ $[1]$ $(q \circ -1  \circ)$ $1[-1]_{s}$ $IS_{s}$ $P \circ S &gt; \zeta_{0;}$ $S Y$ $[1]$ $(q \circ -1  \circ)$ $1[-1]_{s}$ $IS_{s}$ $P \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $[1]$ $[1]$ $P \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $[1]$ $[1]$ $P \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $[1]$ $[1]$ $[1]$ $P \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $[1]$ $[1]$ $[1]$ $P \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $[1]$ $[1]$ $[1]$ $P \circ S &gt; \zeta_{0;}$ $[1]$ $[1]$ $[1]$ $P \circ S &gt; \zeta_{0;}$ $[1]$ $[1]$ $[1]$ $P \circ S &gt; \zeta_{0;}$ $[1]$ $[1]$ $[1]$</td><td>LCSID     Mntx     Analya     SR (limita)     Associated Samples       $LCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $(11 ( q_0 - 1 ^o))$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $(11 ( q_0 - 1 ^o))$ $(11 ( q_0 - 1 ^o))$ $(11 ( q_0 - 1 ^o))$</td></t<><td>LCS ID     Matrix     Analytic     SR filmite)     Associated Samples       $LCS &gt; Cor)$ $By$ $[1]$ $(7o - 1/2)$ $1/-13$, $1S$, $1G$ $LCS &gt; Cor)$ $By$ $[1]$ $(7o - 1/2)$ $1/-13$, $1S$, $1G$ $LCS &gt; Cor)$ $By$ $[1]$ $(7o - 1/2)$ $1/-13$, $1S$, $1G$ $LCS &gt; Cor)$ $By$ $[1]$ $(7o - 1/2)$ $1/-13$, $1S$, $1G$ $I_1 = 13$ $I_2 = 10$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 13$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 10$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 10$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 10$ $I_1 = 10$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 10$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 10$, $I_1 = 10$, $I_1 = 10$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 10$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 10$, $I_2$ $I_1 = 10$, $I_2$ $I_1$</td><td>$\begin{array}{ c c c c c c c c c c c c c c c c c c c$</td><td>LCS D         Matrix         Analytic         Stantine         Associated Samples           LCS -         $\zeta_3$ $\hat{B}_1$ $(11 \ (7 \circ - 1)^2)$ $11 - 13_1 \ (5, 16)$ $11 - 13_1 \ (5, 16)$           Provide         Provide         Provide         Provide         Provide         Provide           Provide         Provide         Provide         Provide         Provide         Provide         Provide           Provide         Provide         Provide         Provide         Provide         Provide         Provide         Provide         Provide</td></td></t<>	LCS IDMatrixAnalyo%R (linte)Associated Samples $L \subset S \supset$ $S_{O_1}$ $B_Y$ $(1)$ $(\mathcal{P} \circ - 1/2)$ $(1-1)_{\mathcal{F}}$ $L_G$ $L \subset S \supset$ $S_{O_1}$ $B_Y$ $(1)$ $(\mathcal{P} \circ - 1/2)$ $(1-1)_{\mathcal{F}}$ $L_G$ $L \subset S \supset$ $S_O_1$ $B_Y$ $(1)$ $(\mathcal{P} \circ - 1/2)$ $(1-1)_{\mathcal{F}}$ $L_G$ $L \subset S \supset$ $S_O_1$ $B_Y$ $(1)$ $(\mathcal{P} \circ - 1/2)$ $(1-1)_{\mathcal{F}}$ $L_G$ $L \subset S \supset$ $S_O_1$ $B_Y$ $(1)$ $(\mathcal{P} \circ - 1/2)$ $(1-1)_{\mathcal{F}}$ $L_G$ $L \subset S \supset$ $S_O_1$ $B_Y$ $(1)$ $(\mathcal{P} \circ - 1/2)$ $(1-1)_{\mathcal{F}}$ $L_G$ $L \subset S \supset$ $S_O_1$ $B_Y$ $(1)$ $(\mathcal{P} \circ - 1/2)$ $(1-1)_{\mathcal{F}}$ $L_G$ $L \subset S \supset$ $S_O_1$ $B_Y$ $(1)$ $(\mathcal{P} \circ - 1/2)$ $(1-1)_{\mathcal{F}}$ $L_G$ $L \subset S \supset$ $S_O_1$ $B_Y$ $(1)$ $(1)$ $(1)$ $(2)$ $(1)$ $L \subset S$ $S_O_1$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $L \subset S$ $S_O_1$ $(1)$ $(1)$ $(1)$ $(2)$ $(1)$ $(1)$ $L \subset S$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $L \subset S$ $(2)$ $(1)$ $(2)$ $(1)$ $(1)$ $(1)$ $(1)$ $L \subset S$ $(1)$ $(1)$ $(1)$ $(2)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(1)$ $(2)$ $(1)$ $(1)$ <t< td=""><td>LCS ID     Matrix     Analytic     SR (limite)     Associated Samples       $L \circ S &gt; \zeta_{0;}$ $S Y$ $[1]$ $(q \circ -1  \circ)$ $1[-1]_{s}$ $IS_{s}$ $P \circ S &gt; \zeta_{0;}$ $S Y$ $[1]$ $(q \circ -1  \circ)$ $1[-1]_{s}$ $IS_{s}$ $P \circ S &gt; \zeta_{0;}$ $S Y$ $[1]$ $(q \circ -1  \circ)$ $1[-1]_{s}$ $IS_{s}$ $P \circ S &gt; \zeta_{0;}$ $S Y$ $[1]$ $(q \circ -1  \circ)$ $1[-1]_{s}$ $IS_{s}$ $P \circ S &gt; \zeta_{0;}$ $S Y$ $[1]$ $(q \circ -1  \circ)$ $1[-1]_{s}$ $IS_{s}$ $P \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $[1]$ $[1]$ $P \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $[1]$ $[1]$ $P \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $[1]$ $[1]$ $[1]$ $P \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $[1]$ $[1]$ $[1]$ $P \circ S &gt; \zeta_{0;}$ $S \circ S &gt; \zeta_{0;}$ $[1]$ $[1]$ $[1]$ $P \circ S &gt; \zeta_{0;}$ $[1]$ $[1]$ $[1]$ $P \circ S &gt; \zeta_{0;}$ $[1]$ $[1]$ $[1]$ $P \circ S &gt; \zeta_{0;}$ $[1]$ $[1]$ $[1]$</td><td>LCSID     Mntx     Analya     SR (limita)     Associated Samples       $LCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $(11 ( q_0 - 1 ^o))$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 15_{r}, 16$ $PCS &gt; C_{0,1}$ $(11 ( q_0 - 1 ^o))$ $(11 ( q_0 - 1 ^o))$ $(11 ( q_0 - 1 ^o))$</td></t<> <td>LCS ID     Matrix     Analytic     SR filmite)     Associated Samples       $LCS &gt; Cor)$ $By$ $[1]$ $(7o - 1/2)$ $1/-13$, $1S$, $1G$ $LCS &gt; Cor)$ $By$ $[1]$ $(7o - 1/2)$ $1/-13$, $1S$, $1G$ $LCS &gt; Cor)$ $By$ $[1]$ $(7o - 1/2)$ $1/-13$, $1S$, $1G$ $LCS &gt; Cor)$ $By$ $[1]$ $(7o - 1/2)$ $1/-13$, $1S$, $1G$ $I_1 = 13$ $I_2 = 10$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 13$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 10$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 10$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 10$ $I_1 = 10$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 10$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 10$, $I_1 = 10$, $I_1 = 10$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 10$, $I_2$ $I_1 = 13$, $I_2$ $I_1 = 10$ $I_1 = 10$, $I_2$ $I_1 = 10$, $I_2$ $I_1$</td> <td>$\begin{array}{ c c c c c c c c c c c c c c c c c c c$</td> <td>LCS D         Matrix         Analytic         Stantine         Associated Samples           LCS -         $\zeta_3$ $\hat{B}_1$ $(11 \ (7 \circ - 1)^2)$ $11 - 13_1 \ (5, 16)$ $11 - 13_1 \ (5, 16)$           Provide         Provide         Provide         Provide         Provide         Provide           Provide         Provide         Provide         Provide         Provide         Provide         Provide           Provide         Provide         Provide         Provide         Provide         Provide         Provide         Provide         Provide</td>	LCS ID     Matrix     Analytic     SR (limite)     Associated Samples $L \circ S > \zeta_{0;}$ $S Y$ $[1]$ $(q \circ -1  \circ)$ $1[-1]_{s}$ $IS_{s}$ $P \circ S > \zeta_{0;}$ $S Y$ $[1]$ $(q \circ -1  \circ)$ $1[-1]_{s}$ $IS_{s}$ $P \circ S > \zeta_{0;}$ $S Y$ $[1]$ $(q \circ -1  \circ)$ $1[-1]_{s}$ $IS_{s}$ $P \circ S > \zeta_{0;}$ $S Y$ $[1]$ $(q \circ -1  \circ)$ $1[-1]_{s}$ $IS_{s}$ $P \circ S > \zeta_{0;}$ $S Y$ $[1]$ $(q \circ -1  \circ)$ $1[-1]_{s}$ $IS_{s}$ $P \circ S > \zeta_{0;}$ $S \circ S > \zeta_{0;}$ $S \circ S > \zeta_{0;}$ $S \circ S > \zeta_{0;}$ $[1]$ $[1]$ $P \circ S > \zeta_{0;}$ $S \circ S > \zeta_{0;}$ $S \circ S > \zeta_{0;}$ $S \circ S > \zeta_{0;}$ $[1]$ $[1]$ $P \circ S > \zeta_{0;}$ $S \circ S > \zeta_{0;}$ $S \circ S > \zeta_{0;}$ $[1]$ $[1]$ $[1]$ $P \circ S > \zeta_{0;}$ $S \circ S > \zeta_{0;}$ $S \circ S > \zeta_{0;}$ $[1]$ $[1]$ $[1]$ $P \circ S > \zeta_{0;}$ $S \circ S > \zeta_{0;}$ $[1]$ $[1]$ $[1]$ $P \circ S > \zeta_{0;}$ $[1]$ $[1]$ $[1]$ $P \circ S > \zeta_{0;}$ $[1]$ $[1]$ $[1]$ $P \circ S > \zeta_{0;}$ $[1]$ $[1]$ $[1]$	LCSID     Mntx     Analya     SR (limita)     Associated Samples $LCS > C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS > C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS > C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS > C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS > C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS > C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS > C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS > C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS > C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS > C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS > C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS > C_{0,1}$ $BY$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 16$ $PCS > C_{0,1}$ $(11 ( q_0 - 1 ^o))$ $(11 ( q_0 - 1 ^o))$ $11 - 13_{r}, 15_{r}, 15_{r}, 16$ $PCS > C_{0,1}$ $(11 ( q_0 - 1 ^o))$ $(11 ( q_0 - 1 ^o))$ $(11 ( q_0 - 1 ^o))$	LCS ID     Matrix     Analytic     SR filmite)     Associated Samples $LCS > Cor)$ $By$ $[1]$ $(7o - 1/2)$ $1/-13$ , $1S$ , $1G$ $LCS > Cor)$ $By$ $[1]$ $(7o - 1/2)$ $1/-13$ , $1S$ , $1G$ $LCS > Cor)$ $By$ $[1]$ $(7o - 1/2)$ $1/-13$ , $1S$ , $1G$ $LCS > Cor)$ $By$ $[1]$ $(7o - 1/2)$ $1/-13$ , $1S$ , $1G$ $I_1 = 13$ $I_2 = 10$ $I_1 = 13$ , $I_2$ $I_1 = 13$ , $I_2$ $I_1 = 13$ $I_1 = 13$ , $I_2$ $I_1 = 13$ , $I_2$ $I_1 = 13$ , $I_2$ $I_1 = 10$ $I_1 = 10$ $I_1 = 13$ , $I_2$ $I_1 = 13$ , $I_2$ $I_1 = 10$ $I_1 = 13$ , $I_2$ $I_1 = 13$ , $I_2$ $I_1 = 13$ , $I_2$ $I_1 = 10$ $I_1 = 10$ $I_1 = 13$ , $I_2$ $I_1 = 13$ , $I_2$ $I_1 = 10$ $I_1 = 10$ $I_1 = 10$ $I_1 = 13$ , $I_2$ $I_1 = 10$ $I_1 = 10$ $I_1 = 13$ , $I_2$ $I_1 = 13$ , $I_2$ $I_1 = 10$ $I_1 = 13$ , $I_2$ $I_1 = 13$ , $I_2$ $I_1 = 13$ , $I_2$ $I_1 = 10$ $I_1 = 10$ , $I_1 = 10$ , $I_1 = 10$ , $I_2$ $I_1 = 13$ , $I_2$ $I_1 = 10$ $I_1 = 10$ , $I_2$ $I_1 = 13$ , $I_2$ $I_1 = 10$ $I_1 = 10$ , $I_2$ $I_1 = 10$ , $I_2$ $I_1 $	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	LCS D         Matrix         Analytic         Stantine         Associated Samples           LCS - $\zeta_3$ $\hat{B}_1$ $(11 \ (7 \circ - 1)^2)$ $11 - 13_1 \ (5, 16)$ $11 - 13_1 \ (5, 16)$ Provide         Provide         Provide         Provide         Provide         Provide           Provide         Provide         Provide         Provide         Provide         Provide         Provide           Provide         Provide         Provide         Provide         Provide         Provide         Provide         Provide         Provide

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LDC #:	SDG #:

VALIDATION FINDINGS WORKSHEET Overall Assessment of Data

Page: ____of__ Reviewer: WH

METHOD: Inorganics, Method

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?

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Qualifications	( o ) X	×.									
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### VALIDATION FINDINGS WORKSHEET Field Duplicates

Page: Reviewer: 2nd Reviewer:

Inorganics, Method See Cover

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

	Concentrati	on (mg/Kg)				Qualification
Analyte	1	2	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Ammonia as N	2.53	2.42		0.11	(≤0.53)	
Total Alkalinity	147	134	9			
Bicarbonate Alkalinity	147	134	9			
Chloride	2960	2860	3			
Hexavalent Chromium	0.78	2.93		2.15	(≤0.42)	J det / A (fd)
Hexavalent Chromium	0.82	3.34		2.52	(≤0.42)	J det / A (fd)
Nitrate as N	40.6	41.1	1			
Nitrite as N	0.14	0.15		0.01	(≤0.11)	
pH (pH Units)	8.17	8.11	1			
Sulfate	6190	6250	1			
Surfactants	8.5	6.0	34			
Total Cyanide	0.42U	0.7		0.28	(≤1.0)	
тос	5400	4800		600	(≤1700)	
Total Phosphorus	856	956	11			
Chlorate (ug/Kg)	8720000	8010000	8			
Perchlorate (ug/Kg)	481000	450000	7			

V:\FIELD DUPLICATES\FD_inorganic\21495H6.wpd

### 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 28, 2009

Matrix: Soil/Water

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903678

### Sample Identification

EB070109-SO1	SA82-0.5BMS
SA114-0.5B	SA82-0.5BMSD
SA114009-0.5B	SA82-0.5BDUP
RSAN6-0.5B	RSAL3-30BMS
SA82-0.5B	RSAL3-30BDUP
SA82-10B	RSAK3-31BMS
SA82-29B	RSAK3-31BMSD
RSAL3-10B	RSAK3-31BDUP
RSAL3-30B	
SA134-10B	
SA134-20B	
SA134-31B	
SA134009-31B	
SA88-10B	
SA88-20B	
SA88-32B	
RSAK3-0.5B	
RSAK3-10B	
RSAK3-20B	
RSAK3-31B	

### Introduction

This data review covers 27 soil samples and one water sample listed on the cover sheet. The analyses were per Standard Method 2320B for Alkalinity, EPA Method 350.1 for Ammonia as Nitrogen, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 353.2 for Nitrite as Nitrogen, EPA 300.1 for Chlorate, EPA SW 846 Method 9012A for Cyanide, EPA SW 846 Method 7199 for Hexavalent Chromium, EPA SW 846 Methods 9040B and 9045D for pH, Standard Method 5540C for Surfactants, EPA Method 314.0 for Perchlorate, EPA Method 365.1 for Total Phosphorus, and Lloyd/Kahn Method for Total Organic Carbon.

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

Field duplicates are summarized in Section X.

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. Calibration

Calibration verification frequency and analysis criteria were met for each method when applicable with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
7/9/09	ccv	Total organic carbon	85.6 (90-110)	SA114-0.5B SA114009-0.5B RSAN6-0.5B SA82-0.5B SA82-10B SA82-29B RSAL3-10B RSAL3-10B RSAL3-30B SA134-10B SA134-20B SA134-20B SA134-31B SA82-0.5BMS SA82-0.5BDUP	J- (all detects) UJ (all non-detects)	Ρ

### III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Concentration	Associated Samples
МВ	Alkalinity, total Alkalinity, bicarbonate Chloride Total phosphorus	1.0 mg/L 1.0 mg/L 0.13 mg/L 0.005 mg/L	EB070109-SO1
ICB/CCB	Alkalinity, total Total phosphorus Ammonia as N	1.0 mg/L 0.0052 mg/L 0.0107 mg/L	EB070109-SO1
МВ	Alkalinity, total Alkalinity, bicarbonate Chloride Nitrate as N	15 mg/Kg 15 mg/Kg 1.1 mg/Kg 0.45 mg/Kg	SA114-0.5B SA114009-0.5B RSAN6-0.5B SA82-10B SA82-29B

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Alkalinity, total Ammonia as N	0.9 mg/L 0.0077 mg/L	SA114-0.5B SA114009-0.5B RSAN6-0.5B SA82-10B SA82-29B
MB	Alkalinity, total Alkalinity, bicarbonate Chloride	10 mg/Kg 10 mg/Kg 1.3 mg/Kg	SA82-0.5B RSAL3-10B RSAL3-30B SA134-10B SA134-20B SA134-20B SA134-31B SA134-009-31B SA88-10B SA88-10B SA88-20B SA88-32B
ICB/CCB	Alkalinity, total	1.0 mg/L	SA82-0.5B RSAL3-10B RSAL3-30B SA134-10B SA134-20B SA134-20B SA134-31B SA134009-31B SA88-10B SA88-10B SA88-20B SA88-32B
MB	Alkalinity, total Alkalinity, bicarbonate Chloride Surfactants	11 mg/Kg 11 mg/Kg 1.3 mg/Kg 1.2 mg/Kg	RSAK3-0.5B RSAK3-10B RSAK3-20B RSAK3-31B
ICB/CCB	Alkalinity, total	1.0 mg/L	RSAK3-0.5B RSAK3-10B RSAK3-20B RSAK3-31B
MB	Total organic carbon Total phosphorus	130 mg/Kg 1.6 mg/Kg	All samples in SDG R0903678
ICB/CCB	Total phosphorus	0.0066 mg/L	All samples in SDG R0903678
ICB/CCB	Total organic carbon	143 mg/Kg	SA114-0.5B SA114009-0.5B RSAN6-0.5B SA82-0.5B SA82-10B SA82-29B RSAL3-10B RSAL3-30B SA134-10B SA134-20B SA134-31B

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Total organic carbon	127 mg/Kg	SA134009-31B SA88-10B SA88-20B SA88-32B RSAK3-0.5B RSAK3-10B RSAK3-20B
ICB/CCB	Total organic carbon	85.1 mg/Kg	RSAK3-31B
ICB/CCB	Chloride	0.106 mg/L	SA114-0.5B SA114009-0.5B RSAN6-0.5B SA82-10B
ICB/CCB	Chloride	0.135 mg/L	SA82-0.5B SA134-10B
ICB/CCB	Chloridə	0.137 mg/L	SA82-29B RSAL3-10B
ICB/CCB	Chloride	0.136 mg/L	RSAL3-30B SA134-20B SA134-31B SA134009-31B SA88-10B SA88-20B SA88-20B SA88-32B RSAK3-0.5B RSAK3-0.5B RSAK3-10B RSAK3-20B RSAK3-31B

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	Analyte	Reported Concentration	Modified Final Concentration
EB070109-SO1	Chloride Total phosphorus Ammonia as N	1.7 mg/L 0.014 mg/L 0.034 mg/L	2.0U mg/L 0.050U mg/L 0.050U mg/L
SA114-0.5B	Ammonia as N	0.48 mg/Kg	0.54U mg/Kg
SA82-10B	Ammonia as N	0.15 mg/Kg	0.35U mg/Kg
RSAK3-0.5B	Surfactants	1.1 mg/Kg	2.2U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
RSAK3-10B	Surfactants	1.3 mg/Kg	2.2U mg/Kg
RSAK3-20B	Surfactants	1.7 mg/Kg	2.7U mg/Kg
RSAK3-31B	Surfactants	3.1 mg/Kg	3.5U mg/Kg

Sample EB070109-SO1 was identified as an equipment blank. No contaminant concentrations were found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
EB070109-SO1	7/1/09	Ammonia as N Total organic carbon Chloride Nitrate as N pH Total phosphorus	0.034 mg/L 0.6 mg/L 1.7 mg/L 0.88 mg/L 4.25 mg/L 0.014 mg/L	No associated samples in this SDG

Sample FB072109-SO (from SDG R0904016) was identified as a field blank. No contaminant concentrations were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
FB072109-SO	7/21/09	Ammonia as N Total organic carbon Chloride Nitrate as N pH Total phosphorus Sulfate Surfactants	0.191 mg/L 0.5 mg/L 9.7 mg/L 1.76 mg/L 3.36 mg/L 0.01 mg/L 5.5 mg/L 0.159 mg/L	SA82-0.5B SA82-10B SA82-29B RSAL3-10B RSAL3-30B SA134-10B SA134-20B SA134-20B SA134-31B SA134009-31B SA88-10B SA88-20B SA88-20B SA88-32B RSAK3-0.5B RSAK3-10B RSAK3-20B RSAK3-31B

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

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA82-0.5B	Ammonia as N	0.22 mg/Kg	0.51U mg/Kg
	Chloride	37.3 mg/Kg	37.3J+ mg/Kg
	Nitrate as N	2.82 mg/Kg	2.82J+ mg/Kg
	Sulfate	175 mg/Kg	175J+ mg/Kg
	Surfactants	1.2 mg/Kg	2.1U mg/Kg
SA82-10B	Ammonia as N	0.15 mg/Kg	0.53U mg/Kg
	Chloride	64.1 mg/Kg	64.1J+ mg/Kg
	Nitrate as N	2.43 mg/Kg	2.43J+ mg/Kg
	Surfactants	1.4 mg/Kg	2.1U mg/Kg
SA82-29B	Nitrate as N	2.60 mg/Kg	2.60J+ mg/Kg
	Surfactants	3.7 mg/Kg	3.7J+ mg/Kg
RSAL3-10B	Chloride	138 mg/Kg	138J+ mg/Kg
	Nitrate as N	3.09 mg/Kg	3.09J+ mg/Kg
	Surfactants	1.4 mg/Kg	2.2U mg/Kg
RSAL3-30B	Nitrate as N	3.32 mg/Kg	3.32J+ mg/Kg
	Surfactants	1.9 mg/Kg	3.2U mg/Kg
SA134-10B	Chloride	71.9 mg/Kg	71.9J+ mg/Kg
	Nitrate as N	3.65 mg/Kg	3.65J+ mg/Kg
	Sulfate	203 mg/Kg	203J+ mg/Kg
	Surfactants	1.1 mg/Kg	2.2U mg/Kg
SA134-20B	Chloride	138 mg/Kg	138J+ mg/Kg
	Nitrate as N	2.20 mg/Kg	2.20J+ mg/Kg
	Surfactants	3.4 mg/Kg	3.4J+ mg/Kg
SA134-31B	Nitrate as N	7.52 mg/Kg	7.52J+ mg/Kg
	Surfactants	2.7 mg/Kg	3.0U mg/Kg
SA134009-31B	Nitrate as N	7.73 mg/Kg	7.73J+ mg/Kg
	Surfactants	1.8 mg/Kg	3.1U mg/Kg
SA88-10B	Ammonia as N	0.33 mg/Kg	0.55U mg/Kg
	Nitrate as N	6.78 mg/Kg	6.78J+ mg/Kg
	Sulfate	89.2 mg/Kg	89.2J+ mg/Kg
	Surfactants	0.9 mg/Kg	2.2U mg/Kg
SA88-20B	Nitrate as N	5.72 mg/Kg	5.72J+ mg/Kg
	Surfactants	1.7 mg/Kg	2.9U mg/Kg
SA88-32B	Ammonia as N	0.27 mg/Kg	0.85U mg/Kg
	Nitrate as N	2.44 mg/Kg	2.44J+ mg/Kg
	Surfactants	3.9 mg/Kg	3.9J+ mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
RSAK3-0.5B	Chloride	939 mg/Kg	939J+ mg/Kg
	Nitrate as N	10.8 mg/Kg	10.8J+ mg/Kg
	Sulfate	442 mg/Kg	442J+ mg/Kg
	Surfactants	1.1 mg/Kg	2.2U mg/Kg
RSAK3-10B	Ammonia as N	0.37 mg/Kg	0.55U mg/Kg
	Chloride	189 mg/Kg	189J+ mg/Kg
	Nitrate as N	3.19 mg/Kg	3.19J+ mg/Kg
	Sulfate	26.2 mg/Kg	26.2J+ mg/Kg
	Surfactants	1.3 mg/Kg	2.2U mg/Kg
RSAK3-20B	Chloride	517 mg/Kg	517J+ mg/Kg
	Nitrate as N	7.55 mg/Kg	7.55J+ mg/Kg
	Surfactants	1.7 mg/Kg	2.7U mg/Kg
RSAK3-31B	Nitrate as N	2.78 mg/Kg	2.78J+ mg/Kg
	Surfactants	3.1 mg/Kg	3.5U mg/Kg

### IV. Matrix Spike/Matrix Spike Duplicates

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

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
SA82-0.5BMS/MSD (SA82-0.5B)	Chlorate	-	128 (75-125)	-	J+ (all detects)	A
SA82-0.5BMS (SA82-0.5B)	Surfactants	64 (75-125)	-	-	J- (all detects) UJ (all non-detects)	A

### V. Duplicates

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

### VI. Laboratory Control Samples

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

LCS ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
LCS	Bromide	111 (90-110)	SA114-0.5B SA114009-0.5B RSAN6-0.5B SA82-10B SA82-29B	J+ (all detects)	Ρ

### VII. Surrogates

Surrogates were added to all samples and blanks as required by method 300.1. All surrogate recoveries (%R) were within QC limits.

### VIII. Sample Result Verification and Project Quantitation Limit

All analytes reported below the PQL were qualified as follows:

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

Raw data were not reviewed for this SDG.

### IX. Overall Assessment

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

### X. Field Duplicates

Samples SA114-0.5B and SA114009-0.5B and samples SA134-31B and SA134009-31B were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Conce	entration				
Analyte	SA114-0.5B	SA114009-0.5B	RPD (Limits)	Difference (Limits)	Flag	A or P
Ammonia as N	0.48 mg/Kg	4.64 mg/Kg	-	4.16 (≤0.55)	J (all detects)	A
Alkalinity, total	4750 mg/Kg	4610 mg/Kg	3 (≤50)	-	-	-
Alkalinity, bicarbonate	4340 mg/Kg	4260 mg/Kg	2 (≤50)	-	-	-
Alkalinity, carbonate	412 mg/Kg	346 mg/Kg	17 (≤50)	-	-	-

	Concentration					
Analyte	SA114-0.5B	SA114009-0.5B	RPD (Limits)	Difference (Limits)	Flag	A or P
Chloride	205 mg/Kg	203 mg/Kg	1 (≤50)	-	-	-
Hexavalent chromium	0.19U mg/Kg	18.9 mg/Kg	-	18.71 (≤0.43)	J (all detects) UJ (all non-detects)	A
Hexavalent chromium	0.19U mg/Kg	19.1 mg/Kg	-	18.91 (≤0.43)	J (all detects) UJ (all non-detects)	A
Nitrate as N	12.4 mg/Kg	12.3 mg/Kg	1 (≤50)	-	-	-
Nitrite as N	0.72 mg/Kg	0.67 mg/Kg	7 (≤50)	-	-	-
рН	9.66 units	9.43 units	2 (≤50)	-	-	-
Sulfate	299 mg/Kg	350 mg/Kg	16 (≤50)	-	-	-
Surfactants	6.7 mg/Kg	6.8 mg/Kg	1 (≤50)	-	-	-
Total organic carbon	71800 mg/Kg	71900 mg/Kg	0 (≤50)	-	-	-
Total phosphorus	451 mg/Kg	402 mg/Kg	11 (≤50)	-	-	-
Chlorate	416000 ug/Kg	411000 ug/Kg	1 (≤50)	-	-	-
Perchlorate	34100 ug/Kg	34900 ug/Kg	2 (≤50)	-	-	-

	Concentration					
Analyte	SA134-31B	SA134009-31B	RPD (Limits)	Difference (Limits)	Flag	A or P
Alkalinity, total	368 mg/Kg	370 mg/Kg	1 (≤50)	-	-	-
Alkalinity, bicarbonate	368 mg/Kg	370 mg/Kg	1 (≤50)	-	_	-
Bromide	2.0 mg/Kg	2.2 mg/Kg		0.2 (≤1.5)	_	-
Chloride	1780 mg/Kg	1880 mg/Kg	5 (≤50)	-	-	-
Nitrate as N	7.52 mg/Kg	7.73 mg/Kg	3 (≤50)	-	-	-
рН	7.94 units	7.89 units	1 (≤50)	-	-	-

	Concentration					
Analyte	SA134-31B	SA134009-31B	RPD (Limits)	Difference (Limits)	Flag	A or P
Sulfate	2510 mg/Kg	2630 mg/Kg	5 (≤50)	-	-	-
Surfactants	2.7 mg/Kg	1.8 mg/Kg	÷	0.9 (≤3.1)	-	-
Total organic carbon	950 mg/Kg	1010 mg/Kg	-	60 (≤880)	-	-
Total Phosphorus	435 mg/Kg	473 mg/Kg	8 (≤50)	-	-	-
Chlorate	1870 ug/Kg	1870 ug/Kg	0 (≤50)	-		-
Perchlorate	31300 ug/Kg	34200 ug/Kg	9 (≤50)	-	-	-

### Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R0903678

SDG	Sample	Analyte	Flag	A or P	Reason
R0903678	SA114-0.5B SA114009-0.5B RSAN6-0.5B SA82-0.5B SA82-10B SA82-29B RSAL3-10B RSAL3-10B RSAL3-30B SA134-10B SA134-20B SA134-31B	Total organic carbon	J- (all detects) UJ (all non-detects)	Ρ	Calibration (CCV %R) (c)
R0903678	SA82-0.5B	Chlorate	J+ (all detects)	A	Matrix spike/Matrix spike duplicates (%R) (m)
R0903678	SA82-0.5B	Surfactants	J- (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R) (m)
R0903678	SA114-0.5B SA114009-0.5B RSAN6-0.5B SA82-10B SA82-29B	Bromide	J+ (all detects)	Ρ	Laboratory control samples (%R) (I)
R0903678	EB070109-SO1 SA114-0.5B SA114009-0.5B RSAN6-0.5B SA82-0.5B SA82-10B SA82-29B RSAL3-10B RSAL3-30B SA134-10B SA134-20B SA134-20B SA134-31B SA134-09-31B SA88-10B SA88-20B SA88-20B SA88-32B RSAK3-0.5B RSAK3-10B RSAK3-20B RSAK3-31B	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)
R0903678	SA114-0.5B SA114009-0.5B	Ammonia as N	J (all detects)	A	Field duplicates (Difference) (fd)
R0903678	SA114-0.5B SA114009-0.5B	Hexavalent chromium	J (all detects) UJ (all non-detects)	A	Field duplicates (Difference) (fd)

### Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R0903678

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903678	EB070109-SO1	Chloride Total phosphorus Ammonia as N	2.0U mg/L 0.050U mg/L 0.050U mg/L	A	Ы
R0903678	SA114-0.5B	Ammonia as N	0.54U mg/Kg	A	bl
R0903678	SA82-10B	Ammonia as N	0.35U mg/Kg	A	bl
R0903678	RSAK3-0.5B	Surfactants	2.2U mg/Kg	A	ы
R0903678	RSAK3-10B	Surfactants	2.2U mg/Kg	A	bl
R0903678	RSAK3-20B	Surfactants	2.7U mg/Kg	A	bl
R0903678	RSAK3-31B	Surfactants	3.5U mg/Kg	A	bl

### Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R0903678

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903678	SA82-0.5B	Ammonia as N Chloride Nitrate as N Sulfate Surfactants	0.51U mg/Kg 37.3J+ mg/Kg 2.82J+ mg/Kg 175J+ mg/Kg 2.1U mg/Kg	A	bf
R0903678	SA82-10B	Ammonia as N Chloride Nitrate as N Surfactants	0.53U mg/Kg 64.1J+ mg/Kg 2.43J+ mg/Kg 2.1U mg/Kg	A	bf
R0903678	SA82-29B	Nitrate as N Surfactants	2.60J+ mg/Kg 3.7J+ mg/Kg	A	bf
R0903678	RSAL3-10B	Chloride Nitrate as N Surfactants	138J+ mg/Kg 3.09J+ mg/Kg 2.2U mg/Kg	A	bf
R0903678	RSAL3-30B	Nitrate as N Surfactants	3.32J+ mg/Kg 3.2U mg/Kg	A	bf

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903678	SA134-10B	Chloride Nitrate as N Sulfate Surfactants	71.9J+ mg/Kg 3.65J+ mg/Kg 203J+ mg/Kg 2.2U mg/Kg	A	bf
R0903678	SA134-20B	Chloride Nitrate as N Surfactants	138J+ mg/Kg 2.20J+ mg/Kg 3.4J+ mg/Kg	A	bf
R0903678	SA134-31B	Nitrate as N Surfactants	7.52J+ mg/Kg 3.0U mg/Kg	A	bf
R0903678	SA134009-31B	Nitrate as N Surfactants	7.73J+ mg/Kg 3.1U mg/Kg	A	bf
R0903678	SA88-10B	Ammonia as N Nitrate as N Sulfate Surfactants	0.55U mg/Kg 6.78J+ mg/Kg 89.2J+ mg/Kg 2.2U mg/Kg	A	bf
R0903678	SA88-20B	Nitrate as N Surfactants	5.72J+ mg/Kg 2.9U mg/Kg	A	bf
R0903678	SA88-32B	Ammonia as N Nitrate as N Surfactants	0.85U mg/Kg 2.44J+ mg/Kg 3.9J+ mg/Kg	A	bf
R0903678	RSAK3-0.5B	Chloride Nitrate as N Sulfate Surfactants	939J+ mg/Kg 10.8J+ mg/Kg 442J+ mg/Kg 2.2U mg/Kg	A	bf
R0903678	RSAK3-10B	Ammonia as N Chloride Nitrate as N Sulfate Surfactants	0.55U mg/Kg 189J+ mg/Kg 3.19J+ mg/Kg 26.2J+ mg/Kg 2.2U mg/Kg	A	bf
R0903678	RSAK3-20B	Chloride Nitrate as N Surfactants	517J+ mg/Kg 7.55J+ mg/Kg 2.7U mg/Kg	A	bf
R0903678	RSAK3-31B	Nitrate as N Surfactants	2.78J+ mg/Kg 3.5U mg/Kg	A	bf

Tron	ox Northgate	Henderson
VALIDATION	COMPLETEN	NESS WORKSHEET

Stage 2B

LDC #: 21495/6 SDG #: R0903678

### Laboratory: Columbia Analytical Services

Date: <u>9/v4/</u> •{
Page:of [/]
Reviewer:
2nd Reviewer:
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METHOD: (Analyte) Alkalinity (SM2320B), Ammonia-N (EPA Method 350.1), Bromide, Chloride, Nitrate-N, Sulfate (EPA SW846 Method 9056), Nitrite-N (EPA Method 353.2), Chlorate (EPA Method 300.1), Cyanide (EPA SW846 Method 9012A), Hexavalent Chromium (EPA SW846 Method 7199), pH (EPA SW846 Method 9040B/9045D), Surfactants (SM5540C), Perchlorate (EPA Method 314.0), Total Phosphorus (EPA Method 365.1), TOC (Lloyd/Kahn / EPA SW846 Method 9060) 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
Ι.	Technical holding times	¥	Sampling dates: $070109$ , $070-209$
lla.	Initial calibration	Â.	
llb.	Calibration verification	SW	
- 111.	Blanks	5W	
IV	Surrogate	A	
V	Matrix Spike/Matrix Spike Duplicates	SN	7 145/4450 / 4~2
VI.	Duplicates	A	
VII.	Laboratory control samples	ŚW	Leg
VIII.	Sample result verification	N	,
IX.	Overall assessment of data	A	
Х.	Field duplicates	Św	(213)(1213)
	Field blanks	- Cry	FB=FB072109-SO (SDG: R0904016) , 7B= )
Note:		No compounds Rinsate	s detected D = Duplicate TB = Trip blank

SW = See worksheet

FB = Field blank

EB = Equipment blank

Valida	ated Samples:	oil eter	+ +   Az		-		
1	EB070109-SO1	11	SA134-20B	21 -	SA82-0.5BMS	31	МВ
2	SA114-0.5B	12	SA134-31B	22 -	SA82-0.5BMSD	32	
3	SA114009-0.5B	13	SA134009-31B	23	SA82-0.5BDUP	33	
4	RSAN6-0.5B	14	SA88-10B	24	RSAL3-30BMS	34	
5⁄	SA82-0.5B	15	SA88-20B	25	RSAL3-30BDUP	35	
6 /	SA82-10B	16	SA88-32B	26	RSAK3-31BMS	36	
7 /	SA82-29B	17	RSAK3-0.5B	27	RSAK3-31BMSD	37	
8	RSAL3-10B	18	RSAK3-10B	28	RSAK3-31BDUP	38	
9	RSAL3-30B	19	RSAK3-20B	29		39	ġ
10	SA134-10B	20	RSAK3-31B	30		40	

Notes:

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2nd reviewer:	
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All circled methods are applicable to each sample.

Sample ID		Parameter
1-20	(i)/10	(Alk pH Br CI NO, NO, SO, NH, TOC)CN (Orst T-P MBAS) TDS TSS Cond (CIO, CIO,
	1	Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
13,500	S.1/2	Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC $(CN)$ Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
1-23, 16-28	505	Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond $Clo_{4}$ ClO ₄
$\sim$		Alk pH Br CI NO NO SO NH TOO CN Cr CH T-P MBAS TDS TSS Cond CIO, CIO,
No		All pH (B) (CI NO3 NO2 ) SO4 (NH3) TOC (CN CP+ T-P MBAS TDS TSS Cond CIO3 CIO4
vz		AIR PH BY CIND, NO, SO, NH, TOO CN CP T-PMBAS TDS TSS Cond CIO, CIO,
24,55		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO3 ClO4
28	X	Alk (PH Br CI NO3 NO2 SO4 NH2 TOC (CN CR T-P MBAS) TDS TSS Cond CIO3 CIO4
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr ⁵⁺ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr ⁵⁺ T-P MBAS TDS TSS Cond CIO3 CIO4
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond CIO3 CIO4
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr ⁵⁺ T-P MBAS TDS TSS Cond CIO3 CIO4
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁸⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁵⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄

Comments:__

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VALIDATION FINDINGS WORKSHEET Calibration

đ F Page: Reviewer: 2nd Reviewer:

METHOD: Inorganics, EPA Method_

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Were all instruments calibrated daily, each set-up time, and were the proper number of standards used? Were all initial and continuing calibration verification percent recoveries (%R) within the control limits of 90-110% ? Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". AN NA

Are all correlation coefficients  $\ge 0.995$  ? VANNA Were

Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recaluculation Worksheet for recalulations. Was a balance check conducted prior to the TDS analysis.? Was the titrant normality checked? (IA)

**AN** 

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			Analuta	8%	Associated Samples	Qualifications
*	Date	Calibration 10	Allalyte	, , , , , , , , , , , , , , , , , , ,		
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Comn	Comments:					

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LDC #: <u>2149516</u> SDG #: <u>See Cover</u>

## VALIDATION FINDINGS WORKSHEET

∿ ĕ 2nd Reviewer: Page: Reviewer:

METHOD: Inorganics, Method See Cover

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

Reason Code: bl

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

Conc. units: mg/L	s: mg/L			Associated Samples: 1
Analyte	Blank ID	Blank ID Maximum	Blank	Sample Identification
	MB	ICB/CCB (mg/L)	Action Limit	
Total AIK	1.0	1.0		
Bicarb. AIK	1.0			
ច	0.13			1.7/2.0
Т-Р	0.005	0.0052		0.014 / 0.050
NH3-N		0.0107		0.034 / 0.050

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Associated Samples: 2-4, 6,7

	B									
Analyte	Blank ID	Maximum	Blank				Sample Idé	Sample Identification		
	MB	MB (mg/L)	Action Limit	2	9					
Total AIK	15	6.0								
Bicarb. AIK	15				-					
ō	1.1									
NO3-N	0.45									
NH3-N		0.0077		0.48 / 0.54 0.15 / 0.35	0.15 / 0.35					

SDG #: See Cover LDC #: 2149516

## VALIDATION FINDINGS WORKSHEET

Blanks



METHOD: Inorganics, Method See Cover

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

Reason Code: bl

<u>♦ N N/A</u> Were all samples associated with a given method blank? <u>♦ N N/A</u> Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below. **Conc. units:** mg/Kq

Analyte	Blank ID	Maximum		Sample Identification
	MB	(mg/L)	Limit	
Total AlK	10	1.0		
Bicarb. AIK	10			
CI	1.3			

•	Conc. units: mg/Kg	s: mg/Kg			11
	Analyte	OI Juela	Maximum	Jucia	

Associated Samples: 17-20

Analyte	Blank ID		Blank					Sample Identification	l		
	MB	(mg/L)		17	18	19	20				
Total AIK	11	1.0									
Bicarb. AIK	11										
C	1.3										
Surfactants	12			11/22	13/22	17127 31135	31/35				

### Conc. units: mg/Kg

# Associated Samples: <u>All except TOC*1: 2-12, TOC*2:13-19, TOC*3:20 (>RL)</u>

Analyte	Blank ID	Maximum	Blank	Sample Identification
	MB	ICB/CCB (mg/L)	MB (mg/L) Action Limit	
TOC	130			
Т-Р	1.6	0.0066		
T0C*1		143 mg/Kg		
TOC*2		127 mg/Kg		
TOC*3		85.1 mg/Kg		

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SDG #: See Cover LDC #: 2149516

## VALIDATION FINDINGS WORKSHEET **Blanks**

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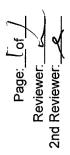
METHOD: Inorganics, Method See Cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Reason Code: bl <u>A N/A</u> Were all samples associated with a given method blank? <u>A N/A</u> Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.

Conc. units: mg/Kg	: mg/Kg			Associated Samples: CI*1:2-4,6,CI*2: 5,10,CI*3:7,8 CI*4:9,11-20 (>RL)	
Analyte	Blank ID	Maximum ICB/CCB	Blank Maximum Blank ID ICB/CCB Action Limit	sample Identification init	
	MB	(mg/L)			
CI*1		0.106			
CI*2		0.135			
CI*3		0.137			
C!*4		0.136			

LDC #: 2149516 SDG #: See Cover

## VALIDATION FINDINGS WORKSHEET <u>Field Blanks</u>



METHOD: Inorganics, MethodSee CoverYNWere field blanks identified in this SDG?YNWere target analytes detected in the field blanks?Blank units:mg/LAssociated sample units:Blank units:mg/LAssociated sample units:Sampling date:7/01/09Soil factor appliedField blank type: (circle one)Field Blank / Rinsate / Other.

Reason Code: be

Associated Samples: None (EB is not from area 1)

Analyte	Blank ID		Sample I	Sample Identification		
	1	Action Level				
Ammonia as N	0.034					
TOC (average)	0.6					
C	1.7					
Nitrate as N	0.88	88				
pH (pH Units)	4.25					
Total Phosnhorus	0 014					

LDC #: 2149516 SDG #: See Cover

## VALIDATION FINDINGS WORKSHEET

Page: Lof Reviewer: 2nd Reviewer:

 METHOD: Inorganics, Method
 See Cover

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

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

 Blank units: mg/L
 Associated sample units: mg/Kq

 Sampling date:
 7/21/09

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

Reason Code: bf

Associated Samples: 5-20

Analyte	Blank ID					Sample	Sample Identification				
	FB072109-SO	Action Level	5	9	7	8	σ	10	11	12	13
Ammonia as N	0.191	19.1	0.22 / 0.51	0.15 / 0.53							
TOC (average)	0.5										
C	9.7	970	37.3 J+	64.1 J+		138 J+		71.9 J+	138 J+		
Nitrate as N	1.76	176	2.82 J+	2.43 J+	2.60 J+	3.09 J+	3.32 J+	3.65 J+	2.20 J+	7.52 J+	7.73 J+
pH (pH Units)	3.36										
Total Phosphorus	0.01										
Sulfate	5.5	550	175 J+					203 J+			
Surfactants	0.159	15.9	1.2/2.1	1.4/2.1	3.7 J+	1.4 / 2.2	1.9/3.2	1.1/2.2	3.4 J+	2.7/3.0	1.8/3.1

Analyte	Blank ID					Sample	Sample Identification			
	FB072109-SO	Action Level	14	15	16	17	18	19	20	
Ammonia as N	0.191	19.1	0.33 / 0.55		0.27 / 0.85		0.37 / 0.55			
TOC (average)	0.5									
ō	9.7	026				939 J+	189 J+	517 J+		
Nitrate as N	1.76	176	6.78 J+	5.72 J+	2.44 J+	10.8 J+	3.19 J+	7.55 J+	2.78 J+	
pH (pH Units)	3.36									
Total Phosphorus	0.01									
Sulfate	5.5	550	89.2 J+			442 J+	26.2 J+			
Surfactants	0.159	15.9	0.9 / 2.2	1.7/2.9	3.9 J+	1.1/2.2	1.3/2.2	1.7/2.7	3.1/3.5	

See cor LDC #: 2149576 SDG #:

### Matrix Spike/Matrix Spike Duplicates VALIDATION FINDINGS WORKSHEET

ď Page: Reviewer: 2nd Reviewer:_

120 Ž METHOD: Inorganics, EPA Method

Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". <u>()</u> N N/A Was a matrix spike analyzed for each matrix in this SDG? <u>y (y) N/A</u> Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample conc of 4 or more, no action was taken.

Were all duplicate sample relative percent differences (RPD)  $\leq$  20% for water samples and  $\leq$ 35% for soll samples?

<u>A N NA</u> Wer LEVEL IV ONLY: <u>Y N NA</u> Wei

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

*	di QSW/SW	Matrix	Analyte	ms %Recovery	MSU %Recovery	RPD (Limits)	Associated Samples	Qualifications
	2127	50r)	count		Sec.)			THA (M)
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$\bot$								
$\frac{1}{1}$	17	502	L.L.L.K	79			5	T-147A (m)
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el cove LDC #: 2149574 SDG #:_

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

Reviewer: 2nd Reviewer:

Page:

Ser Lour METHOD: Inorganics, Method_ Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Y N N/A Was a laboratory control sample (LCS) analyzed for each matrix in this SDG? Y N/N/A Were all LCS percent recoveries (%R) within the control limits of 80-120% (85-115% for Method 300.0)? I EVFI IN ONI V.  $\geq$ 

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*	LCS ID	Matrlx	Analyte	%R (limits)	Associated Samplee	
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Con	Comments:					
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LCS.8

### VALIDATION FINDINGS WORKSHEET Field Duplicates

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

Inorganics, Method See Cover

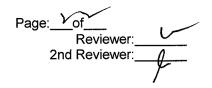


Were field duplicate pairs identified in this SDG? Were target analytes detected in the field duplicate pairs?

	Concentrati	on (mg/Kg)				Qualification
Analyte	2	3	RPD (≤50)	Difference	Limits	(Parent only)
Ammonia as N	0.48	4.64		4.16	(≤0.55)	J det / A (fd)
Total Alkalinity	4750	4610	3			
Bicarbonate Alkalinity	4340	4260	2			
Carbonate Alkalinity	412	346	17			
Chloride	205	203	1			
Hexavalent Chromium	0.19U	18.9		18.71	(≤0.43)	J / UJ / A (fd)
Hexavalent Chromium	0.19U	19.1		18.91	(≲0.43)	J / UJ / A (fd)
Nitrate as N	12.4	12.3	1			
Nitrite as N	0.72	0.67	7			
pH (pH Units)	9.66	9.43	2	ν.		
Sulfate	299	350	16			
Surfactants	6.7	6.8	1			
тос	71800	71900	0			
Total Phosphorus	451	402	11			
Chlorate (ug/Kg)	416000	411000	1			
Perchlorate (ug/Kg)	34100	34900	2			

	Concentrat	ion (mg/Kg)				Outlification
Analyte	12	13	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Total Alkalinity	368	370	1			

### VALIDATION FINDINGS WORKSHEET Field Duplicates



Inorganics, Method See Cover

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

Concer		on (mg/Kg)				Qualification
Analyte	12	13	RPD (≤50)	Difference	Limits	(Parent only)
Bicarbonate Alkalinity	368	370	1			
Bromide	2.0	2.2		0.2	(≤1.5)	
Chloride	1780	1880	5			
Nitrate as N	7.52	7.73	3			
pH (pH Units)	7.94	7.89	1			
Sulfate	2510	2630	5			
Surfactants	2.7	1.8	-	0.9	(≤3.1)	
тос	950	1010		60	(≤880)	
Total Phosphorus	435	473	8			
Chlorate (ug/Kg)	1870	1870	0			
Perchlorate (ug/Kg)	31300	34200	9			

V:\FIELD DUPLICATES\FD_inorganic\21495I6.wpd

### Laboratory Data Consultants, Inc. Data Validation Report

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

Collection Date: June 25 through July 1, 2009

LDC Report Date: September 29, 2009

Matrix: Water

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903561

### Sample Identification

M-75B M-13AB M-13009AB M-64B M-111AB EB062909-GW1 M-25B M-12AB M-110B I-ARB M-111ABMS M-111ABMSD M-111ABMSD M-111ABDUP

### Introduction

This data review covers 13 water samples listed on the cover sheet. The analyses were per Standard Method 2320B for Alkalinity, EPA Method 350.1 for Ammonia as Nitrogen, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 353.2 for Nitrite as Nitrogen, EPA 300.1 for Chlorate, EPA Method 120.1 for Conductivity, EPA SW 846 Method 9012A for Cyanide, EPA Method 218.6 for Dissolved Hexavalent Chromium, EPA SW 846 Method 9040B for pH, Standard Method 5540C for Surfactants, EPA Method 314.0 for Perchlorate, EPA Method 365.1 for Total Phosphorus, Standard Method 2540C for Total Dissolved Solids, Standard Method 2540D for Total Suspended Solids, and EPA SW 846 Method 9060 for Total Organic Carbon.

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

Field duplicates are summarized in Section X.

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

Sample	Analyte	Total Time From Sample Collection Until Analysis	Required Holding Time From Sample Collection Until Analysis	Flag	A or P
M-75B	Perchlorate	34	28 days	J- (all detects) UJ (all non-detects)	Ρ
M-13AB M-13009AB M-64B	Perchlorate	33	28 days	J- (all detects) UJ (all non-detects)	Ρ
M-111AB M-111ABMS M-111ABMSD M-111ABDUP	Perchlorate	30	28 days	J- (all detects) UJ (all non-detects)	Ρ
EB062909-GW1 M-25B	Perchlorate	29	28 days	J- (all detects) UJ (all non-detects)	Ρ

All technical holding time requirements were met with the following exceptions:

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

### II. Calibration

Calibration verification frequency and analysis criteria were met for each method when applicable.

### III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Concentration	Associated Samples
МВ	Alkalinity, total Alkalinity, bicarbonate	1.0 mg/L 1.0 mg/L	All samples in SDG R0903561
ICB/CCB	Alkalinity, total	1.0 mg/L	All samples in SDG R0903561
МВ	Total organic carbon	0.2 mg/L	M-75B M-13AB M-13009AB M-64B

Method Blank ID	Analyte	Concentration	Associated Samples
МВ	Total phosphorus	0.008 mg/L	M-75B M-13AB M-13009AB M-64B
MB	Total phosphorus	0.005 mg/L	M-111AB EB062909-GW1 M-25B M-12AB M-110B I-ARB
ICB/CCB	Total phosphorus	0.008 mg/L	M-75B M-13AB M-13009AB M-64B
ICB/CCB	Total phosphorus	0.005 mg/L	M-111AB EB062909-GW1 M-25B M-12AB M-110B I-ARB
MB	Chloride	0.13 mg/L	EB062909-GW1
ICB/CCB	Chloride	0.13 mg/L	EB062909-GW1
МВ	Chloride	0.13 mg/L	M-25B M-12AB M-110B
ICB/CCB	Chloride	0.14 mg/L	M-25B M-12AB
МВ	Chloride	0.16 mg/L	M-64B M-111AB I-ARB
ICB/CCB	Chloride	0.14 mg/L	M-64B M-111AB I-ARB

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:

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Sample	Analyte	Reported Concentration	Modified Final Concentration
M-75B	Total phosphorus	0.026 mg/L	0.050U mg/L

Sample	Analyte	Reported Concentration	Modified Final Concentration
M-13AB	Total phosphorus	0.021 mg/L	0.050U mg/L
M-13009AB	Total phosphorus	0.019 mg/L	0.050U mg/L
M-64B	Total phosphorus	0.035 mg/L	0.050U mg/L
M-111AB	Total phosphorus	0.029 mg/L	0.050U mg/L
EB062909-GW1	Total phosphorus Chloride	0.015 mg/L 1.9 mg/L	0.050U mg/L 2.0U mg/L
M-25B	Total phosphorus	0.029 mg/L	0.050U mg/L
M-110B	Total phosphorus	0.021 mg/L	0.050U mg/L
I-ARB	Total phosphorus	0.021 mg/L	0.050U mg/L

Sample EB062909-GW1 was identified as an equipment blank. No contaminant concentrations were found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
EB062909-GW1	6/29/09	Ammonia as N Total organic carbon Chloride Conductivity Nitrate as N pH Total phosphorus	0.012 mg/L 0.2 mg/L 1.9 mg/L 3.06 umhos/cm 0.84 mg/L 5.16 units 0.015 mg/L	No associated samples in this SDG

Sample MC-3B-FILT (from SDG R0902886) was identified as a filter blank. No contaminant concentrations were found in this blank.

### **IV. Matrix Spike/Matrix Spike Duplicates**

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

### V. Duplicates

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

### VI. Laboratory Control Samples

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

### VII. Surrogates

Surrogates were added to all samples and blanks as required by method 300.1. All surrogate recoveries (%R) were within QC limits.

### VIII. Sample Result Verification and Project Quantitation Limit

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R0903561	All analytes reported below the PQL.	J (all detects)	A

Raw data were not reviewed for this SDG.

### IX. Overall Assessment

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

### X. Field Duplicates

Samples M-13AB and M-13009AB were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Concentration		Concentration					
Analyte	M-13AB	M-13009AB	RPD (Limits)	Difference (Limits)	Flag	A or P		
Ammonia as N	0.035 mg/L	0.155 mg/L	-	0.12 (≤0.05)	J (all detects)	A		
Alkalinity, total	118 mg/L	116 mg/L	2 (≤30)	-	-	-		
Alkalinity, bicarbonate	118 mg/L	116 mg/L	2 (≤30)	-	-	-		
Bromide	0.8 mg/L	0.9 mg/L	-	0.1 (≤1.0)	-	-		
Chloride	236 mg/L	286 mg/L	19 (≤30)	-	-	-		
Conductivity	4000 umhos/cm	3990 umhos/cm	0 (≤30)	-	-	-		

	Concei	ntration				
Analyte	M-13AB	M-13009AB	RPD (Limits)	Difference (Limits)	Flag	A or P
Cyanide	0.041 mg/L	0.060 mg/L	-	0.019 (≤0.050)	-	-
Hexavalent Chromium	0.714 mg/L	0.720 mg/L	1 (≤30)	-	-	-
Nitrate as N	3.53 mg/L	4.88 mg/L	32 (≤30)	-	J (all detects)	А
рН	7.49 units	7.50 units	0 (≤30)	-	-	-
Sulfate	1440 mg/L	1480 mg/L	3 (≤30)	-	-	-
Surfactants	0.052 mg/L	0.052 mg/L	-	0 (≤0.020)	_	-
Total dissolved solids	3100 mg/L	3120 mg/L	1 (≤30)		_	-
Total organic carbon	1.4 mg/L	1.3 mg/L	•	0.1 (≤1.0)	-	-
Total phosphorus	0.021 mg/L	0.019 mg/L	-	0.002 (≤0.05)	-	-
Chlorate	284000 ug/L	284000 ug/L	0 (≤30)	-	-	-
Perchlorate	18500 ug/L	19500 ug/L	5 (≤30)	-	-	-

### Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R0903561

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0903561	M-75B M-13AB M-13009AB M-64B M-111AB EB062909-GW1 M-25B	Perchlorate	J- (all detects) UJ (all non-detects)	Ρ	Technical holding times (h)
R0903561	M-75B M-13AB M-13009AB M-64B M-111AB EB062909-GW1 M-25B M-12AB M-110B I-ARB	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)
R0903561	M-13AB M-13009AB	Ammonia as N	J (all detects)	A	Field duplicates (Difference) (fd)
R0903561	M-13AB M-13009AB	Nitrate as N	J (all detects)	A	Field duplicates (RPD) (fd)

### Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R0903561

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903561	M-75B	Total phosphorus	0.050U mg/L	A	bl
R0903561	M-13AB	Total phosphorus	0.050U mg/L	A	bl
R0903561	M-13009AB	Total phosphorus	0.050U mg/L	A	bl
R0903561	M-64B	Total phosphorus	0.050U mg/L	A	Ы
R0903561	M-111AB	Total phosphorus	0.050U mg/L	A	bl
R0903561	EB062909-GW1	Total phosphorus Chloride	0.050U mg/L 2.0U mg/L	A	bl
R0903561	M-25B	Total phosphorus	0.050U mg/L	A	bl

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903561	M-110B	Total phosphorus	0.050U mg/L	A	bl
R0903561	I-ARB	Total phosphorus	0.050U mg/L	А	bl

Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R0903561

No Sample Data Qualified in this SDG

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VALIDATION	COMPLETENE	<b>SS WORKSHEET</b>

Stage 2B

LDC #: 21495J6 SDG #: R0903561

### Laboratory: Columbia Analytical Services

Date:	1/2/10	<
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**METHOD:** (Analyte) Alkalinity (SM2320B), Ammonia-N (EPA Method 350.1), Bromide, Chloride, Nitrate-N, Sulfate (EPA SW846 Method 9056), Nitrite-N (EPA Method 353.2), Chlorate (EPA Method 300.1), Conductivity (EPA Method 120.1), Cyanide (EPA SW846 Method 9012A), Dissolved Hexavalent Chromium (EPA Method 218.6), pH (EPA SW846 Method 9040B), Surfactants (SM5540C), Perchlorate (EPA Method 314.0), Total Phosphorus (EPA Method 365.1), TDS (SM2540D), TOC (EPA SW846 Method 9060), Cation-Anion Balance Difference, Calculated TDS/EC Ratio, Measured TDS/EC Ratio, TDS Ratio (SM1030E)

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
Ι.	Technical holding times	52	Sampling dates: 6/25/09 - 7/1/09
lla.	Initial calibration	A	
llb.	Calibration verification	STA	
<u> </u>	Blanks	4~	
IV	Surrogate	A	
v	Matrix Spike/Matrix Spike Duplicates	A	Ins/mso long
VI.	Duplicates	Å	
VII.	Laboratory control samples	Å	Lis/Lisp
VIII.	Sample result verification	., N	,
IX.	Overall assessment of data	A	
<b>X</b> .	Field duplicates	ちん	(2,3)
XI.	Field blanks	SW	Filter Blank=MC-3B-FILT (R0902886), EB=6

Note:

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

Validated Samples:

1	M-75B	11	M-111ABMS	21	IMM	31	
┠╧━━				21	M)		
2	M-13AB	12	M-111ABMSD	22		32	· · · · · · · · · · · · · · · · · · ·
3	M-13009AB	13	M-111ABDUP	23		33	
4	M-64B	14		24		34	
5	M-111AB	15		25		35	
6	EB062909-GW1	16		26		36	
7	M-25B	17		27		37	
8	M-12AB	18		28		38	
9	M-110B	19		29		39	
10	I-ARB	20		30		40	

Notes:

### VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page:_	
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2nd reviewer:	$-\gamma$

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1-10	As-	Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond CIO3 CIO4)
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
M1-13	M	Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond CIO3 CIO4
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond CIO ₃ CIO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond CIO ₃ CIO ₄
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond CIO3 CIO4
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond CIO ₃ CIO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
		CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
		CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
		CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
		CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
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		CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio
		CAB Calculate TDS/EC Measured TDS/EC Cond Ratio TDS Ratio

Comments:_____

LDC #: 1495Jb SDG #: secon

### VALIDATION FINDINGS WORKSHEET Technical Holding Times

Page:___of___ Reviewer:______ 2nd reviewer:_____

Aii	circ	cled	dates have	exceeded the technical holding time.	
Y	N	N/A	Were	all samples preserved as applicable to as	

Were all samples preserved as applicable to each method ? Were all cooler temperatures within validation criteria? YN N/A Method: 3140 lº4 Parameters: 28 for Technical holding time: Sampling Analysis Analysis Analysis Analysis Analysis Sample ID date date date date date date Qualifier 11291-1 6/15/35 JANP (L) 3444 2,3 1/28/-9 33. 7 616/09 33 Jon 7/29/09 -11-13 6129/09 4/28/.5 30 tu 7/28/09 29 1/28 61301.9 28 ょ

SDG #: See Cover LDC #: 21495J6

## VALIDATION FINDINGS WORKSHEET

**Blanks** 

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METHOD: Inorganics, Method See Cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Reason Code: bl Y N/A Were all samples associated with a given method blank? Y N/A Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.

Conc. units: mg/L	s: mg/L			Associated Samples: All (ND or > RL)
Analyte		Blank ID Maximum	Blank	Sample Identification
	MB	ICB/CCB	Action Limit	
Total Alk	1.0	1.0		
Bicar Alk	1.0			

	E		
	entificatio		
	Sample Identification		
<u>()</u>	S	-	
1-4 (>R			
ated Samples: 1-4 (>RL			
ated Sa			
Associa			
		lit	
	Blank	Action Limit	
	Blank ID Maximum	ICB/CCB	
/T	ik ID ⊼	MB	02
nits: mg		Ÿ	
Conc. units: mg/L	Analyte		TOC

Conc. units: mg/l	ts: mg/L				Associated	ciated Samples: <u>T-P*1:1-4,</u> T-P*2:5-10	T-P*1:1-4, T-F	^{&gt;*2:5-} 10					
Analyte	Blank ID Maximum	Maximum	Blank					Sample Identification	ntification				
	MB	ICB/CCB	ICB/CCB Action Limit	4	2	3	4	ۍ	9	7	6	10	
T-P*1	0.008	0.008		0.026 / 0.050 0.021	l ~	0.050 0.019 / 0.050 0.035 / 0.050	0.035 / 0.050						
T-P*2	0.005	0.005			1			0 029 / 0 050	0 015 / 0 050 1	1020 / 0.050	0 029 / 0 050 / 0 015 / 0 050 / 0 050 / 0 050 / 0 050 / 0 050	001 / 0060	

	9	1.9 / 2.0
Blank	Action Limit	
Maximum	ICB/CCB	0.13
Blank ID	MB	0.13
Analyte		CI

Sample Identification

Associated Samples: 6

Conc. units: mg/L

SDG #: See Cover LDC #: 21495J6

## VALIDATION FINDINGS WORKSHEET

**Blanks** 

Page: Vof 2nd Reviewer. Reviewer:

METHOD: Inorganics, Method See Cover

XNNA Were all samples associated with a given method blank? XNA Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below. Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Reason Code: bl

### Sample Identification Associated Samples: MB: 7-9, ICB/CCB: 7,8 (>RL) Blank Action Limit Maximum ICB/CCB Blank ID Conc. units: mg/L ЯB Analyte

Conc. units: mg/L

0 14

0 13

a

Associated Samples: 4,5,10 (>RL)

Analyte	Blank ID	Maximum	Blank	Sample Identification
	MB	ICB/CCB	Action Limit	
C	0.16	0 14		

SDG #: See Cover LDC #: 21495J6

## VALIDATION FINDINGS WORKSHEET **Field Blanks**

2nd Reviewer: Page: Lof / 3 Reviewer:___

Were target analytes detected in the field blanks? METHOD: Inorganics, MethodSee CoverYNWere field blanks identified in this SDG?YNWere target analytes detected in the field blanksYNN/AWrene target analytes detected in the field blanksBlank units:mg/LSampling date:6/29/09Soil factor appliedField blank type: (circle one)Field blank type:

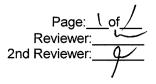
Associated Samples: & Nove

Reason Code: be

Analyte	Blank ID			Sai	Sample Identification	cation		
	9	Action Level	1					
NH3-N	0.012							
TOC (average)	0.2							
σ	1.9							
Conductivity (umhos/cm)	3.06							
NO3-N	0.84	8.4						
pH (pH Units)	5.16				-			
Total Phosphorus	0.015		0-029 / 0 050					

}

### VALIDATION FINDINGS WORKSHEET Field Duplicates



Inorganics, Method See Cover

YN NA YN NA

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

	Concentra	tion (mg/L)				0
Analyte	2	3	RPD (≤30)	Difference	Limits	Qualification (Parent only)
Ammonia as N	0.035	0.155		0.12	(≤0.05)	J det / A (fd)
Total Alkalinity	118	116	2			
Bicarbonate Alkalinity	118	116	2			
Bromide	0.8	0.9		0.1	(≤1.0)	
Chloride	236	286	19			
Conductivity (umhos/cm)	4000	3990	0			
Cyanide	0.041	0.060		0.019	(≤0.050)	
Hexavalent Chromium	0.714	0.720	1			
Nitrate as N	3.53	4.88	32			J det / A (fd)
pH (pH Units)	7.49	7.50	0			
Sulfate	1440	1480	3			
Surfactants	0.052	0.052		0	(≤0.020)	
TDS	3100	3120	1			
TOC, Average	1.4	1.3		0.1	(≤1.0)	
Total Phosphorus	0.021	0.019		0.002	(≤0.05)	
Chlorate (ug/L)	284000	284000	0			
Perchiorate (ug/L)	18500	19500	5			

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### Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:	Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada
Collection Date:	June 25 through June 26, 2009
LDC Report Date:	September 28, 2009
Matrix:	Soil/Water
Parameters:	Wet Chemistry
Validation Level:	Stage 2B
Laboratory:	Columbia Analytical Services, Inc.
Sample Delivery Group (SDC)	D0002594

### Sample Delivery Group (SDG): R0903584

### Sample Identification

SA202-10B	SA202-10BMSD
SA202-28B	SA202-10BDUP
RSAI3-10B	
RSAI3-20B	
RSAI3-32B	
SA188-0.5B	
SA172-0.5B	
SA41-0.5B	
SA44-0.5B	
SA42-0.5B	
RSAI2-10B	
RSAI2009-10B	
RSAI2-20B	
RSAI2-31B	
RSAJ2-10B	
RSAJ2-20B	
RSAJ2-33B	
RSAJ2009-33B	
EB062609-SO	
SA202-10BMS	

### Introduction

This data review covers 21 soil samples and one water sample listed on the cover sheet. The analyses were per Standard Method 2320B for Alkalinity, EPA Method 350.1 for Ammonia as Nitrogen, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 353.2 for Nitrite as Nitrogen, EPA 300.1 for Chlorate, EPA SW 846 Method 9012A for Cyanide, EPA SW 846 Method 7199 for Hexavalent Chromium, EPA SW 846 Method 9040B for pH, Standard Method 5540C for Surfactants, EPA Method 314.0 for Perchlorate, EPA Method 365.1 for Total Phosphorus, Standard Method 2540C for Total Dissolved Solids, Standard Method 2540D for Total suspended Solids, and EPA SW 846 Method 9060 and LLoyd Kahn Method for Total Organic Carbon.

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

Field duplicates are summarized in Section X.

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 with the following exceptions:

Sample	Analyte	Total Time From Sample Collection Until Analysis	Required Holding Time From Sample Collection Until Analysis	Flag	A or P
EB062609-SO	Perchlorate	33 days	28 days	J- (all detects) UJ (all non-detects)	Р
	Hexavalent chromium	27 hours	24 hours	J- (all detects) UJ (all non-detects)	

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

### II. Calibration

Calibration verification frequency and analysis criteria were met for each method when applicable with the following exceptions:

Date	Lab. Reference/ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
7/2/09	CCV (22:09)	Bromide	174 (90-110)	EB062609-SO	R (all detects)	Ρ

### III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Concentration	Associated Samples
МВ	Alkalinity, total Alkalinity, bicarbonate Chloride	19 mg/Kg 19 mg/Kg 1 mg/Kg	SA202-10B SA202-28B RSAI3-10B RSAI3-20B RSAI3-32B SA188-0.5B SA172-0.5B SA41-0.5B SA41-0.5B SA44-0.5B SA42-0.5B

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Alkalinity, total Ammonia as N	1.0 mg/L 0.0056 mg/L	SA202-10B SA202-28B RSAI3-10B RSAI3-20B RSAI3-32B SA188-0.5B SA172-0.5B SA41-0.5B SA41-0.5B SA42-0.5B
мв	Alkalinity, total Alkalinity, bicarbonate Chloride Nitrate as N	10 mg/Kg 10 mg/Kg 1.0 mg/Kg 0.46 mg/Kg	RSAI2-10B RSAI2009-10B RSAI2-20B RSAI2-31B RSAJ2-10B RSAJ2-20B RSAJ2-33B RSAJ2009-33B
ICB/CCB	Alkalinity, total	1.0 mg/L	RSAI2-10B RSAI2-009-10B RSAI2-20B RSAI2-31B RSAJ2-10B RSAJ2-20B RSAJ2-33B RSAJ2-33B RSAJ2009-33B
MB	Total organic carbon	50 mg/Kg	SA202-10B SA202-28B RSAI3-10B RSAI3-20B RSAI3-20B RSAI3-32B SA188-0.5B SA172-0.5B SA41-0.5B SA44-0.5B SA42-0.5B RSAI2-10B RSAI2-10B RSAI2-20B RSAJ2-10B
MB	Total organic carbon	70 mg/Kg	RSAI2-31B RSAJ2-20B RSAJ2-33B RSAJ2009-33B

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Total organic carbon	58 mg/Kg	SA202-10B SA202-28B RSAI3-10B RSAI3-20B RSAI3-32B SA188-0.5B SA172-0.5B SA41-0.5B SA41-0.5B SA44-0.5B SA42-0.5B RSAI2-10B RSAI2-10B RSAI2-20B RSAJ2-10B
ICB/CCB	Total organic carbon	71 mg/Kg	RSAI2-31B RSAJ2-20B RSAJ2-33B RSAJ2009-33B
ICB/CCB	Chloride	0.103 mg/L	SA202-10B SA41-0.5B SA44-0.5B SA42-0.5B
ICB/CCB	Chloride	0.094 mg/L	RSAI2-10B RSAI2009-10B RSAI2-20B
ICB/CCB	Chloride	0.106 mg/L	SA202-28B RSAI3-10B RSAI3-20B RSAI3-32B SA188-0.5B
ICB/CCB	Chloride	0.111 mg/L	SA172-0.5B RSAI2-31B RSAJ2-10B RSAJ2-20B RSAJ2-33B RSAJ2009-33B
MB	Total phosphorus	1.3 mg/Kg	All samples in SDG R0903584
ICB/CCB	Total phosphorus	0.0073 mg/L	All samples in SDG R0903584
MB	Alkalinity, total Alkalinity, bicarbonate Bromide Chloride Total phosphorus	1.0 mg/L 1.0 mg/L 0.06 mg/L 0.1 mg/L 0.005 mg/L	EB062609-SO

Method Blank ID	Analyte	Concentration	Associated Samples
ICB/CCB	Alkalinity, total Bromide Chloride Total phosphorus	1.0 mg/L 0.078 mg/L 0.099 mg/L 0.0052 mg/L	EB062609-SO

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	Analyte	Reported Concentration	Modified Final Concentration
SA202-10B	Ammonia as N	0.39 mg/Kg	0.55U mg/Kg
RSAI3-10B	Ammonia as N	0.43 mg/Kg	0.55U mg/Kg
RSAI3-20B	Ammonia as N	0.21 mg/Kg	0.65U mg/Kg
SA44-0.5B	Ammonia as N	0.11 mg/Kg	0.52U mg/Kg
SA42-0.5B	Ammonia as N	0.13 mg/Kg	0.51U mg/Kg
RSAI2-20B	Chloride	1.6 mg/Kg	2.2U mg/Kg
RSAI3-32B	Total organic carbon	270 mg/Kg	290U mg/Kg
EB062609-SO	Chloride Total phosphorus	1.0 mg/L 0.01 mg/L	2.0U mg/L 0.05U mg/L

Sample EB062609-SO was identified as an equipment blank. No contaminant concentrations were found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
EB062609-SO	6/26/09	Ammonia as N Chloride Nitrate as N pH Total phosphorus Sulfate Surfactants Chlorate	0.087 mg/L 1.0 mg/L 0.62 mg/L 6.27 units 0.01 mg/L 1.5 mg/L 0.016 mg/L 3 ug/L	RSAI2-10B RSAI2009-10B RSAI2-20B RSAI2-31B RSAJ2-10B RSAJ2-20B RSAJ2-33B RSAJ2009-33B
EB062609-SO	6/26/09	Total dissolved solids	6 mg/L	No associated samples in this SDG

Sample FB072109-SO (from SDG R0904016) was identified as a field blank. No contaminant concentrations were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
FB072109-SO	7/21/09	Ammonia as N Total organic carbon Chloride Nitrate as N pH Total phosphorus Sulfate Surfactants	0.191 mg/L 0.5 mg/L 9.7 mg/L 1.76 mg/L 3.36 mg/L 0.01 mg/L 5.5 mg/L 0.159 mg/L	SA202-10B SA202-28B RSAI3-10B RSAI3-20B RSAI3-32B RSAI2-10B RSAI2-10B RSAI2-20B RSAI2-31B RSAJ2-10B RSAJ2-10B RSAJ2-20B RSAJ2-33B RSAJ2-33B

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

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA202-10B	Ammonia as N	0.39 mg/Kg	0.55U mg/Kg
	Nitrate as N	6.18 mg/Kg	6.18J+ mg/Kg
	Sulfate	321 mg/Kg	321J+ mg/Kg
	Surfactants	2.4 mg/Kg	2.4J+ mg/Kg
SA202-28B	Chloride	864 mg/Kg	864J+ mg/Kg
	Nitrate as N	2.65 mg/Kg	2.65J+ mg/Kg
	Surfactants	1.3 mg/Kg	3.2U mg/Kg
RSAI3-10B	Ammonia as N	0.43 mg/Kg	0.55U mg/Kg
	Chloride	177 mg/Kg	177J+ mg/Kg
	Nitrate as N	1.41 mg/Kg	1.41J+ mg/Kg
	Sulfate	170 mg/Kg	170J+ mg/Kg
	Surfactants	2.5 mg/Kg	2.5J+ mg/Kg
RSAI3-20B	Ammonia as N	0.21 mg/Kg	0.65U mg/Kg
	Chloride	934 mg/Kg	934J+ mg/Kg
	Nitrate as N	2.29 mg/Kg	2.29J+ mg/Kg
	Surfactants	3.0 mg/Kg	3.0J+ mg/Kg
RSAI3-32B	Nitrate as N	2.05 mg/Kg	2.05J+ mg/Kg
	Surfactants	3.6 mg/Kg	3.6J+ mg/Kg
RSAI2-10B	Ammonia as N	0.08 mg/Kg	0.54U mg/Kg
	Chloride	4.5 mg/Kg	4.5J+ mg/Kg
	Nitrate as N	1.08 mg/Kg	1.08J+ mg/Kg
	Sulfate	12.2 mg/Kg	12.2J+ mg/Kg
	Surfactants	1.3 mg/Kg	2.2U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
RSAI2009-10B	Ammonia as N	0.11 mg/Kg	0.54U mg/Kg
	Chloride	6.8 mg/Kg	6.8J+ mg/Kg
	Nitrate as N	0.98 mg/Kg	0.98J+ mg/Kg
	Sulfate	15.0 mg/Kg	15.0J+ mg/Kg
	Chlorate	198 ug/Kg	220U ug/Kg
RSAI2-20B	Chloride	1.6 mg/Kg	2.2U mg/Kg
	Nitrate as N	0.71 mg/Kg	0.71J+ mg/Kg
	Surfactants	1.3 mg/Kg	2.2U mg/Kg
	Chlorate	62 ug/Kg	220U Ug/Kg
RSAI2-31B	Nitrate as N	0.93 mg/Kg	0.93J+ mg/Kg
	Surfactants	2.0 mg/Kg	3.2U mg/Kg
	Chlorate	69 Ug/Kg	320U Ug/Kg
RSAJ2-10B	Ammonia as N	0.09 mg/Kg	0.54U mg/Kg
	Nitrate as N	2.15 mg/Kg	2.15J+ mg/Kg
	Sulfate	146 mg/Kg	146J+ mg/Kg
	Surfactants	1.3 mg/Kg	2.2U mg/Kg
RSAJ2-20B	Ammonia as N	0.18 mg/Kg	0.53U mg/Kg
	Chloride	828 mg/Kg	828J+ mg/Kg
	Nitrate as N	1.20 mg/Kg	1.20J+ mg/Kg
	Surfactants	1.2 mg/Kg	2.1U mg/Kg
RSAJ2-33B	Nitrate as N	0.90 mg/Kg	0.90J+ mg/Kg
	Surfactants	1.9 mg/Kg	3.4U mg/Kg
RSAJ2009-33B	Ammonia as N	0.18 mg/Kg	0.88U mg/Kg
	Nitrate as N	0.96 mg/Kg	0.96J+ mg/Kg
	Surfactants	2.5 mg/Kg	3.5U mg/Kg
	Chlorate	71 ug/Kg	360U Ug/Kg

#### IV. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

#### V. Duplicates

Duplicate (DUP) sample analyses were reviewed for each matrix as applicable. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (Limits)	Difference (Limits)	Flag	A or P
SA202-10BDUP (SA202-10B SA202-28B RSAI3-10B RSAI3-20B RSAI3-32B RSAI2-10B RSAI2-0B RSAI2-20B RSAI2-31B RSAJ2-10B RSAJ2-20B RSAJ2-20B RSAJ2-33B RSAJ2-33B	Perchlorate	21 (≤20)	-	J (all detects) UJ (all non-detects)	A

#### VI. Laboratory Control Samples

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

LCS ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
LCS	Hexavalent chromium	91 (92-110)	All water samples in SDG R0903584	J- (all detects) UJ (all non-detects)	Р

#### VII. Surrogates

Surrogates were added to all samples and blanks as required by method 300.1. All surrogate recoveries (%R) were within QC limits.

#### VIII. Sample Result Verification and Project Quantitation Limit

All analytes reported below the PQL were qualified as follows:

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

Raw data were not reviewed for this SDG.

#### IX. Overall Assessment

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

#### X. Field Duplicates

Samples RSAI2-10B and RSAI2009-10B and samples RSAJ2-33B and RSAJ2009-33B were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Conce	ntration				
Analyte	RSAI2-10B	RSAI2009-10B	RPD (Limits)	Difference (Limits)	Flag	A or P
Ammonia as N	0.08 mg/Kg	0.11 mg/Kg	-	0.03 (≤0.54)	-	-
Alkalinity, total	1700 mg/Kg	1730 mg/Kg	2 (≤50)	-	-	-
Alkalinity, bicarbonate	1560 mg/Kg	1620 mg/Kg	4 (≤50)	-	-	-
Alkalinity, carbonate	139 mg/Kg	113 mg/Kg	21 (≤50)	-	-	-
Chloride	4.5 mg/Kg	6.8 mg/Kg	-	2.3 (≤2.2)	J (all detects)	A
Nitrate as N	1.08 mg/Kg	0.98 mg/Kg	-	0.1 (≤0.54)	-	-
рН	9.89 units	9.8 units	1 (≤50)	-	_	-
Sulfate	12.2 mg/Kg	15 mg/Kg	21 (≤50)	-	-	-
Surfactants	1.3 mg/Kg	0.6U mg/Kg	-	0.7 (≤2.2)	-	-
Total organic carbon	530 mg/Kg	610 mg/Kg	-	80 (≤360)	-	-
Total phosphorus	891 mg/Kg	846 mg/Kg	5 (≤50)	-	-	-
Chlorate	335 ug/Kg	198 ug/Kg	-	137 (≤2204)	-	-
Perchlorate	375 ug/Kg	470 ug/Kg	22 (≤50)	-	-	-

	Conce	Concentration				
Analyte	RSAJ2-33B	RSAJ2009-33B	RPD (Limits)	Difference (Limits)	Flag	A or P
Ammonia as N	0.08U mg/Kg	0.18 mg/Kg	-	0.1(≤0.88)	-	-
Alkalinity, total	366 mg/Kg	416 mg/Kg	13 (≤50)	-	-	-
Alkalinity, bicarbonate	366 mg/Kg	416 mg/Kg	13 (≤50)	-	-	-

	Conce	ntration				
Analyte	RSAJ2-33B	RSAJ2009-33B	RPD (Limits)	Difference (Limits)	Flag	A or P
Bromide	26.2 mg/Kg	30.8 mg/Kg	16 (≤50)	-	-	-
Chloride	2450 mg/Kg	2660 mg/Kg	8 (≤50)	-	-	-
Nitrate as N	0.90 mg/Kg	0.96 mg/Kg	-	0.06 (≤0.88)	-	-
рН	8.80 units	8.14 units	8 (≤50)		-	-
Sulfate	890 mg/Kg	1030 mg/Kg	15 (≤50)		-	-
Surfactants	1.9 mg/Kg	2.5 mg/Kg	-	0.6 (≤3.5)	-	-
Total organic carbon	540 mg/Kg	520 mg/Kg		20 (≤300)	-	-
Total phosphorus	711 mg/Kg	755 mg/Kg	6 (≤50)	-	-	-
Chlorate	69U ug/Kg	71 ug/Kg	-	2 (≤360)	-	-

#### Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R0903584

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R0903584	EB062609-SO	Perchlorate Hexavalent chromium	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	Ρ	Technical holding times (h)
R0903584	EB062609-SO	Bromide	R (all detects)	Р	Calibration (CCV %R) (c)
R0903584	SA202-10B SA202-28B RSAI3-10B RSAI3-20B RSAI3-32B RSAI2-10B RSAI2-00B RSAI2-20B RSAI2-31B RSAJ2-10B RSAJ2-10B RSAJ2-20B RSAJ2-33B RSAJ2009-33B	Perchlorate	J (all detects) UJ (all non-detects)	A	Duplicate sample analysis (RPD) (ld)
R0903584	EB062609-SO	Hexavalent chromium	J- (all detects) UJ (all non-detects)	Ρ	Laboratory control samples (%R) (I)
R0903584	SA202-10B SA202-28B RSAI3-10B RSAI3-20B RSAI3-20B RSAI3-32B SA188-0.5B SA41-0.5B SA41-0.5B SA42-0.5B RSAI2-10B RSAI2-10B RSAI2-20B RSAI2-20B RSAI2-31B RSAJ2-10B RSAJ2-20B RSAJ2-20B RSAJ2-33B RSAJ2-33B RSAJ2009-33B EB062609-SO	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)
R0903584	RSAI2-10B RSAI2009-10B	Chloride	J (all detects)	A	Field duplicates (Difference) (fd)

#### Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R0903584

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903584	SA202-10B	Ammonia as N	0.55U mg/Kg	A	bl
R0903584	RSAI3-10B	Ammonia as N	0.55U mg/Kg	A	bl
R0903584	RSAI3-20B	Ammonia as N	0.65U mg/Kg	А	bl
R0903584	SA44-0.5B	Ammonia as N	0.52U mg/Kg	A	bl
R0903584	SA42-0.5B	Ammonia as N	0.51U mg/Kg	А	bl
R0903584	RSAI2-20B	Chloride	2.2U mg/Kg	A	bl
R0903584	RSAI3-32B	Total organic carbon	290U mg/Kg	A	bl
R0903584	EB062609-SO	Chloride Total phosphorus	2.0U mg/L 0.05U mg/L	A	bl

#### Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R0903584

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903584	SA202-10B	Ammonia as N Nitrate as N Sulfate Surfactants	0.55U mg/Kg 6.18J+ mg/Kg 321J+ mg/Kg 2.4J+ mg/Kg	A	be
R0903584	SA202-28B	Chloride Nitrate as N Surfactants	864J+ mg/Kg 2.65J+ mg/Kg 3.2U mg/Kg	A	be
R0903584	RSAI3-10B	Ammonia as N Chloride Nitrate as N Sulfate Surfactants	0.55U mg/Kg 177J+ mg/Kg 1.41J+ mg/Kg 170J+ mg/Kg 2.5J+ mg/Kg	A	be
R0903584	RSAI3-20B	Ammonia as N Chloride Nitrate as N Surfactants	0.65U mg/Kg 934J+ mg/Kg 2.29J+ mg/Kg 3.0J+ mg/Kg	A	be

E,

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903584	RSAI3-32B	Nitrate as N Surfactants	2.05J+ mg/Kg 3.6J+ mg/Kg	A	be
R0903584	RSAI2-10B	Ammonia as N Nitrate as N Surfactants	0.54U mg/Kg 1.08J+ mg/Kg 2.2U mg/Kg	A	be,bf
R0903584	RSAI2-10B	Chloride Sulfate	4.5J+ mg/Kg 12.2J+ mg/Kg	A	bf
R0903584	RSAI2009-10B	Ammonia as N Nitrate as N Sulfate	0.54U mg/Kg 0.98J+ mg/Kg 15.0J+ mg/Kg	A	be,bf
R0903584	RSAI2009-10B	Chloride	6.8J+ mg/Kg	A	bf
R0903584	RSAI2009-10B	Chlorate	220U ug/Kg	A	be
R0903584	RSAI2-20B	Chloride Nitrate as N Surfactants Chlorate	2.2U mg/Kg 0.71J+ mg/Kg 2.2U mg/Kg 220U Ug/Kg	A	be,bf
R0903584	RSAI2-31B	Nitrate as N Surfactants	0.93J+ mg/Kg 3.2U mg/Kg	A	be
R0903584	RSAI2-31B	Chlorate	320U Ug/Kg	A	be,bf
R0903584	RSAJ2-10B	Ammonia as N Nitrate as N Surfactants	0.54U mg/Kg 2.15J+ mg/Kg 2.2U mg/Kg	A	be,bf
R0903584	RSAJ2-10B	Sulfate	146J+ mg/Kg	A	bf
R0903584	RSAJ2-20B	Ammonia as N Nitrate as N Surfactants	0.53U mg/Kg 1.20J+ mg/Kg 2.1U mg/Kg	A	be,bf
R0903584	RSAJ2-20B	Chloride	828J+ mg/Kg	A	bf
R0903584	RSAJ2-33B	Nitrate as N Surfactants	0.90J+ mg/Kg 3.4U mg/Kg	A	bf
R0903584	RSAJ2009-33B	Ammonia as N Nitrate as N Surfactants	0.88U mg/Kg 0.96J+ mg/Kg 3.5U mg/Kg	A	be,bf

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903584	RSAJ2009-33B	Chlorate	360U Ug/Kg	A	be

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VALIDATION	COMPLETEN	<b>IESS W</b>	<b>ORKSHEET</b>

Stage 2B

LDC #: 21495K6 SDG #: R0903584

#### Laboratory: Columbia Analytical Services

Date: <u>9/24/</u> Page: <u>1</u> of <u>1</u> Reviewer: <u>2</u> 2nd Reviewer: <u></u>

METHOD: (Analyte)	Alkalinity (SM2	2320B), Amm	onia-N (EPA	Method 350.1	1), Bromide,	Chloride,	Nitrate-N,	Sulfate (EPA
SW846 Method 9056								
Hexavalent Chromiur	n (EPA SW84	6 Method 71	99), pH (EP	A SW846 Me	thod 9040B	/9045D), \$	Surfactants	(SM5540C),
Perchlorate (EPA Met	hod 314.0), Tot	al Phosphorus	s (EPA Metho	d 365.1), TOC	(Lloyd/Kahr	1/EPASV	V846 Metho	d 9060), TDS
(SM2540C), TSS (SM					•			-

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	SW	Sampling dates: 6/25/09,6/26/09
lla.	Initial calibration	Â	
IIb.	Calibration verification	in	
111.	Blanks	SW	
١V	Surrogate	A	
v	Matrix Spike/Matrix Spike Duplicates	Á.	2ms/lown/hup
VI.	Duplicates	52	
VII.	Laboratory control samples	52	Les
VIII.	Sample result verification	N	,
IX.	Overall assessment of data	A	
Х.	Field duplicates	SW	(11,12), (17,18)
XI	Field blanks	SW	FB=FB072109-SO (SDG: R0904016), EB=19

Note:

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

Validated Samples:	Soil	eagent #	(9	Mo-
--------------------	------	----------	----	-----

1	SA202-10B	11	RSAI2-10B	21	SA202-10BMSD	31	MR
2	SA202-28B	12	RSAI2009-10B	22	SA202-10BDUP	32	
3	RSAI3-10B	13	RSAI2-20B	23		33	
4	RSAI3-20B	14	RSAI2-31B	24		34	
5	RSAI3-32B	15	RSAJ2-10B	25		35	¢
6	SA188-0.5B	16	RSAJ2-20B	26		36	
7	SA172-0.5B	17	RSAJ2-33B	27		37	
8	SA41-0.5B	18	RSAJ2009-33B	28		38	
9	SA44-0.5B	19	EB062609-SO	29		39	
10	SA42-0.5B	20	SA202-10BMS	30		40	

Notes:

Page:	_of
Reviewer:	<u></u>
2nd reviewer:	Q
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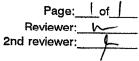
All circled methods are applicable to each sample.

Г		1
Sample ID	Matrix	Deservator
1-18	50; )	
		(Alk pH Br CI NO2 NO2 SO2 NH3 TOC CN Cr6+ T-P MBAS) TDS TSS Cond (CIO3 CIO2)
19	A2_	Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond CIO3 CIO2
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond CIO3 CIO4
20-22	50:	Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond CIO3 CIO
	· · · · · · · · · · · · · · · · · · ·	Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond CIO3 CIO4
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁸⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁵⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond CIO3 CIO4
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄

Comments:____

LDC #: Y cl95 Kb SDG #: <u>cer con</u>

#### VALIDATION FINDINGS WORKSHEET Technical Holding Times



(r) (r)

All eircled dates have ex <u>Y N N/A</u> Were all <u>Y N N/A</u> Were all	ceeded the tech samples preser cooler tempera	ved as applicab	le to each meth	nod ?			/	
Method:		314,0		1199			T	
Parameters:		iery		Crot				
Technical holding tir	ne:	28-22		nfhr (				
Sample ID	Sampling date	Analysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier	
19	6/26/09	7/29/09	(33 ty	)			J-hitle	
Here			8		· ·			
19	6/26/09			6/24/29 1648,1639	(276	)	J-/uis/	
				·····				
			· .					

LDC #: NYTELE	SDG #: Cel com
LDC #: YY	spg #: در

VALIDATION FINDINGS WORKSHEET Calibration

ď  $\checkmark$ IN Page: Reviewer: 2nd Reviewer:

METHOD: Inorganics, EPA Method_

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Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". N N/A Were all instruments calibrated daily, each set-up time, and were the proper number of standards used? V N/N/A Were all initial and continuing calibration verification percent recoveries (%R) within the control limits of 90-110% ?

SNLY: LEVEL JMD Z Z XX

Were recalculated results acceptable? See Level IV Initial and Continuing Calibration Recaluculation Worksheet for recalulations. K/A

Was a balance check conducted prior to the TDS analysis.? Was the titrant normality checked? AN

Y N N/A

Qualifications	R1+18/1 (c)											
Associated Samples												
8%	174											
Analvta	By											1
O Intertion ID	(Jord) (J. J. J											
┣	# Date											

Comments:

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SDG #: See Cover LDC #: 21495K6

## VALIDATION FINDINGS WORKSHEET **Blanks**

ا کر ا Page: Reviewer: 2nd Reviewer.

METHOD: Inorganics, Method See Cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Reason Code: bl Y N/A. Were all samples associated with a given method blank?

Conc. uni	Conc. units: mg/Kg			-	Associated	Associated Samples: 1-10 (>RL)	1-10 (>RL)				
Analyte	Blank ID	Maximum						Sample Identification	ntification		
	MB	ICB/CCB (mg/L)	Action Limit	-	ε	4	თ	10			
Total AIK	19	1.0									
Bicarb. AIK	19										
NH3-N		0.0056		0.39 / 0.55	0.43 / 0.55	0.39/0.55 0.43/0.55 0.21/0.65 0.11/0.52 0.13/0.51	0.11 / 0.52	0.13 / 0.51			
G										 	

Conc. units: mg/Kg	mg/Kg			Ast	Associated Samples: 11-18				
Analyte	Blank ID	Maximum ICB/CCB	Blank Action			Sample Identification	ication		
	MB	(mg/L)	Limit	13				 	
Total AlK	10	1.0							
Bicarb. AIK	10							-	
CI	1.0			1.6 / 2.2					-
NO3-N	0.46								

Conc. units: mg/Kg

Associated Samples: TOC*1: 1-13,15, TOC*2:14,16-18

Analyte	Blank ID	Maximum	Blank	sample Identification	
	MB	ICB/CCB (mg/Kg)	Action Limit	or 5 fill 5	
TOC*1	50	58		270 / 290	
TOC*2	70	71			

SDG #: See Cover LDC #: 21495K6

# VALIDATION FINDINGS WORKSHEET

<u>Blanks</u>

Page: 2 of Reviewer: 2nd Reviewer:

METHOD: Inorganics, Method See Cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Reason Code: bl <u>Y N N/A</u> Were all samples associated with a given method blank? <u>Y N N/A</u> Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.

### Associated Samples: CI*1:1,8-10, CI*2:11-13, CI*3:2-6, CI*4:7,14-18 Sample Identification 1.6/2.2 <u></u> Action Limit Blank Maximum ICB/CCB (mg/L) 0.103 0.094 0.106 0.111 Blank ID Conc. units: mg/Kg ШB Analyte Cl*3 Cl*2 Cl*4 <u>c</u>*

Conc. units: mg/h	<u>mg/Kg</u>			Associated Samples: <u>All Soil (&gt;RL)</u>
Analyte	Blank ID	Maximum	Blank	Sample Identification
	MB	ICB/CCB (mg/L)	Action Limit	
I.P	13	0 0073		

Conc. units: mg/L	mg/L			Associated Samples: <u>19</u>	
Analyte	Blank ID	Maximum	Blank	Sample Identification	
	MB	MB (mg/L)	Action Limit	19	
Total AIK	1.0	1.0			
Bicarb. AIK	1.0				
Br	0.06	0.078			
ū	0.1	660.0		1.0/2.0	
Т-Р	0.005	0.0052		0.01 / 0.05	

LDC #: 21495K6 SDG #: <u>See Cover</u>

## VALIDATION FINDINGS WORKSHEET <u>Field Blanks</u>

Page: Lot 2 Reviewer:__ 2nd Reviewer:__

METHOD: Inorganics, MethodSee CoverN N/AWere field blanks identified in this SDG?N N/AWere target analytes detected in the field blanks?N N/AWere target analytes detected in the field blanks?Blank units: mg/LAssociated sample units: mg/KqSampling date:6/26/09Soil factor appliedField blank type: (circle one)Field Blank / Rinsate / Other: EB

L

Reason Code: be

Associated Samples: 11-18 except TDS:None

Analyte	Blank ID					Sample	Sample Identification				
	19	Action Level	11	12	13	14	15	16	17	18	
Ammonia as N	0.087	8.7	0.08 / 0.54	0.11 / 0.54			0.09 / 0.54 0.18 / 0.53	0.18 / 0.53		0.18 / 0.88	
G	1.0				1.6/2.2						
Nitrate as N	0.62	62	1.08 J+	0.98 J+	0.71 J+	0.93 J+	2.15 J+	1.20 J+	0.90 J+	0.96 J+	
pH (pH Units)	6.27										
Total Phosphorus	0.01										
Sulfate	1.5										
Surfactants	0.016		1.3/2.2		1.3/2.2	2.0/3.2	1.3/2.2	1.2 / 2.1	1.9/3.4	2.5/3.5	
TDS	ų										

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

Analyte	Blank ID					Sample	Sample Identification		
	19	Action Level	12	13	14	18			
Chlorate	ю		198 / 220	62 / 220	69 / 320	71 / 360			

LDC #: 21495K6 SDG #: See Cover

## VALIDATION FINDINGS WORKSHEET <u>Field Blanks</u>

) Page: / of > Reviewer: ( 2nd Reviewer: _____

METHOD: Inorganics, Method See CoverMN N/AWere field blanks identified in this SDG?MN/AWere target analytes detected in the field blanks?Blank units: mg/LAssociated sample units: mg/KgSampling date:7/21/09Field blank type: (circle one) Field Blank / Rinsate / Other: FB

Reason Code: bf

Associated Samples: 1-5, 11-18

Analyte	Blank ID					Sample I	Sample Identification				
	FB072109-SO	Action Level	1	2	3	4	5	11	12	13	14
Ammonia as N	0.191	19.1	0.39 / 0.55		0.43 / 0.55	0.21 / 0.65		0.08 / 0.54	0.11 / 0.54		
TOC (average)	0.5										
C	9.7	970		864 J+	177 J+	934 J+		4.5 J+	6.8 J+	1.6 / 2.2	
Nitrate as N	1.76	176	6.18 J+	2.65 J+	1.41 J+	2.29 J+	2.05 J+	1.08 J+	0.98 J+	0.71 J+	0.93 J+
pH (pH Units)	3.36										
Total Phosphorus	0.01										
Sulfate	5.5	550	321 J+		170 J+			12.2 J+	15.0 J+		
Surfactants	0.159	15.9	2.4 J+	1.3/3.2	2.5 J+	3.0 J+	3.6 J+	1.3/2.2		1.3/2.2	2.0/3.2
Analyte	Blank ID					Sample	Sample Identification				

Analyte	Blank ID					Sample	Sample Identification	
	FB072109-SO	Action Level	15	16	17	18		
Ammonia as N	0.191	19.1	0.09 / 0.54	0.18 / 0.53		0.18 / 0.88		
TOC (average)	0.5							
IJ	2.6	026		828 J+				
Nitrate as N	1.76	176	2.15 J+	1.20 J+	0:90 J+	0.96 J+		
pH (pH Units)	3.36							
Total Phosphorus	0.01							
Sulfate	5.5	550	146 J+					
Surfactants	0.159	15.9	1.3/2.2	1.2/2.1	1.9/3.4	2.5/3.5		

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ğ	SDG

VALIDATION FINDINGS WORKSHEET **Duplicate Analysis** 

2 Page: / of 2nd Reviewer: Reviewer:

Ĕ METHOD: Inorganics, Method_ Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

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Was a duplicate sample analyzed for each matrix in this SDG? YIN NA VIN NA

Were all duplicate sample relative percent differences (RPD) ≤ 20% for water and ≤ 35% for soil samples (≤ 10% for Method 300.0)? If no, see qualification below. A control limit of ±CRDL (±2X CRDL for soil) was used for samples that were ≤5X the CRDL, including when only one of the duplicate sample values were ≤5X the CRDL. If field blanks were used for laboratory duplicates, see overall assessment.

initiated results accentable? See Level N Becalculation Worksheet for recalculations

Z ≻	Y N N/A WERE RECARCULE	aleu lesulo act	יכהומחום: סכם ר	Wele lecalculated lesuis acceptable: See Levelly The accurate the transmission of the second		
*	Dualicata ID	Matrix	Ansivte	RPD (Limite)	Associated Samples	Qualifications
+ -	, , , ,	<u>(2:1</u>	top	7	81-11 .2-1	J/r/A (24)
╀						
]						
E Sol	Comments:					

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3 LDC #: MYISK6 ž SDG #:

## VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

Reviewer: Page:

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Y N N/A Was a laboratory control sample (LCS) analyzed for each matrix in this SDG? Were all LCS percent recoveries (%R) within the control limits of 80-120% (85-115% for Method 300.0)? LEVEL IV ONLY: Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

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METHOD: Inorganics, Method

#	LCS ID	Matrix	Analyte	%B (limite)	Associated	
-	Lef	R.	19.0		Associated Samples	Qualifications
$\mathbf{F}$	-		5		E	(3) Q/2n/-f
Com	Comments:	:				

LCS.0

#### VALIDATION FINDINGS WORKSHEET Field Duplicates

Page: 1_of 2 Reviewer: _____ 2nd Reviewer: _____

Inorganics, Method_See Cover____



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

ſ	Concentrati	on (mg/Kg)				Qualification
Analyte	11	12	RPD (≤50)	Difference	Limits	(Parent only)
Ammonia as N	0.08	0.11		0.03	(≤0.54)	
Total Alkalinity	1700	1730	2			
Bicarbonate Alkalinity	1560	1620	4			
Carbonate Alkalinity	139	113	21			
Chloride	4.5	6.8		2.3	(≤2.2)	J det / A (fd)
Nitrate as N	1.08	0.98		0.1	(≤0.54)	
pH (pH Units)	9.89	9.80	1			
Sulfate	12.2	15.0	21			
Surfactants	1.3	0.6U		0.7	(≤2.2)	
тос	530	610		80	(≤360)	
Total Phosphorus	891	846	5			
Chlorate (ug/Kg)	335	198		137	(≤220)	
Perchlorate (ug/Kg)	375	470	22			

	Concentrati	on (mg/Kg)				Qualification
Analyte	17	18	RPD (≤50)	Difference	Limits	(Parent only)
Ammonia as N	0.08U	0.18		0.1	(≤0.88)	
Total Alkalinity	366	416	13			
Bicarbonate Alkalinity	366	416	13			
Bromide	26.2	30.8	16			

#### VALIDATION FINDINGS WORKSHEET **Field Duplicates**

	Page:	∠ _{of_}	2
F	Reviewer:	(	
2nd F	Reviewer:		
			-

Inorganics, Method See Cover

<u>YN NA</u> ON NA Were field duplicate pairs identified in this SDG? Were target analytes detected in the field duplicate pairs?

	Concentrat	ion (mg/Kg)				
Analyte	17	18	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Chloride	2450	2660	8			
Nitrate as N	0.90	0.96		0.06	(≤0.88)	
pH (pH Units)	8.80	8.14	8			
Sulfate	890	1030	15	_140/	(≤)	
Surfactants	1.9	2.5		0.6	(≤3.5)	
тос	540	520		20	(≤300)	
Total Phosphorus	711	755	6			
Chlorate (ug/Kg)	69U	71		2	(≤360)	

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#### Laboratory Data Consultants, Inc. Data Validation Report

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

Collection Date: July 6 through July 7, 2009

LDC Report Date: September 29, 2009

Matrix: Soil

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R0903729

#### Sample Identification

SA206-0.5B SA206-10B SA206-25B SA206-30B RSAK4-10B RSAK4-20B RSAK4-31B RSAL4-0.5B RSAL4009-0.5B RSAL4-10B RSAL4-28B SA100-10B SA100-30B SA69-0.5B SA69-10B SA69-29B SA206-30BMS SA206-30BMSD SA206-30BDUP

#### Introduction

This data review covers 19 soil samples listed on the cover sheet. The analyses were per Standard Method 2320B for Alkalinity, EPA Method 350.1 for Ammonia as Nitrogen, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, and Sulfate, EPA Method 353.2 for Nitrite as Nitrogen, EPA 300.1 for Chlorate, EPA SW 846 Method 9012A for Cyanide, EPA SW 846 Method 7199 for Hexavalent Chromium, EPA SW 846 Method 9045D for pH, Standard Method 5540C for Surfactants, EPA Method 314.0 for Perchlorate, EPA Method 365.1 for Total Phosphorus, and Lloyd/Kahn Method for Total Organic Carbon.

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

Field duplicates are summarized in Section X.

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. Calibration

Calibration verification frequency and analysis criteria were met for each method when applicable.

#### III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the initial, continuing and preparation blanks with the following exceptions:

Method Blank ID	Analyte	Concentration	Associated Samples
МВ	Alkalinity, total Alkalinity, bicarbonate Chloride Surfactants	11 mg/Kg 11 mg/Kg 1.3 mg/Kg 1.2 mg/Kg	SA206-0.5B SA206-10B SA206-25B
ICB/CCB	Alkalinity, total	1.0 mg/L	SA206-0.5B SA206-10B SA206-25B
MB	Alkalinity, total Alkalinity, bicarbonate Chloride	12 mg/Kg 12 mg/Kg 1.3 mg/Kg	SA206-30B RSAK4-10B RSAK4-20B RSAK4-31B RSAL4-0.5B RSAL4-0.5B RSAL4-0.5B RSAL4-10B RSAL4-28B SA100-10B SA100-30B
ICB/CCB	Alkalinity, total	1.0 mg/L	SA206-30B RSAK4-10B RSAK4-20B RSAK4-31B RSAL4-0.5B RSAL4-0.5B RSAL4-0.5B RSAL4-10B RSAL4-28B SA100-10B SA100-30B

Method Blank ID	Analyte	Concentration	Associated Samples
МВ	Alkalinity, total Alkalinity, bicarbonate Chloride	10 mg/Kg 10 mg/Kg 1.3 mg/Kg	SA69-0.5B SA69-10B SA69-29B
ICB/CCB	Alkalinity, total	0.5 mg/L	SA69-0.5B SA69-10B SA69-29B
ICB/CCB	Chloride	0.131 mg/L	SA69-0.5B SA69-10B
MB	Total organic carbon	70 mg/Kg	SA206-0.5B SA206-10B SA206-25B SA206-30B RSAK4-10B RSAK4-20B RSAK4-20B RSAK4-31B RSAL4-0.5B RSAL4-0.5B RSAL4-0.5B RSAL4-10B RSAL4-28B SA100-10B
MB	Total organic carbon	50 mg/Kg	SA100-30B SA69-0.5B SA69-10B SA69-29B
ICB/CCB	Total organic carbon	65.9 mg/Kg	SA206-0.5B SA206-10B SA206-25B SA206-30B RSAK4-10B RSAK4-20B RSAK4-20B RSAK4-31B RSAL4-0.5B RSAL4-0.5B RSAL4-0.5B RSAL4-10B RSAL4-28B SA100-10B
ICB/CCB	Total organic carbon	76.2 mg/Kg	SA100-30B SA69-0.5B SA69-10B SA69-29B
MB	Total phosphorus	1.6 mg/Kg	SA206-0.5B

Method Blank ID	Analyte	Concentration	Associated Samples
МВ	Total phosphorus	1.4 mg/Kg	SA206-10B SA206-25B SA206-30B RSAK4-10B RSAK4-20B RSAK4-31B RSAL4-0.5B RSAL4-0.5B RSAL4-05B RSAL4-10B RSAL4-10B RSAL4-28B SA100-10B SA100-30B SA69-0.5B SA69-10B SA69-29B
ICB/CCB	Total phosphorus	0.0066 mg/L	SA206-0.5B SA206-10B SA206-25B SA206-30B RSAK4-20B
ICB/CCB	Total phosphorus	0.0094 mg/L	RSAK4-10B RSAK4-31B RSAL4-0.5B RSAL4-09-0.5B RSAL4-10B RSAL4-28B SA100-10B SA100-30B SA69-0.5B SA69-10B SA69-29B
ICB/CCB	Chloride	0.148 mg/L	RSAK4-31B RSAL4-0.5B RSAL4009-0.5B RSAL4-10B RSAL4-28B SA69-29B
ICB/CCB	Chloride	0.139 mg/L	SA206-10B
ICB/CCB	Chloride	0.18 mg/L	SA69-0.5B SA69-10B

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

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA206-0.5B	Surfactants	1.9 mg/Kg	2.1U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA206-10B	Surfactants	1.6 mg/Kg	2.2U mg/Kg
SA206-25B	Surfactants	2.0 mg/Kg	3.9U mg/Kg
SA69-10B	Chloride	1.9 mg/Kg	2.2U mg/Kg
SA206-30B	Total organic carbon	250 mg/Kg	290U mg/Kg
RSAL4-28B	Total organic carbon	290 mg/Kg	300U mg/Kg

Sample FB072109-SO (from SDG R0904016) was identified as a field blank. No contaminant concentrations were found in this blank with the following exceptions:

Field Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
FB072109-SO	7/21/09	Ammonia as N Total organic carbon Chloride Nitrate as N pH Total phosphorus Sulfate Surfactants	0.191 mg/L 0.5 mg/L 9.7 mg/L 1.76 mg/L 3.36 mg/L 0.01 mg/L 5.5 mg/L 0.159 mg/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 with the following exceptions:

Sample	Analyte	Reported Concentration	Modified Final Concentration
SA206-0.5B	Chloride	409 mg/Kg	409J+ mg/Kg
	Nitrate as N	7.77 mg/Kg	7.77J+ mg/Kg
	Sulfate	475 mg/Kg	475J+ mg/Kg
	Surfactants	1.9 mg/Kg	2.1U mg/Kg
SA206-10B	Chloride	880 mg/Kg	880J+ mg/Kg
	Nitrate as N	2.71 mg/Kg	2.71J+ mg/Kg
	Surfactants	1.6 mg/Kg	2.2U mg/Kg
SA206-25B	Nitrate as N	2.04 mg/Kg	2.04J+ mg/Kg
	Surfactants	2.0 mg/Kg	3.9U mg/Kg
SA206-30B	Total organic carbon	250 mg/Kg	290U mg/Kg
	Nitrate as N	1.68 mg/Kg	1.68J+ mg/Kg
	Surfactants	2.3 mg/Kg	3.3U mg/Kg

Sample	Analyte	Reported Concentration	Modified Final Concentration
RSAK4-10B	Nitrate as N	14.8 mg/Kg	14.8J+ mg/Kg
	Surfactants	0.9 mg/Kg	2.2U mg/Kg
RSAK4-20B	Chloride	336 mg/Kg	336J+ mg/Kg
	Nitrate as N	2.52 mg/Kg	2.52J+ mg/Kg
	Surfactants	1.1 mg/Kg	2.2U mg/Kg
RSAK4-31B	Chloride	284 mg/Kg	284J+ mg/Kg
	Nitrate as N	4.20 mg/Kg	4.20J+ mg/Kg
RSAL4-0.5B	Chloride	195 mg/Kg	195J+ mg/Kg
	Nitrate as N	9.93 mg/Kg	9.93J+ mg/Kg
	Sulfate	276 mg/Kg	276J+ mg/Kg
	Surfactants	1.3 mg/Kg	2.1U mg/Kg
RSAL4009-0.5B	Chloride	197 mg/Kg	197J+ mg/Kg
	Nitrate as N	9.91 mg/Kg	9.91J+ mg/Kg
	Sulfate	268 mg/Kg	268J+ mg/Kg
	Surfactants	1.2 mg/Kg	2.1U mg/Kg
RSAL4-10B	Chloride	409 mg/Kg	409J+ mg/Kg
	Nitrate as N	7.30 mg/Kg	7.30J+ mg/Kg
	Sulfate	163 mg/Kg	163J+ mg/Kg
	Surfactants	1.5 mg/Kg	2.2U mg/Kg
RSAL4-28B	Total organic carbon	290 mg/Kg	300U mg/Kg
	Chloride	553 mg/Kg	553J+ mg/Kg
	Nitrate as N	5.27 mg/Kg	5.27J+ mg/Kg
	Surfactants	1.5 mg/Kg	3.7Umg/Kg
SA100-10B	Nitrate as N	2.01 mg/Kg	2.01J+ mg/Kg
	Surfactants	1.3 mg/Kg	2.2U mg/Kg
SA100-30B	Nitrate as N	2.85 mg/Kg	2.85J+ mg/Kg
	Surfactants	1.2 mg/Kg	3.1U mg/Kg
SA69-0.5B	Chloride	4.3 mg/Kg	4.3J+ mg/Kg
	Nitrate as N	1.42 mg/Kg	1.42J+ mg/Kg
	Sulfate	175 mg/Kg	175J+ mg/Kg
	Surfactants	1.2 mg/Kg	2.2U mg/Kg
SA69-10B	Chloride	1.9 mg/Kg	2.2J+ mg/Kg
	Nitrate as N	1.15 mg/Kg	1.15J+ mg/Kg
	Sulfate	102 mg/Kg	102J+ mg/Kg
	Surfactants	1.3 mg/Kg	2.2Umg/Kg
SA69-29B	Chloride	278 mg/Kg	278J+ mg/Kg
	Nitrate as N	7.36 mg/Kg	7.36J+ mg/Kg
	Surfactants	1.5 mg/Kg	3.0U mg/Kg

#### IV. Matrix Spike/Matrix Spike Duplicates

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

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	RPD (Limits)	Flag	A or P
SA206-30BMS (All samples in SDG R0903729)	Surfactants	63 (75-125)	-	-	J- (all detects) UJ (all non-detects)	A

#### V. Duplicates

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

#### VI. Laboratory Control Samples

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

#### VII. Surrogates

Surrogates were added to all samples and blanks as required by method 300.1. All surrogate recoveries (%R) were within QC limits.

#### VIII. Sample Result Verification and Project Quantitation Limit

All analytes reported below the PQL were qualified as follows:

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

Raw data were not reviewed for this SDG.

#### IX. Overall Assessment

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

#### X. Field Duplicates

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

	Conce	ntration					
Analyte	RSAL4-0.5B	RSAL4009-0.5B	RPD (Limits)	Difference (Limits)	Flag	A or P	
Alkalinity, total	252 mg/Kg	263 mg/Kg	4 (≤50)	-	-	-	
Alkalinity, bicarbonate	245 mg/Kg	256 mg/Kg	4 (≤50)	-	-	-	
Alkalinity, carbonate	6 mg/Kg	7 mg/Kg	-	1 (≤21)	-	-	
Chloride	195 mg/Kg	197 mg/Kg	1 (≤50)	-	÷	-	
Nitrate as N	9.93 mg/Kg	9.91 mg/Kg	0 (≤50)	-	-	-	
рН	8.73 units	8.75 units	0 (≤50)	-	-	-	
Sulfate	276 mg/Kg	268 mg/Kg	3 (≤50)	-	-	-	
Surfactants	1.3 mg/Kg	1.2 mg/Kg	-	0.1 (≤2.1)	-	-	
Total organic carbon	980 mg/Kg	860 mg/Kg	-	120 (≤310)	-	-	
Total phosphorus	855 mg/Kg	928 mg/Kg	8 (≤50)	-	-	-	
Chlorate	2070 ug/Kg	2340 ug/Kg	12 (≤50)	-	-	-	
Perchlorate	91600 ug/Kg	82400 ug/Kg	11 (≤50)	-	-	-	

#### Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R0903729

SDG	Sample	Analyte	Flag	A or P	Reason
R0903729	SA206-0.5B SA206-10B SA206-25B SA206-30B RSAK4-10B RSAK4-20B RSAK4-31B RSAL4-0.5B RSAL4-0.5B RSAL4-05B RSAL4-10B RSAL4-28B SA100-10B SA100-30B SA69-0.5B SA69-10B SA69-29B	Surfactants	J- (all detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicates (%R) (m)
R0903729	SA206-0.5B SA206-10B SA206-25B SA206-30B RSAK4-10B RSAK4-20B RSAK4-20B RSAL4-0.5B RSAL4-0.5B RSAL4-0B RSAL4-10B RSAL4-28B SA100-10B SA100-30B SA69-0.5B SA69-10B SA69-29B	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (sp)

#### Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R0903729

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903729	SA206-0.5B	Surfactants	2.1U mg/Kg	A	bl
R0903729	SA206-10B	Surfactants	2.2U mg/Kg	A	bl
R0903729	SA206-25B	Surfactants	3.9U mg/Kg	A	bl
R0903729	SA69-10B	Chloride	2.2U mg/Kg	A	Ы
R0903729	SA206-30B	Total organic carbon	290U mg/Kg	A	Ы

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903729	RSAL4-28B	Total organic carbon	300U mg/Kg	A	bl

#### Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R0903729

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903729	SA206-0.5B	Chloride Nitrate as N Sulfate Surfactants	409J+ mg/Kg 7.77J+ mg/Kg 475J+ mg/Kg 2.1U mg/Kg	A	bf
R0903729	SA206-10B	Chloride Nitrate as N Surfactants	880J+ mg/Kg 2.71J+ mg/Kg 2.2U mg/Kg	A	bf
R0903729	SA206-25B	Nitrate as N Surfactants	2.04J+ mg/Kg 3.9U mg/Kg	A	bf
R0903729	SA206-30B	Total organic carbon Nitrate as N Surfactants	290U mg/Kg 1.68J+ mg/Kg 3.3U mg/Kg	A	bf
R0903729	RSAK4-10B	Nitrate as N Surfactants	14.8J+ mg/Kg 2.2U mg/Kg	A	bf
R0903729	RSAK4-20B	Chloride Nitrate as N Surfactants	336J+ mg/Kg 2.52J+ mg/Kg 2.2U mg/Kg	A	bf
R0903729	RSAK4-31B	Chloride Nitrate as N	284J+ mg/Kg 4.20J+ mg/Kg	A	bf
R0903729	RSAL4-0.5B	Chloride Nitrate as N Sulfate Surfactants	195J+ mg/Kg 9.93J+ mg/Kg 276J+ mg/Kg 2.1U mg/Kg	A	bf
R0903729	RSAL4009-0.5B	Chloride Nitrate as N Sulfate Surfactants	197J+ mg/Kg 9.91J+ mg/Kg 268J+ mg/Kg 2.1U mg/Kg	A	bf
R0903729	RSAL4-10B	Chloride Nitrate as N Sulfate Surfactants	409J+ mg/Kg 7.30J+ mg/Kg 163J+ mg/Kg 2.2U mg/Kg	A	bf

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903729	RSAL4-28B	Total organic carbon Chloride Nitrate as N Surfactants	300U mg/Kg 553J+ mg/Kg 5.27J+ mg/Kg 3.7Umg/Kg	A	bf
R0903729	SA100-10B	Nitrate as N Surfactants	2.01J+ mg/Kg 2.2U mg/Kg	A	bf
R0903729	SA100-30B	Nitrate as N Surfactants	2.85J+ mg/Kg 3.1U mg/Kg	A	bf
R0903729	SA69-0.5B	Chloride Nitrate as N Sulfate Surfactants	4.3J+ mg/Kg 1.42J+ mg/Kg 175J+ mg/Kg 2.2U mg/Kg	A	bf
R0903729	SA69-10B	Chloride Nitrate as N Sulfate Surfactants	2.2J+ mg/Kg 1.15J+ mg/Kg 102J+ mg/Kg 2.2Umg/Kg	A	bf
R0903729	SA69-29B	Chloride Nitrate as N Surfactants	278J+ mg/Kg 7.36J+ mg/Kg 3.0U mg/Kg	A	bf

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903729	SA206-10B	Surfactants	2.2U mg/Kg	A	bl
R0903729	SA206-25B	Surfactants	3.9U mg/Kg	A	bl
R0903729	SA69-10B	Chloride	2.2U mg/Kg	A	bl
R0903729	SA206-30B	Total organic carbon	290U mg/Kg	A	bl
R0903729	RSAL4-28B	Total organic carbon	300U mg/Kg	A	bl

#### Tronox LLC Facility, 2009 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R0903729

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903729	SA206-0.5B	Chloride Nitrate as N Sulfate Surfactants	409J+ mg/Kg 7.77J+ mg/Kg 475J+ mg/Kg 2.1U mg/Kg	A	bf
R0903729	SA206-10B	Chloride Nitrate as N Surfactants	880J+ mg/Kg 2.71J+ mg/Kg 2.2U mg/Kg	A	bf
R0903729	SA206-25B	Nitrate as N Surfactants	2.04J+ mg/Kg 3.9U mg/Kg	A	bf
R0903729	SA206-30B	Total organic carbon Nitrate as N Surfactants	290U mg/Kg 1.68J+ mg/Kg 3.3U mg/Kg	A	bf
R0903729	RSAK4-10B	Nitrate as N Surfactants	14.8J+ mg/Kg 2.2U mg/Kg	A	bf
R0903729	RSAK4-20B	Chloride Nitrate as N Surfactants	336J+ mg/Kg 2.52J+ mg/Kg 2.2U mg/Kg	A	bf
R0903729	RSAK4-31B	Chloride Nitrate as N	284J+ mg/Kg 4.20J+ mg/Kg	A	bf
R0903729	RSAL4-0.5B	Chloride Nitrate as N Sulfate Surfactants	195J+ mg/Kg 9.93J+ mg/Kg 276J+ mg/Kg 2.1U mg/Kg	A	bf

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R0903729	RSAL4009-0.5B	Chloride Nitrate as N Sulfate Surfactants	197J+ mg/Kg 9.91J+ mg/Kg 268J+ mg/Kg 2.1U mg/Kg	A	bf
R0903729	RSAL4-10B	Chloride Nitrate as N Sulfate Surfactants	409J+ mg/Kg 7.30J+ mg/Kg 163J+ mg/Kg 2.2U mg/Kg	A	bf
R0903729	RSAL4-28B	Total organic carbon Chloride Nitrate as N Surfactants	300U mg/Kg 553J+ mg/Kg 5.27J+ mg/Kg 3.7Umg/Kg	A	bf
R0903729	SA100-10B	Nitrate as N Surfactants	2.01J+ mg/Kg 2.2U mg/Kg	A	bf
R0903729	SA100-30B	Nitrate as N Surfactants	2.85J+ mg/Kg 3.1U mg/Kg	A	bf
R0903729	SA69-0.5B	Chloride Nitrate as N Sulfate Surfactants	4.3J+ mg/Kg 1.42J+ mg/Kg 175J+ mg/Kg 2.2U mg/Kg	A	bf
R0903729	SA69-10B	Chloride Nitrate as N Sulfate Surfactants	2.2J+ mg/Kg 1.15J+ mg/Kg 102J+ mg/Kg 2.2Umg/Kg	A	bf
R0903729	SA69-29B	Chloride Nitrate as N Surfactants	278J+ mg/Kg 7.36J+ mg/Kg 3.0U mg/Kg	A	bf

Tronox Northgate Henderson
VALIDATION COMPLETENESS WORKSHEET
Stage 2B

LDC #: <u>21495L6</u> SDG #: R0903729

#### Laboratory: Columbia Analytical Services

Date: 9/x1	5
Page:of/	/
Reviewer:	
2nd Reviewer:	

METHOD: (Analyte) Alkalinity (SM2320B), Ammonia-N (EPA Method 350.1), Bromide, Chloride, Nitrate-N, Sulfate (EPA SW846 Method 9056), Nitrite-N (EPA Method 353.2), Chlorate (EPA Method 300.1), Cyanide (EPA SW846 Method 9012A), Hexavalent Chromium (EPA SW846 Method 7199), pH (EPA SW846 Method 9045D), Surfactants (SM5540C), Perchlorate (EPA Method 314.0), Total Phosphorus (EPA Method 365.1), TOC (Lloyd/Kahn)

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
١.	Technical holding times	A	Sampling dates: 7/06/09 7/07/09
lla.	Initial calibration	A,	
llb.	Calibration verification	AST	
111.	Blanks	SW	· · · · · · · · · · · · · · · · · · ·
IV	Surrogate	A	
v	Matrix Spike/Matrix Spike Duplicates	ŚW	> my hurs / vine
VI.	Duplicates	A	For Johnman GRL.
VII.	Laboratory control samples	A	les
VIII.	Sample result verification	N	
IX.	Overall assessment of data	A	
Х.	Field duplicates	Św	(8,9)
XI.	Field blanks	42	FB=FB072109-SO (SDG: 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

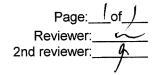
Validated Samples:

1	SA206-0.5B	11	RSAL4-28B	21	MB	31
2	SA206-10B	12	SA100-10B	22	-	32
3	SA206-25B	13	SA100-30B	23		33
4	SA206-30B	14	SA69-0.5B	24		34
5	RSAK4-10B	15	SA69-10B	25	······································	35
6	RSAK4-20B	16	SA69-29B	26		36
7	RSAK4-31B	17	SA206-30BMS	27		37
8	RSAL4-0.5B	18	SA206-30BMSD	28		38
9	RSAL4009-0.5B	19	SA206-30BDUP	29		39
10	RSAL4-10B	20		30		40

Notes:

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All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1-76	Soi)	(Alk pH Br CI NO3 NO3 SO4 NH3 TOC CN Cr6+ T-P MBAS) TDS TSS Cond (CIO3 CIQ4)
	,	Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond CIO3 CIO4
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
n17-19	Soil	Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond CO2 CO4
112	1	Alk pH (Br/C) NO NO SO NH TOC CN CP TOMBAS TDS TSS Cond CIO, CIO4
19	V	AIK OH BY CI NO3 (NO) SO NH3 (TOC CN CP+ (T-P MBAS) TDS TSS Cond CIO3 CIO4
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO $_3$ NO $_2$ SO $_4$ NH $_3$ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO $_3$ ClO $_4$
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond CIO ₃ CIO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond CIO ₃ CIO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond CIO ₃ CIO ₄
		Alk pH Br CI NO ₃ NO ₂ SO ₄ NH ₃ TOC CN $Cr^{6+}$ T-P MBAS TDS TSS Cond CIO ₃ CIO ₄
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr ⁵⁺ T-P MBAS TDS TSS Cond ClO3 ClO4

Comments:_____

SDG #: See Cover LDC #: 21495L6

# VALIDATION FINDINGS WORKSHEET

Blanks

Page: <u></u>_of <u></u> ∕ 2nd Reviewer:___ Reviewer:__

METHOD: Inorganics, Method See Cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Reason Code: bl X N N/A Were all samples associated with a given method blank? Y N N/A Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.

Conc. units: mg/Kg	s: mg/Kg			-	Associated	Associated Samples: 1-3	ې ۲				
Analyte	Blank ID	Maximum	Blank				Sa	Sample Identification	ĸ		
	MB	ICB/CCB (mg/L)	Action Limit		7	ъ					
Total AIK	11	1.0									
Bicarb. AIK	11										
Ū	1.3										
Surfactants	1.2			1.9/2.1	1.6 / 2.2	2.0/3.9					

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Conc. units: mg/Kg	mg/Ng			Associated Samples: 4-13
Analyte	Blank M ID IO	Maximum ICB/CCB	Blank Action	Sample Identification
	MB	(mg/L)		
Total AIK	12	1.0		
Bicarb. AIK	12			
CI	1.3			

## VALIDATION FINDINGS WORKSHEET Blanks



METHOD: Inorganics, Method See Cover

<u>ANNA</u> Were all samples associated with a given method blank? <u>ANNA</u> Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below. Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Reason Code: bl

### Sample Identification Sample Identification Associated Samples: 14-16 except ICB/CCB: CI:14,15 Associated Samples: TOC*1: 1-12, TOC*2:13-16 1.9/2.2 32 Action Limit Blank Blank Maximum ICB/CCB (mg/L) 0.131 0.5 Blank ID Conc. units: mg/Kg Conc. units: mg/Kg MB 10 1.3 9 Analyte Analyte Bicarb. AIK Total AIK σ

## 290 / 300 ÷ 250 / 290 4 Action Limit Maximum ICB/CCB (mg/Kg) 65.9 76.2 Blank ID MB 2 50 TOC*1 TOC*2

Conc. units: mg/Kg	mg/Kg			Associated Samples: <u>MB: T-P*1:1, T-P*2: 2-16, ICB/CCB: T-P*1: 1-4,6, T-P*2: 5, 7-16 (&gt;RL)</u>
Analyte	Blank ID		Maximum Blank ICB/CCB Action Limit	Sample Identification
	MB	(mg/L)		
T-P*1	1.6	0.0066		
Т-Р*7	14	0 0004		

SDG #: See Cover LDC #: 21495L6

# VALIDATION FINDINGS WORKSHEET Blanks

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METHOD: Inorganics, Method See Cover

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". Reason Code: bl X N N/A Were all samples associated with a given method blank? X N N/A Were any inorganic contaminants detected above the reporting limit in the method blanks? If yes, please see qualifications below.

Conc. units: mg/Kg	mg/Kg			Associated Samples: CI*1:7-11,16, CI*2: 2, SO4: 14, 15
Analyte		Maximum ICB/CCB	Maximum Blank ICB/CCB Action Limit	Sample Identification
	MB	(mg/L)		
C *1		0 148		
CI*2		0.139		
S04		0.18		

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LDC #: 21495/6 SDG #: See Cover

## VALIDATION FINDINGS WORKSHEET Field Blanks

Q Page: ________ 2nd Reviewer:___ Reviewer.

METHOD:Inorganics, MethodSee CoverYNN/AWere field blanks identified in this SDG?YNN/AWere target analytes detected in the field blanks?YNN/AWere target analytes detected in the field blanks?Blank units:mg/LAssociated sample units:mg/KqSampling date:7/21/09Soil factor applied10XField blank type: (circle one)Field Blank / Rinsate / Other:FB

Reason Code: bf

Associated Samples: All

Analyte	Blank ID					Sample I	Sample Identification				
	FB072109-SO	Action Level	Ł	2	ю	4	Ω	ω	7	œ	6
Ammonia as N	0.191	19.1									
TOC (average)	0.5					250 / 290					
G	9.7	970	409 J+	880 J+				336 J+	284 J+	195 J+	197 J+
Nitrate as N	1.76	176	+L 77.7	2.71 J+	2.04 J+	1.68 J+	14.8 J+	2.52 J+	4.20 J+	9.93 J+	9.91 j+
pH (pH Units)	3.36										
Total Phosphorus	0.01										
Sulfate	5.5	550	475 J+							276 J+	268 j+
Surfactants	0.159	15.9	1.9/2.1	1.6 / 2.2	2.0/3.9	2.3/3.3	0.9/2.2	1.1/2.2		1.3 / 2.1	1.2/2.1

Analyte	Blank ID					Sample I	Sample Identification			
	FB072109-SO	Action Level	10	11	12	13	14	15	16	
Ammonia as N	0.191	19.1								
TOC (average)	0.5			290 / 300						
ō	2.6	026	<b>4</b> 09 J+	553 J+			4.3 J+	1.9/2.2	278 J+	
Nitrate as N	1.76	176	7.30 J+	5.27 J+	2.01 J+	2.85 J+	1.42 J+	1.15 J+	7.36 J+	
pH (pH Units)	3.36									
Total Phosphorus	0.01									
Sulfate	5.5	550	163 J+				175 J+	102 J+		
Surfactants	0.159	15.9	1.5/2.2	1.5/3.7	1.3/2.2	1.2/3.1	1.2/2.2	1.3/2.2	1.5/3.0	

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ves sar LDC #: 2149TL6 SDG #:

## VALIDATION FINDINGS WORKSHEET **Matrix Spike Analysis**

ζ 0 Page: | of 2nd Reviewer: Reviewer:___

mas sons METHOD: Inorganics, Method Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". <u>M N/A</u> Was a matrix spike analyzed for each matrix in this SDG?

Were matrix spike percent recoveries (%R) within the control limits of 75-125 (85-115% for Method 300.0)? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

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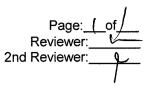
Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

L						
*	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
		50:	Sudartante	62	A.	J-/~ (~)
1						
L						
_						
Com	Comments:					

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LDC#:<u>21495L6</u> SDG#:<u>See Cover</u>

#### VALIDATION FINDINGS WORKSHEET Field Duplicates



Inorganics, Method See Cover

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

	Concentrati	ion (mg/Kg)				Qualification
Analyte	8	9	RPD (≤50)	Difference	Limits	(Parent only)
Total Alkalinity	252	263	4			
Bicarbonate Alkalinity	245	256	4			
Carbonate Alkalinity	6	7		1	(≤21)	
Chloride	195	197	1			
Nitrate as N	9.93	9.91	0			
pH (pH Units)	8.73	8.75	0			
Sulfate	276	268	3			
Surfactants	1.3	1.2		0.1	(≤2.1)	
тос	980	860		120	(≤310)	
Total Phosphorus	855	928	8			
Chlorate (ug/Kg)	2070	2340	12			
Perchlorate (ug/Kg)	91600	82400	11			

V:\FIELD DUPLICATES\FD_inorganic\21495L6.wpd