Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Data Validation Reports LDC# 21257

Wet Chemistry



LDC Report# 21257A6

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2008 Phase B Investigation,

Henderson, Nevada

Collection Date:

June 16 through June 23, 2008

LDC Report Date:

September 17, 2009

Matrix:

Water

Parameters:

Wet Chemistry

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R2844538

Sample Identification

PB061608B

PC-40B

H-48B

MC-66BD

MC-65B

MC-66B

PC-37B

PC-72B

M-94BX

MC-62B

Introduction

This data review covers 10 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 120.1 for Conductivity, EPA Method 218.6 for Hexavalent Chromium, EPA Method 350.1M for Ammonia as Nitrogen, EPA Method 365.1 for Total Phosphorus, EPA SW 846 Method 9012 for Total Cyanide, EPA SW 846 Method 9040 for pH, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, Nitrite as Nitrogen, and Sulfate, EPA SW 846 Method 9060 for Total Organic Carbon, Standard Method 2320B for Alkalinity, Standard Method 2540C for Total Dissolved Solids, Standard Method 2540D for Total Suspended Solids, and Standard Method 5540C for Surfactants.

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 IX.

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
PB061 608B	Conductivity	39 days	28 days	J- (all detects) UJ (all non-detects)	Р
PC-40B	Conductivity	37 days	28 days	J- (all detects) UJ (all non-detects)	Р
H-48B	Conductivity	36 days	28 days	J- (all detects) UJ (all non-detects)	Р
MC-66BD MC-65B MC-66B PC-37B	Conductivity	35 days	28 days	J- (all detects) UJ (all non-detects)	Р
PC-72B M-94BX MC-62B	Conductivity	32 days	28 days	J- (all detects) UJ (all non-detects)	P
*H-48B	Ammonia as N Nitrate as N	35 days 53 hours	28 days 48 hours	J- (all detects) UJ (all non-detects) J- (all detects) UJ (all non-detects)	А
*H-48B	Nitrite as N	99.25 hours	48 hours	J- (all detects) R (all non-detects)	Α
MC-66B	Nitrite as N	75.5 hours	48 hours	J- (all detects) UJ (all non-detects)	А
MC-66BD	Nitrite as N	73.75 hours	48 hours	J- (all detects) UJ (all non-detects)	А
MC-65B	Nitrite as N	74 hours	48 hours	J- (all detects) UJ (all non-detects)	Α
PC-37B	Nitrite as N	76.5 hours	48 hours	J- (all detects) UJ (all non-detects)	, A

^{*}Corrected analyte.

^{*}All samples were received in good condition with the following exceptions:

Sample	Analyte :	Finding	Criteria	Flag	A or P
H-48B	Total cyanide	Sample pH reported at approximately 5 upon receipt by the laboratory.	Sample must be preserved at pH >12.	J- (all detects) R (all non-detects)	Р
MC-65B	Total cyanide	Sample pH reported at approximately 10 upon receipt by the laboratory.	Sample must be preserved at pH >12.	J- (all detects) R (all non-detects)	P

^{*}Added sample H-48B to finding for total cyanide.

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 of each method were met.

b. Calibration Verification

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.

Sample FB062408GWAREA1 (from SDG R2844650) 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
FB062408GWAREA1	6/24/08	Conductivity pH	1.96 umhos/cm 5.87 S.U.	PC-40B H-48B MC-66BD MC-65B MC-66B PC-37B PC-72B M-94BX MC-62B

Sample PB061608B was identified as a pump blank. No contaminant concentrations were found in this blank with the following exceptions:

Pump Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
PB061608B	6/16/08	Total alkalinity Bicarbonate alkalinity Conductivity pH	2.90 mg/L 2.90 mg/L 1.65 umhos/cm 6.07 S.U.	PC-40B H-48B MC-66BD MC-65B MC-66B PC-37B PC-72B M-94BX MC-62B

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

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 with the following exceptions:

LCS ID	Analyte	%R (Limits)	Associated Samples	Flag	A or P
LCS	Total suspended solids	74.1 (80-120)	MC-66BD MC-65B MC-66B PC-37B	J- (all detects) UJ (all non-detects)	Р

VII. Sample Result Verification and Project Quantitation Limit

The QAPP PQLs were met with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All samples in SDG R2844538	Nitrite as N	Laboratory reporting limit reported at 0.05 mg/L.	PQL should be reported at 0.01 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 R2844538	All analytes reported below the PQL.	J (all detects)	А

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

Samples MC-66B and MC-66BD were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Concer	ntration	RPD			
Analyte	*MC-66BD	*MC-66BD *MC-66B		Difference (Limits)	Flags	A or P
Ammonia as N	0.646 mg/L 0.0500U mg/L - 0.59		0.596 (≤0.0500)	J (all detects) UJ (all non-detects)	А	
Bicarbonate alkalinity	94.7 mg/L	93.3 mg/L	1 (≤30)	-	-	-
Total alkalinity	94.7 mg/L	93.3 mg/L	1 (≤30)	-	-	- -
Bromide	1.41 mg/L	1.88 mg/L	29 (≤30)	- .	· -	-
Chloride	2210 mg/L	2220 mg/L	0 (≤30)	-	<u>.</u>	-
Conductivity	10700 umhos/cm	10600 umhos/cm	1 (≤30)	-	. •	-
Hexavalent chromium	0.634 mg/L	0.106 mg/L	143 (≤30)	-	J (all detects)	А
Nitrate as N	33.3 mg/L	32.1 mg/L	4 (≤30)	-	-	

	Concer	ntration				
Analyte	*MC-66BD	*MC-66B	RPD (Limits)	Difference (Limits)	Flags	A or P
рН	7.46 S.U.	7.44 S.U.	0 (≤30)	-	-	-
Sulfate	2220 mg/L	2220 mg/L	0 (≤30)	-	-	-
Surfactants	0.292 mg/L	0.751 mg/L	88 (≤30)	-	J (all detects)	А
Total cyanide	0.0200U mg/L	0.0379 mg/L		0.0179 (≤0.0200)	<u>-</u>	-
Total dissolved solids	8530 mg/L	8040 mg/L	6 (≤30)	<u>.</u>	-	-
Total organic carbon (AVG)	2.27 mg/L	1.71 mg/L	-	0.56 (≤1.0)	-	-
Total phosphorus	0.0832 mg/L	0.0500U mg/L	-	0.0332 (≤0.0500)	-	-
Total suspended solids	77.7 mg/L	42.3 mg/L	59 (≤30)		J (all detects)	A

*Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R2844538

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R2844538	PB061608B		J- (all detects) UJ (all non-detects)	Р	Technical holding times (h)
*R2844538	H-48B	Ammonia as N Nitrate as N	UJ (all non-detects)		Technical holding times (h)
*R2844538	H-48B	Nitrite as N	J- (all detects) R (all non-detects)	A	Technical holding times (h)
R2844538	MC-66B MC-66BD MC-65B PC-37B	Nitrite as N	J- (all detects) UJ (all non-detects)	A	Technical holding times (h)
R2844538	H-48B MC-65B	Total cyanide	J- (all detects) R (all non-detects)	Р	Sample condition (preservation) (pH)
R2844538	MC-66BD MC-65B MC-66B PC-37B	Total suspended solids	J- (all detects) UJ (all non-detects)	Р	Laboratory control samples (%R) (I)
R2844538	PB061 608B PC-40B H-48B MC-66BD MC-65B MC-66B PC-37B PC-72B M-94BX MC-62B	Nitrite as N	None	Р	Sample result verification

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R2844538	PB061608B PC-40B H-48B MC-66BD MC-65B MC-66B PC-37B PC-72B M-94BX MC-62B	All analytes reported below the PQL.	below J (all detects)		Sample result verification (PQL) (sp#)
R2844538	MC-66B MC-66BD	Ammonia as N	J (all detects) UJ (all non-detects)	A	Field duplicates (Difference) (fd)
R2844538	MC-66B MC-66BD	Hexavalent chromium Surfactants Total suspended solids	J (all detects) J (all detects) J (all detects)	А	Field duplicates (RPD) (fd)

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R2844538

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R2844538

No Sample Data Qualified in this SDG

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	t: R2844538	-		S	Stage 2B				Page: <u>/</u> of_/
abora	atory: Columbia Analytic	al Ser	vices						Reviewer:
			/		Teta	J			2nd Reviewer:
ETH	OD: (Analyte) Alkalinity	(SM23	320B), Ámn	nonia-N (E	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		romide, Ch	loride. N	litrate-N, Nitrite-N, Sulfat
PA S	SW846 Method 9056), C	onduc	ctivity (EPA	Method 12	20.1), * Cyani	ide (EPA Ş	W846 Meth	nod 9012	2), Hexavalent Chromiui
						M5540C), T	Total Phosp	ohorus (I	EPA Method 365.1), TD
	40C), TSS (SM2540D),					idation are	oc Validati	on findir	ngs are noted in attache
	inples listed below wer ion findings worksheets		ewed for ear	Cit Of the it	Ulluwii ig vai	iualion are	as. Valluali	on man	igs are noted in attache
	Validation	Area					Comr	nents	
1.	Technical holding times			5W	Sampling da	tes: 6/16	108 - 6	1>310	ş
lla.	Initial calibration			A					
llb.	Calibration verification			A					
111.	Blanks			Α,					
IV	Matrix Spike/Matrix Spike D	uplicate	es	I V	Zuli	ent sp	enifild		
V	Duplicates			N					
VI.	Laboratory control samples			AX,SW	Les				
VII.	Sample result verification			5 vm					
VIII.	Overall assessment of data			A					
IX.	Field duplicates			SW	14.6)			
x	Field blanks			5W	Pump Bla	nk = 1	FB=FB	06240	r gwarza
te:	A = Acceptable N = Not provided/applicable SW = See worksheet	€	R = Rin	o compounds sate eld blank	s detected		iplicate rip blank Equipment bla		R GWARZA (Sby R28446)
idate	d Samples: A								
Ī	PB061608B	11			21			31	
	°C-40 ¢B	12			22			32	
	1-48B	13			23			33	
4	MC-166BD	14			24			34	#*************************************
	MC-65B	15			25			35	
1	MC-66B	16		· · · · · · · · · · · · · · · · · · ·	26			36	
F	PC-37B	17			27			37	
F	PC-72B	18			28			38	
	и-94В Х	19			29			39	
	MC-62B	20			30			40	

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VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

	Page:	_of
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2nd	reviewer:	

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
10	AL	(Alk pH Br CI NO, NO, SO, NH, TOC CN Cr5+ T-P MBAS TDS TSS Cond)CIO, CIO,
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ 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 Cr5+ 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 NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr8+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
	•	Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr8+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr8+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ 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 CIO3 CIO4
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Comments:	
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VALIDATION FINDINGS WORKSHEET Technical Holding Times

2nd reviewer:

N N/A Were all	cooler tempera	tures within vali	dation criteria?	<u> </u>				
Method:		120,1	9040	350/M				
Parameters:		Conductivity	ely	M+3-N				
Technical holding tin	ne:	28 tap	ifter	28 Joza				
Sample ID	Sampling date	Analysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier	
	6/61.8	1/2/8	(39 Jun	,			J-MJp	(h)
2	6/18/-8		(31 tog	-)	·		1 / 1/1	
3	6/191-8		(36 top)				
4-7	6/20/-8		(35 top)				
8-10	8-1819	J	(32 Jay	<i>つ</i>				
			U					
	6/16/18 1430		6/17/8	(18.75)	~~)		3/43/	(h)
<u> </u>	6/18/56 1300		140	125.75	h~)		7 (` /
}	6/1968		6/10/8	(31,75	h-)			
10-	6/3/08 1030		0174/08/	(xix	h-)			
								(100)
	6/191-8			7/14/-8	(35 Jag)	J-JuJ/A	(120
							/	
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					WB. 6			

VALIDATION FINDINGS WORKSHEET Technical Holding Times

2nd reviewer:

All circled dates have exceeded the technical holding time.

Were all samples preserved as applicable to each method?

Were all cooler temperatures within validation criteria?

cooler tempera	tures within valid	dation criteria?_					_
	9056	•	905%	9012			
	NO2-N		M3-N	CN			
ne:	48h	****	48h	144			
Sampling date	Analysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier	repu
6/19/08			6/21/8	653 hu)		
\bigvee	6/23/28	(99,751		·		J-/R/A	
		(17-5	hus			T-hath	
blooks	6/13/-8	(73,75	· hu)			1	
1 nos	61731-8 14.7	(74m	<u>-)</u>				
J 1000	6/x108 /	(76.5	- hu-)				
		****		.011 F		71. /	(04)
				14725	. \	3/K/P	(411)
				1 .		1	
				1 64 2 5		<u> </u>	W
7							
					· · · · · · · · · · · · · · · · · · ·		
	Sampling date 6/14/08 103, bloole 1050 bloole 1050	9.56 102-N 102-N 102-N 103-N 104-N 104	9°56 NO2-N ne: 48h Sampling date Analysis date 6/19/08 1/3/08	9°56 NO2-N NO2-N NO3-N Ash Sampling Analysis date 6/19/08 103. 1/3/08 1338 (99.55) 6/3/08 1573 6/3/08 1075 6/3/08 1075 6/3/08 1075 6/3/08 1075 6/3/08 1075 6/3/08 1075 6/3/08 1075 6/3/08 1075 6/3/08 1075 6/3/08 1075 6/3/08 1075 6/3/08 1075 1075 1075 1075 1075 1075 1075 1075	9°56 ' 9°56 9°12 1002-N 1003-N CN 148h 48h 141y Sampling date Analysis date Analysis date 6/19/08 10338 (99.254) 6/20/08 1252 (75.5 hr) 6/20/08 1252 (75.5 hr) 1000 6/20/18 1202 (74h) 1000 6/20/18 1407 (76.5 hr) 1000 6/20/18 1407 (76.5	9°56	1 1 1 1 1 1 1 1 1 1

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VALIDATION FINDINGS WORKSHEET

Field Blanks

Reviewer:

Page:

METHOD: Inorganics, Method See Cover Y N N/A Were field blanks identified in this SDG?

Were target analytes detected in the field blanks? Blank units:

Blank units: Associated sample units: Sampling date: 6/24/08 Soil factor applied Field blank type: (circle one) Field Blank / Rinsate / Other: FB Sampling date: 6/24/08

Analyte

Associated Samples: 2-10

Sample Identification No samples were qualified Action Level 19.6 FB062408GW AREA1 Blank ID 1.96 5.87 Conductivity (umhos/cm)

Sampling date: 6/16/08 Soil factor applied Field blank type: (circle one) Field Blank / Rinsate / Other: Pump Blank

pH (S.U.)

Associated Samples: 2-10

Analyte	Blank ID				Sample Identification	cation		
	PB061608B	Action Level	Action No samples					
Total Alkalinity (mg/L)	2.90	29.0						
Bicarbonate Alkalinity (mg/L)	2.90	29.0					-	
Conductivity (umhos/cm)	1.65	16.5						
pH (S.U.)	6.07							

LDC #: YINTIAS SDG #: METHOD: Inorganics, Method_

VALIDATION FINDINGS WORKSHEET Laboratory Control Samples (LCS)

2nd Reviewer: Reviewer:

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

Ons Marione	J-Mz/D (2)													
Associated Samples	4-4													
%R (limits)	1.41													
Analyte	75.5				,								1 1 to	
Matrix	₹						• •						Ties com	
# rcs iD	3												Comments:	

SDG #: 2/24/1/6 SDG #: 422 Com

VALIDATION FINDINGS WORKSHEET Sample Result Verification

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METHOD: Inorganics, Method See LOWN

*	Sample 10	Analyte	Lab Reporting Limit (units)	REP LEWIS		Quairfeations
	Ē	NO2-N	10,05 my	Mm 100	les trait > AAPP Limit	hint nove to
	٠					
				-		
						-
E 0 0	Comments:					

LDC#: <u>21257A6</u> SDG#: <u>See Cover</u>

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	
Reviewer:	ب
2nd Reviewer:	Y

Inorganics, Method See Cover

$(N_{\overline{X}})$	NA
NO	NA

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

	Concentrat	ion (mg/L)				Qualification
Analyte	ref	16	RPD (≤30)	Difference	Limits	(Parent only)
Ammonia as N	0.646	0.0500U		0.596	(≤0,0500)	J/W/A
Bicarbonate Alkalinity	94.7	93.3	1			
Total Alkalinity	94.7	93.3	1			
Bromide	1.41	1.88	29			
Chloride	2210	2220	0			
Conductivity (umhos/cm)	10700	10600	1			
Hexavalent Chromium	0.634	0.106	143			J det / A
Nitrate as N	33.3	32.1	4			
pH (S.U.)	7.46	7.44	0			
Sulfate	2220	2220	0			
Surfactants	0.292	0.751	88			J det / A
Total Cyanide	0.0200U	0.0379		0.0179	(≤0.0200)	
TDS	8530	8040	6			
TOC AVG	2.27	1.71		0.56	(≤1.0)	
Total Phosphorus	0.0832	0.0500 U		0.0332	(≤0.0500)	
TSS	77.7	42.3	59			J det / A

V:\FIELD DUPLICATES\FD_inorganic\21257A6.wpd

(beason Cooke
fol)

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2008 Phase B Investigation,

Henderson, Nevada

Collection Date:

June 24 through June 27, 2008

LDC Report Date:

September 4, 2009

Matrix:

Water

Parameters:

Wet Chemistry

Validation Level:

Stage 4

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R2844650

Sample Identification

M-44B

M-7BBDUP

H-49AB

M-5ABDL

FB062408GWAREA1

M-61BDL

MC-45B

MC-53B

M-23B

MC-97B

MC-94B

MW-16B

M-5AB

EB062608GW3

M-61B

M-88BB

M-7BB

M-67B

M-6AB

M-57AB

M-95B

M-68B

M-7BBMS

Introduction

This data review covers 23 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 120.1 for Conductivity, EPA Method 218.6 for Hexavalent Chromium, EPA Method 350.1M for Ammonia as Nitrogen, EPA Method 365.1 for Total Phosphorus, EPA SW 846 Method 9012 for Total Cyanide, EPA SW 846 Method 9040 for pH, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, Nitrite as Nitrogen, and Sulfate, EPA SW 846 Method 9060 for Total Organic Carbon, Standard Method 2320B for Alkalinity, Standard Method 2540C for Total Dissolved Solids, Standard Method 2540D for Total Suspended Solids, and Standard Method 5540C for Surfactants.

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 IX.

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
M-5ABDL M-61BDL	Surfactants	5 days	48 hours	J- (all detects) R (all non-detects)	А
MC-94B	рН	50.25 hours	48 hours	J (all detects) UJ (all non-detects)	Р
M-44B H-49AB FB062408GWAREA1	Conductivity	31 days	28 days	J- (all detects) UJ (all non-detects)	Р
MC-45B MC-53B M-23B MC-97B MC-94B	Conductivity	30 days	28 days	J- (all detects) UJ (all non-detects)	Р
MW-16B M-5AB EB062608GW3 M-61B M-88BB M-7BB	Conductivity	29 days	28 days	J- (all detects) UJ (all non-detects)	Р

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

Sample	Analyte	Finding	Criteria	Flag	AorP
H-49AB MC-94B	Total cyanide	Sample pH reported at approximately 10 upon receipt by the laboratory.	Sample must be preserved at pH >12.	J- (all detects) R (all non-detects)	Р
MW-16B M-5AB	Total cyanide	Sample pH reported at approximately 8 upon receipt by the laboratory.	Sample must be preserved at pH >12.	J- (all detects) R (all non-detects)	Р
M-6AB M-7BBMS M-7BBDUP	Total cyanide	Sample pH reported at approximately 9 upon receipt by the laboratory.	Sample must be preserved at pH >12.	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

a. Initial Calibration

All criteria for the initial calibration of each method were met.

b. Calibration Verification

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.

Sample EB062608GW3 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
EB062608GW3	6/26/08	Chloride Conductivity pH	0.478 mg/L 4.95 umhos/cm 6.17 S.U.	MW-16B M-5AB

Sample FB062408GWAREA1 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
FB062408GWAREA1	6/24/08	Conductivity pH	1.96 umhos/cm 5.87 S.U.	M-44B H-49AB MC-45B MC-53B M-23B MC-97B MC-94B MW-16B M-5AB M-61B M-88BB M-7BB M-67B M-67B M-6AB M-57AB M-95B M-68B

Sample PB061608B (from SDG R2844538) was identified as a pump blank. No contaminant concentrations were found in this blank with the following exceptions:

Pump Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
PB061608B	6/16/08	Total alkalinity Bicarbonate alkalinity Conductivity pH	2.90 mg/L 2.90 mg/L 1.65 umhos/cm 6.07 S.U.	M-44B H-49AB MC-45B MC-53B M-23B MC-97B MC-94B MW-16B M-5AB M-61B M-88BB M-7BB M-67B M-67B M-6AB M-57AB M-95B M-68B

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

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-7BBMS (M-61 B M-88BB M-7BB)	Total cyanide	74 (75-125)	J- (all detects) UJ (all non-detects)	А

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 sample result verifications were acceptable with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
M-5AB M-61B	Surfactants	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	А
*M-44B	Hexavalent chromium	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	А

^{*}This sample was diluted but the dilution factor could not be verified through laboratory documentation and was classified as not quantitative.

The QAPP PQLs were met with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
M-44B H-49AB FB062408GWAREA1 MC-45B MC-53B M-23B MC-97B MC-94B MW-16B M-5AB EB062608GW3 M-61B M-88BB M-7BB M-67B M-6AB M-57AB M-95B M-95B M-68B	Nitrite as N	Laboratory reporting limit reported at 0.05 mg/L.	PQL should be reported at 0.01 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 R2844650	All analytes reported below the PQL.	J (all detects)	A

VIII. Overall Assessment of Data

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

Sample	Analyte	Flag	A or P
M-5AB M-61B	Surfactants	х	A

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, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R2844650

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R2844650	M-5ABDL M-61BDL	Surfactants	J- (all detects) R (all non-detects)	А	Technical holding times (h)
R2844650	MC-94B	рН	J (all detects) UJ (all non-detects)	Р	Technical holding times (h)
R2844650	M-44B H-49AB FB062408GWAREA1 MC-45B MC-53B M-23B MC-97B MC-94B MW-16B M-5AB EB062608GW3 M-61B M-88BB M-7BB	Conductivity	J- (all detects) UJ (all non-detects)	Р	Technical holding times (h)
R2844650	H-49AB MC-94B MW-16B M-5AB M-6AB	Total cyanide	J- (all detects) R (all non-detects)	Р	Sample condition (preservation) (pH)
R2844650	M-61B M-88BB M-7BB	Total cyanide	J- (all detects) UJ (all non-detects)	А	Matrix spike analysis (%R) (m)
R2844650	M-5AB M-61B	Surfactants	J (all detects)	А	Sample result verification (e)
R2844650	M-44B	Hexavalent chromium	J (all detects)	А	Sample result verification (e)

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R2844650	M-44B H-49AB FB062408GWAREA1 MC-45B MC-53B M-23B MC-97B MC-94B MW-16B M-5AB EB062608GW3 M-61B M-88BB M-7BB M-67B M-6AB M-57AB M-95B M-95B M-68B	Nitrite as N	None	Р	Sample result verification
R2844650	M-44B H-49AB FB062408GWAREA1 MC-45B MC-53B M-23B MC-97B MC-94B MW-16B M-5AB EB062608GW3 M-61B M-88BB M-7BB M-67B M-67B M-6AB M-57AB M-95B M-68B M-5ABDL M-61BDL	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)
R2844650	M-5AB M-61B	Surfactants	Х	A	Overall assessment of data (o)

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R2844650

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R2844650

No Sample Data Qualified in this SDG

			Tro	nox Nor	thga	ite F	lenderson		, ,
LDC	#: <u>21257B6</u>	V۵	LIDATIO				ESS WORKSHE	EET	Date: 8/10/0
	#: R2844650			;	Stag	e 4			Page: <u> </u>
Labo	ratory: Columbia Analytica	al Se	<u>rvices</u>	1					Reviewer:
				1-N		Ti	tol		2nd Reviewer:
MET	HOD: (Analyte) Alkalinity	(SM2	2320B), Amr	monia (EP	A Me	thod	350.1M), Bromide,	Chloride, N	litrate-N, Nitrite-N, Sulfate
(EPA	SW846 Method 9056), C	ondu	ctivity (EPA	Method 12	20.1),	Cya	nide (EPA SW846 N	Method 901	2), Hexavalent Chromium
							SM5540C), Total Ph	nosphorus (EPA Method 365.1), TDS
The	540C), TSS (SM2540D),	revi	ewed for each	th of the f	ollowi	na v	alidation areas Vali	dation findi	ngs are noted in attached
	ation findings worksheets.		01100 101 00		0110111	9 **	andation areas. Van	addon midi	ngo are noted in attached
	-								
	Validation	Area					Co	mments	
I.	Technical holding times			5W	Samp	oling d	ates: 6/14/08	-6127	108
lla.	Initial calibration			A			,	,	
llb.	Calibration verification			A					
III.	Blanks			A					X.
IV	Matrix Spike/Matrix Spike Di	uplicat	es	5w		LM	2/2~P		
V	Duplicates			A		/			
VI.	Laboratory control samples			A	L	5			
VII.	Sample result verification			シ W					
VIII	Overall assessment of data			ASW			· · · · · · · · · · · · · · · · · · ·		
IX.	Field duplicates			N					
يعــا	Field blanks			SW	<u> </u>	-B=	3, EB=11, 1	Pump Bla	nk = PRO61608B
Note:	A = Acceptable N = Not provided/applicable SW = See worksheet		R = Rins	o compounds sate eld blank	s detec	cted	D = Duplicate TB = Trip blank EB = Equipment	t blank	(509R28445)
Valida	ted Samples:								
1	M-44B	11	EB062608GV	V3		21	M-7BBDUP	31	MB
2	H-49AB	12	M-61B			22	M-5ABDL	32	
3	FB062408GWAREA1	13	M-88BB			23	M-61BDL	33	
4	MC-45B	14	M-7BB			24		34	
5	MC-53B	15	M-67B			25		35	
6	M-23B	16	M-6AB			26	, in the section of t	36	
7	MC-97B	17	M-57AB			27		37	
8	MC-94B	18	M-95B			28		38	
9	MW-16B	19	M-68B			29		39	
10	M-5AB	20	M-7BBMS			30		40	
Notes	:								

VALIDATION FINDINGS CHECKLIST

Page: 1 of 1 Reviewer: 444 2nd Reviewer: 2

Method:Inorganics (EPA Method) U Coul				
Validation Area	Yes	No	NA	Findings/Comments
Tada and published the control of th		4	11	Chief to Edde The Control
All technical holding times were met.		/		
Cooker temperature criteria was met.	1			
Were all instruments calibrated daily, each set-up time?	1		<u> </u>	
Were the proper number of standards used?	/	<u> </u>	<u> </u>	
Were all initial calibration correlation coefficients > 0.995?	/			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	/			
Were titrant checks performed as required? (Level IV only)	1		<u> </u>	
Were balance checks performed as required? (Level IV only)				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		/		
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.	V			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.		✓		
Were the MS/MSD or duplicate relative percent differences (RPD) \leq 20% for waters and \leq 35% for soil samples? A control limit of \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.	\mathcal{I}		فليد د د د	
Was an LCS anayized for this SDG?	1			
Was an LCS analyzed per extraction batch?	1			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?				
TO RESIDENCE OF THE STATE OF TH				
Were performance evaluation (PE) samples performed?	Ç	V	9	
18/am the performance surflustics (DE) correlate within the acceptance limits?			1	

VALIDATION FINDINGS CHECKLIST

Page: Vof Y Reviewer: MM 2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
VIII. Sample reside Verification		i i		
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	1			
Were detection limits < RL?	~			
Overall assessment of data was found to be acceptable.	1			
Field duplicate pairs were identified in this SDG.		\		
Target analytes were detected in the field duplicates.				
Field blanks were identified in this SDG.	V			
Target analytes were detected in the field blanks.	$\sqrt{}$			

LDC #:_	>1×1	136
SDG #:_	· (. '	over

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page:_	
Reviewer:_	
2nd reviewer:	Q

All circled methods are applicable to each sample.

Sample ID	<u>Matrix</u>	Parameter Parameter
1-19	AL	(Alk pH Br Cl NO, NO, SO, NH, TOC CN Crs+ T-P MBAS TDS TSS Cond ClO, ClO,
22.13	- V	Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr8+ T-P (MBAS) TDS TSS Cond ClO3 ClO4
a. v. 1	Az	Alk pH Br CI NO, NO, SO, NH, TOO CN CAST-P MBAS TOS TSS COND CIO, CIO,
W 71	\mathcal{V}	Alk of Br CI NO, NO, SO, NH, TOC (CN CFS+ T-P MBAS (TDS TSS) Cond) CIO, CIO,
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr8+ T-P MBAS TDS TSS Cond ClO3 ClO4
	•	Alk pH Br Ci NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond CIO3 CIO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond CIO3 CIO4 .
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ 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 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 Cr8+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr8+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ 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

Comments:

VALIDATION FINDINGS WORKSHEET Technical Holding Times

2nd reviewer:

All circled dates have exceeded the technical holding time.

Were all samples preserved as applicable to each method?

Were all cooler temperatures within validation criteria?

♥ <u>)N N/A</u> Were al	l cooler tempera	tures within vali	dation criteria?_					-
Method:		94554°C	9040					
Parameters:		surfactants	plt					
Technical holding ti	me:	481	49h					voca cos
Sample ID	Sampling date	Analysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier	(h)
~~	910	71.108 0845	(5 Jug)			J-/6/A	(verw)
γ3	61261.8	Ĭ,	Y '				1	
	6124128		612/08	(15.75	\bowtie		J/47/P	
2	900		1915	132.15	h_)			
્રે	1000 81816		10/10/18	129,7				
4	(3.0		1345	174-75	h)			
5	منعوا ا			(Y5.7t				
6	800			(29.95	lw)		1	
7	930		<i>y y</i>	(18,75	hu)		1	
V 8	(43)		612/19/1620	150,25	w)		J/R/p	Jhos/p
9	6481-8 1405			(26.75	>>		J/R/p	~ (L)
lo	910			(31,95	h)			
(1	1400			(3b,75	(h)		<u> </u>	
12	1100			(29,75	W)			
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	0800			(32.75	W)			
14,2	y .900		X X	(31.5	hu)			
15	0127109 400		P181-8 120	(29, 15	hu)			
16	950		(22)	(26.5	w) ·			
17	1130		1220	(24.75	h)			
18/	८ ३०		1220	(27,75				_
X _	1800		. (120	(26,45	W)		1	
					ŕ			

LDC #:_	1/2/1	3b
SDG #:	(U	<u> </u>

VALIDATION FINDINGS WORKSHEET Technical Holding Times

2nd reviewer:

All circled dates have exceeded the technical holding time.

Which N/A

Were all samples preserved as applicable to the circled dates have exceeded the technical holding time.

Which N/A

Were all cooler temperatures within validations. Were all samples preserved as applicable to each method?
Were all cooler temperatures within validation criteria?

Y/AY IV/A Were all	cooler tempera	tures within vali	dation criteria?_					
Method:		(20.)		9612				1
Parameters:		(mulestricy		CH				
Technical holding tir	ne:	induting redup		الإلر				
Sample ID	Sampling date	Analysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier	(h)
1-3	6/14/08	1/10/18	(2) top	n			J/15/p	
4 -8	6/15/08						1 1	
9-142	6/1/108		(30 tag	~)				
<u> </u>			U U	PHEVIO	(10 1) ~ 1		T / /	, 11.
8				PHNO	(P47b		J-/p/p	CpH;
9			4	104~C			 	
· · · · · · · · · · · · · · · · · · ·				1014~8				
14, 20,21 4, 20,21				104~8 104~8 104~9	V		1	V
			· · · · · · · · · · · · · · · · · · ·	**************************************				

								ŀ

LDC #: 21257B6

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET

Page: 0f Reviewer: (1) 2nd Reviewer: (

Field Blanks

METHOD: Inorganics, Method See Cover Y N N/A Were field blanks identified in this SDG?

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

Sampling date: 6/24/08 Soil factor applied Field blank type: (circle one) Field Blank / Rinsate / Other FB

Associated Samples: 1,2,4-10, 12-19

Analyte	Blank ID				Sample Identification	cation		
	3	Action Level	No samples were qualified					
Conductivity (umhos/cm)	1.96	19.6						
pH (S.U.)	2.87			:				

Sampling date: 6/16/08 Soil factor applied _______Field blank type: (circle one) Field Blank / Rinsate / Other: Pump Blank

Associated Samples: 1,2,4-10, 12-19

Analyte	Blank ID				Sample Identification	cation		
	PB061608B	Action Level	Action No samples Level were qualified					
Total Alkalinity (mg/L)	2.90	29.0						
Bicarbonate Alkalinity (mg/L)	2.90	29.0						
Conductivity (umhos/cm)	1.65	16.5						
pH (S.U.)	6.07							

Sampling date: 6/26/08 Soil factor applied Field blank type: (circle one) Field Blank / Rinsate / Other: EB

Associated Samples: 9,10

Analyte	Blank ID				Sample Identification	ntification		
	11	Action Level	Action No samples Level were qualified					
Chloride (mg/L)	0.478	4.78						
Conductivity (umhos/cm)	4.95	49.5						
pH (S.U.)	6.17							

2 12/18b LDC #: SDG #:

VALIDATION FINDINGS WORKSHEET

Matrix Spike Analysis

	}	9
Page:	Reviewer:	2nd Reviewer:

METHOD: Inorganics, Method

See com

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

Was a matrix spike analyzed for each matrix in this SDG?

Y 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.

LEVEL IV ONLY:

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

*	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
	\$	\$	CN	力 な	★ 1 - <	(m) 4/5/
					,	

Comments:

1DC #: 21-87 BU SDG #: (21 COM

METHOD: Inorganics, Method_

VALIDATION FINDINGS WORKSHEET

Sample Result Verification

Page: Co Reviewer: 2

*	Samole ID	Analyte	Lab Reporting Limit (units)	RDL (units)	Finding	Qualifications
	Z1 '01	Singerthats	443		> calletanton rouge	TIT/4 (8)(e)
		-	.	t is any o		
7	110	10.00	1, 10 X 24 1	0 0 mm	4.6 Part > PARITANT	100 Mare 100
1	7	≥				
					- 1	
\sim		CN6+			V salution Con	Jat 1/4 (e)
					12, 810, 8 X01)	
					1 sough was sol	which , but an easing
					14 1	- Lu Lub
Com	Comments:					

LDC #: 2/75/18 b SDG #: 5ex Com

VALIDATION FINDINGS WORKSHEET

Overall Assessment of Data

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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?

4						
*		Date	Sample ID	Finding	Associated Samples	Qualifications
	-		2 01	Sind wtate	-	X/4
1						(> celibration rouge)
<u>L</u>	-					\
<u> </u>						
<u> </u>						
]						
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<u></u>	_					
<u> </u>						
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<u> </u>						
<u> </u>						
<u>L.</u>	-					
<u> </u>	-					
] 8	Comments					

Validatin Findings Worksheet Initial and Continuing Calibration Calculation Verification

Page: of Reviewer: 4

Method: Inorganics, Method

hod See and

The correlation coefficient (r) for the calibration of $\frac{C\sqrt{64}}{C\sqrt{164}}$ was recalculated. Calibration date: $\frac{1}{16}$ $\frac{1}{16}$ $\frac{1}{16}$

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = <u>Found X 100</u> True

Where, Four

Found = concentration of each analyte measured in the analysis of the ICV or CCV solution

True = concentration of each analyte in the ICV or CCV source

					Recalculated	Reported	Acceptable
Type of analysis	Analyte	Standard	Conc. (mg/L)	Area	r or r²	r or r²	(V/N)
Initial calibration	1	s1	0	0			
	Cr (VI)	s2	0.005	156910	0.999998	0.999998	
		s3	0.01	347287			7
		s4	0.1	3343001			
•		s5	0.5	16638083			
		se	0.7	23248396			
ξηνς (γηνς Calibration verification	βy	2.0	(.816		93-8	8.86	A
رسک Calibration verification	Sufatets	6.3	Srel o		(.)5	W	
Calibration verification	CN /	01,0	96590		7 6	X	7

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

44/2×1× 301

VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

Page: 2nd Reviewer:

METHOD: Inorganics, Method

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

%R = Found x 100 Where,

Found *

True #

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.

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

RPD = <u>1S-D1</u> × 100 Where, (S+D)/2

Original sample concentration Duplicate sample concentration 0 Q

		1.10			Receipulated	Reported	
Sample ID	Type of Analysis	Element	Found / S (units)	True / D (unita)	%R/RPD	%R/RPD	Acceptable (Y/N)
	Laboratory control sample						
12		A1k	۶ ۶	0,00	(0)	(°)	>
	Matrix spike sample		(SSR-SR)				•
2		10434	78hio	0, 50	96	96	
	Duplicate semple		ı				7
7		+°<	(433	レナナー			

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

LDC #:_	2/25	136
SDG #:	Sel	ww

Page:	L 01 4
Reviewer:	
2nd reviewer	Ψ/

IDATION LINDINGS HOLIKOHEEL	1 agc
Sample Calculation Verification	Reviewer:

			Ella Tetlettor	
	organics, Method			
Compound (ualifications below for all quest Have results been reported Are results within the calibra Are all detection limits below analyte) results for		t applicable questions are identified as "N/A". tly? uments?reported with a positive def	
Concentration =	= .17 × 10 -6 × Arm + 6	Recalculation:	7-	
	,		-4. 0	

NO2-N=45780 X/MX106+ Q04595) X10= 0.995.

*	Sample ID	Analyte	Reported Concentration (WJL)	Calculated Concentration (W//)	Acceptable (Y/N)
N		AIK	19.3	79.3	Y
		By	2.27	2,41	'
		u	1420	1426	
	·	(unlutivity (umlor/u)	grov	9200	
		W6+1	0-82/	0,809	
		6°3− N	60.0	60.00	
		M2-N	0.995	0.995	
		yt (mil)	450	150 V330	
		504) भेडे ०	V350	
		surfact out s	1-17	1.17	
		'cN'	0.0376	0.0322	
		TOS	8310	8310	
		Tow (Ay)	2-39	2,39	7
		TSS	1-90	1.90	J J
			<u> </u>		

Note:	 	 	 	
*	 	 	 	

LDC #: > 38) 136	VALIDATION FINDINGS WORKSHEET	Page: 11 of 4
SDG #: yei www	Sample Calculation Verification	Reviewer: MM 2nd reviewer:
METHOD: Inorganics, Method _	Su com	٠
Please see qualifications below to	or all questions answered "N". Not applicable questi	ons are identified as "N/A".
	en reported and calculated correctly?	
	n the calibrated range of the instruments?	
Y)N N/A Are all detection	limits below the CRQL?	,
	12	
Compound (analyte) results for		reported with a positive detect were
t to do and the design of		

AIR= 1.85x0.05x50000 = 114 mg/

*	Sample ID	Analyte	Reported Concentration (Wy)	Calculated Concentration	Acceptable (Y/N)
7	12	Ntr	1.90	196	4
		AIK	114	114	
		BY	391	39	
		CL	127	7>7	
		contentraty (umls/m)	6580	6480	
		wet/	133	1-31	
		103-N	7.90	7.90	
		· PI+ (siu)	7.40	1.40	
		Sulfate	2430	2430	
		Surfactorts	0,402	0,402	
			0.3287	0,2289	
	<i>j</i>	ThS	5610	5610	\\/_
		Tollay)	1.43	L43	4
		d /			
					<u> </u>
					<u> </u>
	_				

AIK = VELT X NELT X 50000

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2008 Phase B Investigation,

Henderson, Nevada

Collection Date:

June 25 through June 26, 2008

LDC Report Date:

August 24, 2009

Matrix:

Soil

Parameters:

Wet Chemistry

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R2844666

Sample Identification

SA87-0.5B

SA87-10B

SA87-20B

SA87-30B

SA87-25B

SA180-0.5B

SA180-0.5BD

SA 100-0.5D

SA180-10B

SA180-20B

SA180-30B

SA57-0.5B

SA57-10B

SA57-20B

SA57-30B

SA57-10BD

SA87-10BMS

SA87-10BDUP

SA87-20BDUP

SA180-10BMS

SA180-10BDUP

Introduction

This data review covers 20 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 350.1M for Ammonia as Nitrogen, EPA Method 365.1 for Total Phosphorus, EPA SW 846 Method 7199 for Hexavalent Chromium, EPA SW 846 Method 9012 for Total Cyanide, EPA SW 846 Method 9045 for pH, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, Nitrite as Nitrogen, and Sulfate, Standard Method 2320B for Alkalinity, Standard Method 5540C for Surfactants, 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 IX.

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 Extraction Until Analysis	Required Holding Time From Sample Extraction Until Analysis	Flag	A or P
SA87-20B	Nitrate as N	99.75 hours	48 hours	J- (all detects) R (all non-detects)	А
SA87-25B	Nitrite as N	101.25 hours	48 hours	J- (all detects) R (all non-detects)	А

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 of each method were met.

b. Calibration Verification

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.

No field blanks were identified in this SDG.

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
SA87-10BMS (SA87-0.5B SA87-10B)	Chloride	149 (75-125)	J+ (all detects)	А

Spike ID (Associated Samples)	Analyte	%R (Limits)	Flag	A or P
SA87-10BMS (SA87-10B SA87-30B)	Sulfate	54 (75-125)	J- (all detects) UJ (all non-detects)	A
SA87-10BMS (SA87-0.5B SA87-10B SA87-25B)	Total alkalinity	23 (75-125)	J- (all detects) R (all non-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
SA87-10BDUP (SA87-0.5B SA87-10B SA87-20B SA87-25B)	Total organic carbon	-	380 mg/Kg (≤300)	J (all detects) UJ (all non-detects)	А

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

The QAPP PQLs were met with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All samples in SDG R2844666	Alkalinity	Laboratory reporting limit reported at 200 mg/Kg.	PQL should be reported at 2 mg/Kg per the QAPP.	None	Р
All samples in SDG R2844666	Nitrite as N	Laboratory reporting limit reported at 5.0 mg/Kg.	PQL should be reported at 0.1 mg/Kg 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 R2844666	All analytes reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

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

Sample	Compound	Flag	A or P
SA87-25B SA180-30B SA57-20B	Sulfate	R	А

The Sulfate results for the samples listed above were overdiluted.

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

IX. Field Duplicates

Samples SA180-0.5B and SA180-0.5BD and samples SA57-10B and SA57-10BD were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Concentration					
Analyte	SA180-0.5B	SA180-0.5BD	RPD (Limits)	Difference (Limits)	Flags	A or P
Bicarbonate alkalinity	399 mg/Kg	200 mg/Kg	-	199 (≤243)	-	-
Total alkalinity	421 mg/Kg	348 mg/Kg	-	73 (≤243)	-	-
Hexavalent chromium	0.463U mg/Kg	0.664 mg/Kg	-	0.201 (≤0.487)	-	
Hexavalent chromium	0.463U mg/Kg	0.645 mg/Kg	-	0.182 (≤0.487)	-	•
рН	9.18 S.U.	9.37 S.U.	2 (≤50)	<u>-</u>	-	-
Sulfate	74.7 mg/Kg	95.5 mg/Kg	24 (≤50)	•	-	-
Total organic carbon	7900 mg/Kg	9550 mg/Kg	19 (≤50)	-	-	-

	Concentration					
Analyte	SA180-0.5B	SA180-0.5BD	RPD (Limits)	Difference (Limits)	Flags	A or P
Total phosphorus	891 mg/Kg	1090 mg/Kg	20 (≤50)	-	-	_

	Concentration		555			
Analyte	SA57-10B	SA57-10BD	RPD (Limits)	Difference (Limits)	Flags	A or P
Bicarbonate alkalinity	232 mg/Kg	216U mg/Kg	-	16 (≤218)	•	-
Total alkalinity	257 mg/Kg	240 mg/Kg	-	17 (≤218)	-	_
Chloride	21.8U mg/Kg	22.0 mg/Kg	-	0.2 (≤21.8)	-	-
рН	8.71 S.U.	8.65 S.U.	1 (≤50)	-	•	_
Sulfate	324 mg/Kg	311 mg/Kg	4 (≤50)	•	-	-
Total organic carbon	372 mg/Kg	463 mg/Kg	•	91 (≤300)	•	-
Total phosphorus	855 mg/Kg	841 mg/Kg	2 (≤50)	-	-	-

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R2844666

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R2844666	SA87-20B	Nitrate as N	J- (all detects) R (all non-detects)	А	Technical holding times (h)
R2844666	SA87-25B	Nitrite as N	J- (all detects) R (all non-detects)	А	Technical holding times (h)
R2844666	SA87-0.5B SA87-10B	Chloride	J+ (all detects)	А	Matrix spike analysis (%R) (m)
R2844666	SA87-10B SA87-30B	Sulfate	J- (all detects) UJ (all non-detects)	А	Matrix spike analysis (%R) (m)
R2844666	SA87-0.5B SA87-10B SA87-25B	Total alkalinity	J- (all detects) R (all non-detects)	А	Matrix spike analysis (%R) (m)
R2844666	SA87-0.5B SA87-10B SA87-20B SA87-25B	Total organic carbon	J (all detects) UJ (all non-detects)	А	Duplicate sample analysis (Difference) (Id)
R2844666	SA87-0.5B SA87-10B SA87-20B SA87-20B SA87-25B SA180-0.5B SA180-0.5BD SA180-10B SA180-20B SA180-20B SA57-0.5B SA57-10B SA57-20B SA57-30B SA57-30B	Alkalinity Nitrite as N	None None	Р	Sample result verification

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R2844666	SA87-0.5B SA87-10B SA87-20B SA87-25B SA180-0.5B SA180-0.5BD SA180-10B SA180-20B SA180-30B SA57-0.5B SA57-10B SA57-10B SA57-10B SA57-30B SA57-10BD	All analytes reported below the PQL.	J (all detects)	Α	Sample result verification (PQL) (sp)
R2844666	SA87-25B SA180-30B SA57-20B	Sulfate	R	А	Overall assessment of data (o)

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R2844666

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R2844666

No Sample Data Qualified in this SDG

SDG	#: <u>21257C6</u> #:_ <u>R2844666</u> ratory: <u>Columbia Analytic</u>	- cal Se	ALIDATIO	N COMP	-	Henderson ESS WORK		Date: 8/14/ Page: 1 of / Reviewer: 2
(EPA	HOD: (Analyte) Alkalinity SW846 Method 9056), V SW846 Method 9045), S	∕∕SM2 Cyanio	<u>de (EPA SV</u>	<u>V846 Meth</u>	nod 9012),	Hexavalent Ch	nide, Chloride, Nitra nromium (EPA SW	ate-N, Nitrite-N, Sulfat 846 Method 7199), pl
The s	samples listed below wer ation findings worksheets	re revi		,		•		
	Validation	<u>. Area</u>	<u> </u>				Comments	
<u>l.</u>	Technical holding times			52	Sampling d	dates: 6/15/0	8,6/26/08	
lla.	Initial calibration			A				
Ilb.	Calibration verification			A				
III.	Blanks			Ĥ			·	
IV	Matrix Spike/Matrix Spike D	Duplica'	les	SW	7 M	5/n.yp		
V	Duplicates			5W		. V		
VI.	Laboratory control samples	>		A	Ley			
VII.	Sample result verification			5W				
VIII.	. Overall assessment of data	<u>a</u>		A				
IX.	Field duplicates			Syv	(6,7), (12,15)			
Lx	Field blanks			<u>/_</u>	<u> </u>			W-2
Note: Validat	A = Acceptable N = Not provided/applicable SW = See worksheet ted Samples:	e	R = Rin	o compounds sate eld blank	s detected	D = Duplic TB = Trip t EB = Equip		
1	SA87-0.5B	11	SA57-0.5B		21	MB	31	
2	SA87-10B	12-	SA57-10B		22		32	
3	SA87-20B	13	SA57-20B		23		33	
4	SA87-30B	14	SA57-30B		24		34	
4 V 5	SA87-25B	15	SA57-10BD		25		35	· · · · · · · · · · · · · · · · · · ·
61	SA180-0.5B	16	SA87-10BMS	-	26		36	
7	SA180-0.5BD	17	SA87-10BDU	Р	27		37	
8	SA180-10B	18	SA87-20BDU	P	28		38	
9,	SA180-20B	19	SA180-10BM	s	29		39	
Y 0	SA180-30B	20	SA180-10BDI	UP	30		40	

Notes:			
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LDC #:_	YK	yck)
SDG #:_	Su	Émi	

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page:	<u>lof_</u>
Reviewer:_	<u></u>
2nd reviewer:	$\Omega \sim$

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter Parame
1-15	501	(Alk pH Br Cl NO, NO, SO, NH, TOC CN Cr6+ T-P MBAS) TDS TSS Cond ClO, 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 CI NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
m 16,19	70-1	(AIK) pH (B) (CI) NO3 (NO) (SO) (NH) TOO (CN) (T-P)MBAS TOS TSS COND CIO3 CIO4
1 (8		Alk pH Br CI NO, NO, SO, NH, TOC CN Cr6+ T-P MBAS TDS TSS Cond CIO, CIO,
19,20	<i>\</i>	(Alk) pH (BI) CI) NO, NO, SO, NH, TOO CN (CIP) T-RMBAS TDS TSS COND CIO, CIO,
17,~		(A) Br CI NO, NO, SO, NH, TOC CN CIST 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
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
	\$	Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
	,	Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4 .
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond CIO3 CIO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr8+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4

Comments:	

LDC #:_	2/16	106

VALIDATION FINDINGS WORKSHEET Technical Holding Times

Page:_	of
Reviewer:_	h-
2nd reviewer:	0

All circled dates have exceeded the technical holding time.

X N NA

Were all samples preserved as applicable to the property of the property Were all cooler temperatures within validation criteria?

1036	<u>Y N N/A</u> Were all	cooler tempera	tures within vali	dation criteria?					
Parameters: Man Man	Method:		905%		9052				Ī
Sample ID date date Analysis date date date date date date date date	Parameters:		33						
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3 6/15/3 6/16/8	Sample ID	Sampling date	date	Analysis date	Analysis date	date	Analysis date	Qualifier	ner
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see com LDC #: 2/159/C6 SDG #:

VALIDATION FINDINGS WORKSHEET Matrix Spike Analysis

Page: of 2nd Reviewer: Reviewer:__

METHOD: Inorganics, Method

Se son

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

Were matrix spike percent recoveries (%R) within the control limits of 75-125 (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

LEVEL IV ONLY:

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

				THE AK													***************************************
Qualifications	m) 4/17+5 (m)						M fand (>41)		3								
Associated Samples	(80/4/9) 21	\$108/9) ×, €	١.														
₩.	641	25	2.3				7	代_									
Analyte	3	705	CELA AIK				504	<u>d-1</u>									
Matrix	(? • 5						ં.છ										
Matrix Spike ID	91						6)									oonte:	Confinence.
*						Į.	٨										Ξ 5

SDG #: XINCTULE
SDG #: See Conv

VALIDATION FINDINGS WORKSHEET Duplicate Analysis

Reviewer: MH

METHOD: Inorganics, Method 大略 し

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

Y TO N/A

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 Were all duplicate sample relative percent differences (RPD) < 20% for water and < 85% for soil samples (< 10% for Method 300.0)? If no, see qualification Was a duplicate sample analyzed for each matrix in this SDG?

values were ≤5X the CRDL. If field blanks were used for laboratory duplicates, see overall assessment. LEVEL IV ONLY: Y N MA

ToC \$80 (£300)	*	Dupilcate ID	Matrix	Analyte	Pilicate ID Matrix Analyse Committee 17 11 11 11 11 11 11 11 11 11 11 11 11	Walter	
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LDC #: V1759 C6 SDG #: (see corn

VALIDATION FINDINGS WORKSHEET Sample Result Verification

Page: of Reviewer: WM

METHOD: Inorganics, Method 224 Co

See Cover

				041 P Lz. t			Γ
*	Sample ID	Analyte	Lab Reporting Limit (units)	RDL (units)			1
	Pr.	AIKelinit	my som our	1m/2m ~	Lab limit > applyinit	init mar/p	
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LDC#: <u>21257C6</u> SDG#: <u>See Cover</u>

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	of
Reviewer:	\sim
2nd Reviewer:	<u>a</u>

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?

	Concentrat	ion (mg/Kg)				
Analyte	6	7	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Bicarbonate Alkalinity	399	200		199	(≤243)	
Total Alkalinity	421	348		73	(≤243)	
Hexavalent Chromium	0.463U	0.664		0.201	(≤0.487)	
Hexavalent Chromium	0.463U	0.645		0.182	(≤0.487)	
pH (S.U.)	9.18	9.37	2			
Sulfate	74.7	95.5	24			
тос	7900	9550	19			
Total Phosphorus	891	1090	20			

	Concentrati	ion (mg/Kg)				
Analyte	12	15	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Bicarbonate Alkalinity	232	216U		16	(≤218)	
Total Alkalinity	257	240		17	(≤218)	
Chloride	21.8U	22.0		0.2	(≤21.8)	
pH (S.U.)	8.71	8.65	1			
Sulfate	324	311	4			
тос	372	463		91	(≤300)	
Total Phosphorus	855	841	2			

V:\FIELD DUPLICATES\FD_inorganic\21257C6.wpd

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2008 Phase B Investigation,

Henderson, Nevada

Collection Date:

June 29 through June 30, 2008

LDC Report Date:

August 14, 2009

Matrix:

Water

Parameters:

Wet Chemistry

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R2844768

Sample Identification

M-79B

M-126B

M-84B

M-14ADBF

M-14ABF

Introduction

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

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 IX.

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
M-126B	Nitrite as N	49.5 hours	48 hours	J- (all detects) UJ (all non-detects)	А

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

Sample	Analyte	Finding	Criteria	Flag	A or P
M-126B	Total cyanide	Sample pH reported at approximately 8 upon receipt by the laboratory.	Sample must be preserved at pH >12.	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

a. Initial Calibration

All criteria for the initial calibration of each method were met.

b. Calibration Verification

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.

Sample FB062408GWAREA1 (from SDG R2844650) 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
FB062408GWAREA1	6/24/08	Conductivity pH	1.96 umhos/cm 5.87 S.U.	All samples in SDG R2844768

Sample PB061608B (from SDG R2844538) was identified as a pump blank. No contaminant concentrations were found in this blank with the following exceptions:

Pump Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
PB061608B	6/16/08	Total alkalinity Bicarbonate alkalinity Conductivity pH	2.90 mg/L 2.90 mg/L 1.65 umhos/cm 6.07 S.U.	All samples in SDG R2844768

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

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. Sample Result Verification and Project Quantitation Limit

The QAPP PQLs were met with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All samples in SDG R2844768	Nitrite as N	Laboratory reporting limit reported at 0.05 mg/L.	PQL should be reported at 0.01 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 R2844768	All analytes reported below the PQL.	J (all detects)	А

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

Samples M-14ADBF and M-14ABF were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Concer	ntration	222	D.//		
Analyte	M-14ADBF	M-14ABF	RPD (Limits)	Difference (Limits)	Flags	A or P
Bicarbonate alkalinity	107 mg/L	104 mg/L	3 (≤30)	-	-	-
Total alkalinity	107 mg/L	104 mg/L	3 (≤30)	-	-	-
Bromide	1.66 mg/L	1.57 mg/L	6 (≤30)	•	-	•
Chloride	661 mg/L	652 mg/L	1 (≤30)	-	-	-
Conductivity	3980 umhos/cm	3920 umhos/cm	2 (≤30)	-	-	•
Nitrate as N	7.88 mg/L	7.72 mg/L	2 (≤30)	-	-	-
рН	7.63 S.U.	7.58 S.U.	1 (≤30)	•	-	-
Sulfate	1180 mg/L	1150 mg/L	3 (≤30)	-	-	-
Surfactants	0.208 mg/L	0.180 mg/L	14 (≤30)	-	-	-
Total dissolved solids	3210 mg/L	3110 mg/L	3 (≤30)	-	-	-
Total organic carbon (AVG)	1.12 mg/L	1.05 mg/L	-	0.07 (≤1.00)	-	-

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R2844768

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R2844768	M-126B	Nitrite as N	J- (all detects) UJ (all non-detects)	А	Technical holding times (h)
R2844768	M-126B	Total cyanide	J- (all detects) R (all non-detects)	Р	Sample condition (preservation) (pH)
R2844768	M-79B M-126B M-84B M-14ADBF M-14ABF	Nitrite as N	None	Р	Sample result verification
R2844768	M-79B M-126B M-84B M-14ADBF M-14ABF	All analytes reported below the PQL.	J (all detects)	А	Sample result verification (PQL) (sp)

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R2844768

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R2844768

No Sample Data Qualified in this SDG

SDG#	21257D6 VALIDATIO	N COMP	thgate Henderson LETENESS WORKSHEET Date: 8/12/5 Page:
Labora	tory: Columbia Analytical Services		Reviewer:
			2nd Reviewer:
			PA Method 350.1M), Bromide, Chloride, Nitrate-N, Nitrite-N, Sulfate
			120.1), Total Cyanide (EPA SW846 Method 9012), Hexavalent
			d 9040), Surfactants (SM5540C), Total Phosphorus (EPA Method
365.1),	TDS (SM2540C), TSS (SM2540D), TO	C (EPA SV	V846 Method 9060)
The sa	mples listed below were reviewed for ea	ch of the fo	ollowing validation areas. Validation findings are noted in attached
	on findings worksheets.		· ·
		T	
	Validation Area		Comments
1.	Technical holding times	SW	Sampling dates: 6/ンタしき, 6/30/08

	Validation Area		Comments
l.	Technical holding times	SW	Sampling dates: 6/39/08, 6/30/08
lla.	Initial calibration	A	,
llb.	Calibration verification	A	
111.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	N	z cliat specified
V	Duplicates	N	3 -1
VI.	Laboratory control samples	A	Les
VII.	Sample result verification	SW	,
VIII.	Overall assessment of data	· A	
IX.	Field duplicates	SW	(4,5)
L _x _	Field blanks	5W	Pump Blank = PROBIDISE (K2844538)

Note:

A = Acceptable

N = Not provided/applicable SW = See worksheet

ND = No compounds detected
R = Rinsate

R = Rinsate FB = Field blank

D = Duplicate OF 4W ARTA | (K25 4 + 650)
TB = Trip blank
EB = Equipment blank

Validated Samples: A2

_					
1	M-79B	11	21 14 15	31	
2	M-126B	12	22	32	
3	M-84B	13	23	33	
4	M-14ADBF	14	24	34	
5	M-14ABF	15	25	35	
6		16	26	36	
7		17	27	37	
8		18	28	38	
9		19	29	39	
10		20	30	40	

Notes:			
			

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SDG #:	()

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

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<u> </u>
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All circled methods are applicable to each sample.

Sample ID	Matrix	Done
		Parameter
1-5	AL	(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 ⁵⁺ 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 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 Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
	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 ^{S+} 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
		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:				
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LDC #: 175106 SDG #: <u>See cover</u>

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

Page: of Reviewer: 2nd reviewer:

All circled dates have exceeded the technical holding time.

M N N/A
Were all samples preserved as applicable to each method?
Were all cooler temperatures within validation criteria?

Method: 9056 9012 102-N Parameters: 48h Technical holding time: Sampling Analysis Analysis **Analysis Analysis Analysis** date Sample ID date date date date date Qualifier 7/01/8 6/29108 (49,54 PH=8

LDC #: 21257D6

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET

Field Blanks

Reviewer:_ 2nd Reviewer:

METHOD: Inorganics, Method See Cover A N/A Were field blanks identified in this SDG? N N/A

Were target analytes detected in the field blanks? AN NA

Sampling date: 6/24/08 Soil factor applied Field blank type: (circle one) Field Blank / Rinsate / Other: FB Associated sample units: Blank units:

Associated Samples: All

Analyte	Blank ID		Sample Identification	
	FB062408GW AREA1	Action Level	FB062408GW Action No samples AREA1 Level were qualified	
Conductivity (umhos/cm)	1.96	19.6		
(C) Ha	5.87			

Sampling date: 6/16/08 Soil factor applied _______Field blank type: (circle one) Field Blank / Rinsate / Other: Pump Blank

Associated Samples: All

Analyte	Blank ID		Sample	Sample Identification
	PB061608B	Action Level	No samples were qualified	
Total Alkalinity (mg/L)	2.90	29.0		
Bicarbonate Alkalinity (mg/L)	2.90	29.0		
Conductivity (umhos/cm)	1.65	16.5		
pH (S.U.)	6.07			

SDG #: 54 CM

VALIDATION FINDINGS WORKSHEET Sample Result Verification

Page: of Reviewer: MM 2nd Reviewer

METHOD: Inorganics, Method See www

*	Sample ID	Analyte	Lab Reporting Limit (units)	AMP Lm.t. RBL tunits)	Finding	13 II
		NO2-1	1/1m 20'0	Thm 100	les limit > after limit	hint nove to
-						
Comments:	ionte					

LDC#: 21257D6 SDG#: See Cover

VALIDATION FINDINGS WORKSHEET Field Duplicates

2nd Reviewer

Inorganics, Method See Cover

<u>AN NA</u> AN NA

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

	Concentrat	ion (mg/L)				0 - 1151 - 41
Analyte	4	5	RPD (≤30)	Difference	Limits	Qualification (Parent only)
Bicarbonate Alkalinity	107	104	3			
Total Alkalinity	107	104	3			
Bromide	1.66	1.57	6			
Chloride	661	652	1			
Conductivity (umhos/cm)	3980	3920	2			
Nitrate as N	7.88	7.72	2			
pH (S.U.)	7.63	7.58	1			
Sulfate	1180	1150	3			
Surfactants	0.208	0.180	14			
TDS	3210	3110	3		`	
TOC AVG	1.12	1.05	FIELD DUDI ICAT	0.07	(≤1.00)	

V:\FIELD DUPLICATES\FD_inorganic\21257D6.wpd

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

Project/Site Name:

Tronox LLC Facility, 2008 Phase B Investigation,

Henderson, Nevada

Collection Date:

June 30 through July 2, 2008

LDC Report Date:

August 17, 2009

Matrix:

Soil

Parameters:

Wet Chemistry

Validation Level:

Stage 4

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R2844797

Sample Identification

SA207-0.5B

SA207-10B

SA207-20B

SA207-30B

SA207-40B

SA181-0.5B

SA181-10B

SA181-20B

SA181-30B

SA181-35B

SA207-30BMS

SA207-30BDUP

Introduction

This data review covers 12 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 350.1M for Ammonia as Nitrogen, EPA Method 365.1 for Total Phosphorus, EPA SW 846 Method 7199 for Hexavalent Chromium, EPA SW 846 Method 9012 for Total Cyanide, EPA SW 846 Method 9045 for pH, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, Nitrite as Nitrogen, and Sulfate, Standard Method 2320B for Alkalinity, Standard Method 5540C for Surfactants, 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 IX.

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 Extraction Until Analysis	Required Holding Time From Sample Extraction Until Analysis	Flag	A or P
SA207-0.5B	Nitrite as N	6 days	48 hours	J- (all detects) R (all non-detects)	А
SA207-10B	Nitrite as N Nitrate as N	6 days 6 days	48 hours 48 hours	J- (all detects) R (all non-detects) J- (all detects) R (all non-detects)	А
SA207-30B SA207-30BMS SA207-30BDUP	Nitrite as N Nitrate as N	10 days 10 days	48 hours 48 hours	J- (all detects) R (all non-detects) J- (all detects) R (all non-detects)	А

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 of each method were met.

b. Calibration Verification

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.

No field blanks were identified in this SDG.

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
SA207-30BMS (SA207-30B)	Chloride	53 (75-125)	J- (all detects) UJ (all non-detects)	А

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 sample result verifications were acceptable.

The QAPP PQLs were met with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All samples in SDG R2844797	Alkalinity	Laboratory reporting limit reported at 200 mg/Kg.	PQL should be reported at 2 mg/Kg per the QAPP.	None	Р
All samples in SDG R2844797	Nitrite as N	Laboratory reporting limit reported at 5.0 mg/Kg.	PQL should be reported at 0.1 mg/Kg 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 R2844797	All analytes reported below the PQL.	J (all detects)	А

VIII. Overall Assessment of Data

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

Sample	Compound	Flag	A or P
SA207-30B SA181-20B	Sulfate	R	А
SA207-40B	Chloride	R	А

The Chloride and Sulfate results for the samples listed above were overdiluted.

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, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R2844797

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R2844797	SA207-0.5B	Nitrite as N	J- (all detects) R (all non-detects)	А	Technical holding times (h)
R2844797	SA207-10B SA207-30B	Nitrite as N Nitrate as N	J- (all detects) R (all non-detects) J- (all detects) R (all non-detects)		Technical holding times (h)
R2844797	SA207-30B	Chloride	J- (all detects) UJ (all non-detects)	А	Matrix spike analysis (%R) (m)
R2844797	SA207-0.5B SA207-10B SA207-20B SA207-30B SA207-40B SA181-0.5B SA181-10B SA181-20B SA181-30B SA181-35B	Alkalinity Nitrite as N	None None	Р	Sample result verification
R2844797	SA207-0.5B SA207-10B SA207-20B SA207-30B SA207-40B SA181-0.5B SA181-10B SA181-20B SA181-30B SA181-35B	All analytes reported below the PQL.	J (all detects)	А	Sample result verification (PQL) (sp)
R2844797	SA207-30B SA181-20B	Sulfate	R	А	Overall assessment of data (o)
R2844797	SA207-40B	Chloride	R	А	Overall assessment of data (o)

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R2844797

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R2844797

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VORKSHEET

LDC #: 21257E6	VALIDATION COMPLETENESS V
SDG #: R2844797	Stage 4
Laboratory: Columbia Analytica	I Sarvinas

Date: 8/15/54
Page: of
Reviewer:
2nd Reviewer:

Laboratory: Columbia Analytical Services

METHOD: (Analyte) Alkalinity (SM2320B), Ammonia-N (EPA Method 350.1M), Bromide, Chloride, Nitrate-N, Nitrite-N, Sulfate (EPA SW846 Method 9056), Cyanide (EPA SW846 Method 9012), Hexavalent Chromium (EPA SW846 Method 7199), pH (EPA SW846 Method 9045), Surfactants (SM5540C), Total Phosphorus (EPA Method 365.1), Percent Solids (EPA Method 160.3), 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
I.	Technical holding times	KW	Sampling dates: 6/30/18 - 1/2/08
lla.	Initial calibration	A	
llb.	Calibration verification	A	
111.	Blanks	4	
IV	Matrix Spike/Matrix Spike Duplicates	SW	> 65/1012
V	Duplicates	Á	, , , , , , , , , , , , , , , , , , , ,
VI.	Laboratory control samples	A	LCG
VII.	Sample result verification	G~/	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	ν,	
L _x	Field blanks	N	

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

		1				
1	SA207-0.5B	11	SA207-30BMS	21	Mrs	31
2	SA207-10B	12	SA207-30BDUP	22		32
3,54	\$A207-20B	13		23		33
4 44	SA207-30B	14		24		34
₅ ч	SA207-40B	15		25		35
6	SA181-0.5B	16		26		36
7	SA181-10B	17		27		37
84°4	SA181-20B	18		28		38
9	SA181-30B	19		29		39
10	SA181-35B	20		30		40

Notes:			
	•		

VALIDATION FINDINGS CHECKLIST

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

Method:Inorganics (EPA Method) LL WY		,	,	
Validation Area	Yes	No	NA	Findings/Comments
Caracina horizo imea		7.) 1	MINISTER OF THE PERSON
All technical holding times were met.		V		
Coolor temperature criteria was met.				
		锁		
Were all instruments calibrated daily, each set-up time?	1			
Were the proper number of standards used?	1			
Were all initial calibration correlation coefficients > 0.995?	1			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	1			
Were titrant checks performed as required? (Level IV only)				
Were balance checks performed as required? (Level IV only)			⁄ـر	
Was a method blank associated with every sample in this SDG?	17			
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.	V	`		
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.		/		
Were the MS/MSD or duplicate relative percent differences (RPD) \leq 20% for waters and \leq 35% for soil samples? A control limit of \leq CROL(\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.	/		úa. cas	
Was an LCS anaytzed for this SDG?	J			
Was an LCS analyzed per extraction batch?	1			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?				
A CANADA STOLEN COMPANY OF THE STOLEN				
Were performance evaluation (PE) samples performed?			1	
Were the performance evaluation (PF) samples within the acceptance limits?			V	

VALIDATION FINDINGS CHECKLIST

Page: Yof Y Reviewer: MM 2nd Reviewer:

Validation Area	Yes	No	NA	Findings/Comments
Ytt Sample Rasius Verticaucit	淵			
Wore RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	1			
Were detection limits < RL?	/			
有一种的一种的一种的一种的一种的一种的一种的一种的一种的一种的一种的一种的一种的一	婟			
Overall assessment of data was found to be acceptable.	1			
Field duplicate pairs were identified in this SDG.		V	-	
Target analytes were detected in the field duplicates.				
Field blanks were identified in this SDG.		\checkmark		
Target analytes were detected in the field blanks.			/	

LDC #:_	YK	<u> 1</u> 26
SDG #:_		

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page:	<u>lof_</u>
Reviewer:	bo
2nd reviewer:_	

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
Sample ID	Soi	Alk pH Br Cl NO ₂ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁶⁺ T-P MBAS/TDS TSS Cond ClO ₃ ClO ₄
1,10		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁵⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
De11,12	Soil	(Alk) pH (Br)(CI)(NO) (NO2) (Q)(NH) (TOC)(N) (Cr ⁶)(T-P)(MBAS) TDS TSS Cond CIO ₃ CIO ₄
1/2)01 J	Alk pH) Br CI NO3 NO2 SO4 NH3 TOC CN Cr8+ T-P MBAS TDS TSS Cond CIO3 CIO4
		Alk pH Br Cl NO ₃ NO ₂ SO ₄ NH ₃ TOC CN Cr ⁵⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
		_
1		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 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 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 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 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 ⁵⁺ T-P MBAS TDS TSS Cond ClO ₃ ClO ₄
37		Alk pH Br Cl 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 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
	<u> </u>	Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr8+ T-P MBAS TDS TSS Cond CIO3 CIO4
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr8+ T-P MBAS TDS TSS Cond CIO3 CIO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4

Comments:		
	•	
		*

LDC #: 125) bb SDG #: Lee we

VALIDATION FINDINGS WORKSHEET Technical Holding Times

2nd reviewer:

All circled dates have exceeded the technical holding time.

X N N/A

Were all samples preserved as applicable to Were all cooler temperatures within validation. Were all samples preserved as applicable to each method? Were all cooler temperatures within validation criteria?

Method: 9056 9056 Parameters: M2-N W2-N Technical holding time: * 48h 4900 Banution Analysis Sampling **Analysis** Analysis **Analysis Analysis** Sample ID date date date date date date Qualifier 7/8/08 7/2/08 6/30/08 1230 17.8 7/8/.8

I from exitation to analysis

ZINGER SDG #: LDC #:

VALIDATION FINDINGS WORKSHEET Matrix Spike Analysis

Page: of Reviewer: 2nd Reviewer:

METHOD: Inorganics, Method _

Y NA Were matrix spike analyzed for each matrix in this SDG?

LEVEL IV ONLY:

Were recalculated results accounts in 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.

Qualifications	(m) 4/2m/-s	50 g. 1	10											/2 p.L.		
Associated Samples	7	-1												sot RL on	()	õ
%R	23	+ # 051	230 # A											+ 6pike Rue	1941/ws 0 = 92	13.0-14.1/ = 897
Analyte	ಕ	Tos	4 1 K	•										trd ND	1t 3813	
Matrix	بغ													between regular	- Lager Jan	from how the
Matrix Spike ID														ents: Sangle &	524	MS.6 KIK
*	_													Comments:		

SDG #: 1/15/166

VALIDATION FINDINGS WORKSHEET Sample Result Verification

Page: of Reviewer: WM 2nd Reviewer

Lee Com

METHOD: Inorganics, Method_

Qualifications Jamy/ 0 4 8 limit > apply fruit over Libral Finding 71.42 2110 7 2/2 RDL (units) 0 Lab Reporting Limit (units) Run our 5.0 Alkelin Ty Analyte 2002 Sample ID 4 Z Comments:_

SDG #: 2115/12/b

Validatin Findings Worksheet Initial and Continuing Calibration Calculation Verification

Page: of A

Method: Inorganics, Method __

Jan 23

The correlation coefficient (r) for the calibration of $\overline{\mathcal{CN}}$

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

was recalculated.Calibration date: $7/(\sqrt{-1000})$

%R = Found X 100

Where, Fot

Found = concentration of each analyte measured in the analysis of the ICV or CCV solution

True = concentration of each analyte in the ICV or CCV source

Acceptable N Z (org Reported 0.999985 r or r 3 3 (orth Recalculated 0.999985 rorr 99 Response 0.01326 0.02168 0.04724 0.09358 0.18346 0.44546 0.00424 0.8858Conc. (mg/L) 03.75 0.49> 69 0.05 0.02 0.01 0.7 0.5 0.1 Standard 00 300 0.50 2 88 **s**2 83 **84 S**2 **s**6 S s₇ ナチをた Z Z アセン Analyte S CcV Calibration verification Calibration verification Calibration verification Type of analysis Initial calibration 3 <u>ک</u>

Mark # on SDG #:

VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

Reviewer: Page:

METHOD: Inorganics, Method

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

%R = <u>Found</u> x 100 Where, True

Found .

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

True m

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

0 C RPD = $\frac{1.5 \cdot D!}{(S+D)/2} \times 100$ Where,

Original sample concentration Duplicate sample concentration

	•				Receipulated	Reported	
Sample ID	Type of Analysis	Element	Found / S (unite)	True / D (unita)	%R / RPD	%R / RPD	Acceptable (Y/N)
	Laboratory control sample	Mary Andrews Control					
La		3	141	2	546	96	>
	Matrix spike sample		(\$\$R-\$R)				•
		. By	9-81	75.4	83	83	
Ć	Duplicate sample	1]' 0	7		1	->
1		<u>ي</u> ق) e 	7 00		_	

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

LDC # SDG #	: 1187 bb	VALIDATION FINDINGS WO Sample Calculation Verit		Page Reviewer 2nd reviewer	:MH			
METH	OD: Inorganics, Metho	d See cour						
Please Y N N N	N/A Have results N/A Are results w	ow for all questions answered "N". Not appose to the context of th		re identified as "f	VA⁻.			
Compo	ound (analyte) results f	or	repoi	ted with a positiv	e detect were			
Concentration = SOY = (0,020 1616 × Arec - 0,0215664) × 157 A2504 = (0,0701616 × 107,528 - 0,041564) × 100 = 14.64 × 100 The source of the								
	A2 804 =	(0.0001616 × 107, 528-0,0x	(150 (150 (1664) XI.	- M 52 mg/	kg			
			Reported Concentration	Calculated Concentration	Acceptable			
	Sample 10	Analyt•	(wf/)	(1/2/)	(Y/N)			
	2	Bicoloute AVR	868	868	У			
		contact AIK	2560	20/0				
		le	63700	63700				
		rid (sy)	9.59	9.99				
		30 y	2760	2760				
		Surfact on 15	4.88	4.88				

#	Sample 10	Analyte	(mf/-z)	(17/2)	(Y/N)
(2	Bicohuti AVK Carlette AVK	868	868	У
		codute AIK	2560	20/00	<u> </u>
		10	63700	63700	
		MH rsu)	9.59	9 99	
		ζυι	2760	9.99 2960 4.88	
		Surfact ont 5 The Blk To C T-P	9.59 2760 4.88	4.88	
		The Am	3130	7130	
		Toc	96100	96700	
		T-P	78.2	18	\mathcal{Y}
				·	
		1.			

Note:		
4		

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2008 Phase B Investigation,

Henderson, Nevada

Collection Date:

July 1 through July 2, 2008

LDC Report Date:

August 14, 2009

Matrix:

Water

Parameters:

Wet Chemistry

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R2844803

Sample Identification

M-55B

M-55DB

M-78B

M-65B

EB070208GW1

M-55BDL1

M-55BDL2

M-55DBDL1

M-55DBDL2

M-78BDL1

M-78BDL2

M-78BMS

M-78BDUP

M-78BMSDL1

M-78BDUPDL1

M-78BMSDL2

M-78BDUPDL2

Introduction

This data review covers 17 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 120.1 for Conductivity, EPA Method 218.6 for Hexavalent Chromium, EPA Method 350.1M for Ammonia as Nitrogen, EPA Method 365.1 for Total Phosphorus, EPA SW 846 Method 9012 for Total Cyanide, EPA SW 846 Method 9040 for pH, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, Nitrite as Nitrogen, and Sulfate, EPA SW 846 Method 9060 for Total Organic Carbon, Standard Method 2320B for Alkalinity, Standard Method 2540C for Total Dissolved Solids, Standard Method 2540D for Total Suspended Solids, and Standard Method 5540C for Surfactants.

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 IX.

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
M-55B M-78B M-78BMS M-78BDUP	Total organic carbon	30 days	28 days	J- (all detects) UJ (all non-detects)	Р
M-55DB	Total organic carbon	31 days	28 days	J- (all detects) UJ (all non-detects)	Р
M-65B EB070208GW1	Total organic carbon	29 days	28 days	J- (all detects) UJ (all non-detects)	Р

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

Sample	Analyte	Finding	Criteria	Flag	A or P
M-55DB M-78B M-65B M-78BMS M-78BMSDL1 M-78BMSDL1 M-78BDUPDL1 M-78BDUPDL2 M-55DBDL1 M-55DBDL1 M-55DBDL2 M-78BDL1 M-78BDL1	Total cyanide	Sample pH reported at approximately 10 upon receipt by the laboratory.	Sample must be preserved at pH >12.	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

a. Initial Calibration

All criteria for the initial calibration of each method were met.

b. Calibration Verification

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.

Sample EB070208GW1 was identified as an equipment blank. No contaminant concentrations were found in this blank with the following exceptions:

Equipment Blank ID	Sampling Date	' • 1		Associated Samples
EB070208GW1	7/2/08	Conductivity pH	3.2 umhos/cm 6.09 S.U.	M-65B

Sample FB062408GWAREA1 (from SDG R2844650) 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
FB062408GWAREA1	6/24/08	Conductivity pH	1.96 umhos/cm 5.87 S.U.	M-55B M-55DB M-78B M-65B

Sample PB061608B (from SDG R2844538) was identified as a pump blank. No contaminant concentrations were found in this blank with the following exceptions:

Pump Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
PB061608B	6/16/08	Total alkalinity Bicarbonate alkalinity Conductivity pH	2.90 mg/L 2.90 mg/L 1.65 umhos/cm 6.07 S.U.	M-55B M-55DB M-78B M-65B

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

IV. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) samples were reviewed for each matrix as applicable. Percent recoveries (%R) were not within QC limits. Since the sample concentration was greater than the spiked concentration, no data were qualified.

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

The QAPP PQLs were met with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
M-55B M-55DB M-78B M-65B EB070208GW1	Nitrite as N	Laboratory reporting limit reported at 0.05 mg/L.	PQL should be reported at 0.01 mg/L per the QAPP.	None	P

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG R2844803	All analytes reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

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

Sample	Analyte	Flag	A or P
M-55B M-55DB M-55BDL2 M-55DBDL2 M-78BDL1 M-78BDL2	Total cyanide	X	А

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

IX. Field Duplicates

Samples M-55B and M-55DB, samples M-55BDL1 and M-55DBDL1, and samples M-55BDL2 and M-55DBDL2 were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Concen	tration	222	Difference		
Analyte	M-55B	M-55DB	RPD (Limits)	(Limits)	Flags	A or P
Ammonia as N	1.88 mg/L	1.95 mg/L	4 (≤30)	-	-	-
Bicarbonate alkalinity	153 mg/L	152 mg/L	1 (≤30)	-	-	-
Total alkalinity	153 mg/L	152 mg/L	1 (≤30)	•	-	•
Bromide	2880 mg/L	2780 mg/L	4 (≤30)	-	-	-
Chloride	1810 mg/L	1710 mg/L	6 (≤30)	-	-	-
Conductivity	10700 umhos/cm	10300 umhos/cm	4 (≤30)	-	-	_
Hexavalent chromium	11.7 mg/L	12.6 mg/L	7 (≤30)	-	-	_
Nitrate as N	27.1 mg/L	27.5 mg/L	1 (≤30)	-	-	-
pН	7.11 S.U.	7.14 S.U.	0 (≤30)	-	-	-
Sulfate	1210 mg/L	1160 mg/L	4 (≤30)	-	-	-
Surfactants	1.71 mg/L	1.56 mg/L	9 (≤30)	-	-	-
Total cyanide	2.64 mg/L	3.14 mg/L	17 (≤30)	٠	-	-
Total dissolved solids	9520 mg/L	9410 mg/L	1 (≤30)	-	-	-
Total organic carbon (AVG)	1.86 mg/L	1.00U mg/L	-	0.86 (≤1.00)	-	-

	Concentrat	ion (mg/L)		D.11		
Analyte	M-55BDL1	M-55DBDL1	RPD (Limits)	Difference (Limits)	Flags	A or P
Total cyanide	0.466	0.459	2 (≤30)	-	-	-

	Concentra	tion (mg/L)	RPD	Difference		
Analyte	M-55BDL2	M-55DBDL2	(Limits)	Difference (Limits)	Flags	A or P
Total cyanide	2.64	3.14	17 (≤30)	-	-	-

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R2844803

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R2844803	M-55B M-78B M-55DB M-65B EB070208GW1	Total organic carbon	J- (all detects) UJ (all non-detects)	A	Technical holding times (h)
R2844803	M-55DB M-78B M-65B M-55DBDL1 M-55DBDL2 M-78BDL1 M-78BDL2	Total cyanide	J- (all detects) R (all non-detects)	Р	Sample condition (preservation) (pH)
R2844803	M-55B M-55DB M-78B M-65B EB070208GW1	Nitrite as N	None	Р	Sample result verification
R2844803	M-55B M-55DB M-78B M-65B EB070208GW1 M-55BDL1 M-55BDL2 M-55DBDL1 M-55DBDL2 M-78BDL1 M-78BDL1	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)
R2844803	M-55B M-55DB M-55BDL2 M-55DBDL2 M-78BDL1 M-78BDL2	Total cyanide	x	А	Overall assessment of data (o)

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R2844803

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R2844803

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET Date: 9/13/ SDG #: R2844803 Stage 2B Page: of Reviewer: 2nd Revie									
	Validation	Area					Comments		
I.	Technical holding times			SW	Sampling	dates: 7/1/0			
lla.	Initial calibration			A			/		
llb.	Calibration verification			A					
111.	Blanks			4					
IV	Matrix Spike/Matrix Spike Du	uplicat	es	SW) M	5/ pig			
V	Duplicates			A	>	7 - 1			
VI.	Laboratory control samples			A	Lug				
VII.	Sample result verification			5 N					
VIII.	Overall assessment of data			5W					
IX.	Field duplicates			5~/	د ۱۱)	(b, 8) (7,9)		
X.	Field blanks			SW		np Blank=PB0616 2408GWAREA1(R			
Note: Validat	A = Acceptable N = Not provided/applicable SW = See worksheet ed Samples:		R = Rins	o compounds sate eld blank	s detected	D = Dupli TB = Trip EB = Equ			
1	M-55B	11	M-78BDL2		21	MB	31		
2	M-55DB	12	M-78BMS		22		32		
	M-78B	13	M-78BDUP		23		33		
4	M-65B	14	M-18Bh	50-1	24		34		
5	EB070208GW1	15	l 1 ' '	19921	25		35		
6	M-55BDL1	16	М	5)12	26		36		
7	M-55BDL2	17		40LY	27		37		
8	M-55DBDL1	18		l .	28		38		
9	M-55DBDL2	19			29		39		
	M-78BDL1	20			30		40		

Notes:_

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VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

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All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
15	AL	(Alk pH Br Cl NO, NO, SO, NH, TOC CN Cr6+ T-P MBAS TDS TSS Cond)CIO, CIO,
6-11	<i></i>	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
m(2,13	Ma	Alk pH Br CI NO, NO, SO, NH, TOC CN CT T-P MBAS TOS TSS Cond CIO, CIO,
V 13	<i>y</i>	Alb(pH) Br CI NO, NO, SO, NH, TOC CN Cr6+ T-P MBAS (TDS (SS (Cond) CIO, CIO,
14-17		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 NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		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 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 NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		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 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 Cr5+ 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 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:		

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VALIDATION FINDINGS WORKSHEET Technical Holding Times

Page:	of
Reviewer:	br
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All circled dates have exceeded the technical holding time.

Y N N/A

Were all samples preserved as applicable to the color temperatures within validations.

Were all cooler temperatures within validations. Were all samples preserved as applicable to each method?
Were all cooler temperatures within validation criteria?

Y) N N/A Were all	cooler tempera		dation criteria?_	· · · · · · · · · · · · · · · · · · ·			***************************************
Method:		9060		9012			
Parameters:		TOC		CN			
Technical holding tin	ne:	28 /2		145			
Sample ID	Sampling date	Analysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier
1,3,17,13	7/108	714108	(30 top	-)			J-/47/p
i	V	8/1/8	(31 Jay	7)			
4,5	712708	7/31/08	(29 to	J~)			
				9 -			
2-4, 8-17				PH =10			J-/p/p
				(PI+71)	_)		
			*				
				·			
•							

LDC #: 21257F6

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET

Field Blanks

Reviewer: Page: ☐ of ☐

2nd Reviewer:

Were field blanks identified in this SDG? METHOD: Inorganics, Method See Cover N N/A

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

Blank units: Associated sample units: Sampling date: 6/24/08 Soil factor applied Field blank type: (circle one) Field Blank / Rinsate / Other: FB

Associated Samples: 1-4

ank ID	W Action No samples Level were qualified	1.96 19.6	5.87	
	Action No samp Level were qual	19.6		
Blank ID	FB062408GW AREA1	1.96	5.87	
Analyte		Conductivity (umhos/cm)	pH (S.U.)	

Sampling date: 6/16/08 Soil factor applied Field blank type: (circle one) Field Blank / Rinsate / Other: Pump Blank

Associated Samples: 1-4

Analyte	Blank ID			ÿ	Sample Identification	cation		
	PB061608B	Action Level	Action No samples Level were qualified					
Total Alkalinity (mg/L)	2.90	29.0						
Bicarbonate Alkalinity (mg/L)	2.90	29.0						
Conductivity (umhos/cm)	1.65	16.5						
pH (S.U.)	6.07							

Sampling date: 7/2/08 Soil factor applied Field blank type: (circle one) Field Blank / Rinsate / Other: EB

Associated Samples: 4

Analyte	Blank ID				Sample Identification	cation		
	5	Action	No samples were qualified					
Conductivity (umhos/cm)	3.2	32.0						
pH (S.U.)	6.09							

LDC #: > 1757 76

VALIDATION FINDINGS WORKSHEET Matrix Spike Analysis

Page: | of / 2nd Reviewer: Reviewer:

METHOD: Inorganics, Method

10 m

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

| NA | 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

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

*	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
	7	Je Je	1 Sutateta	ηş	(-3	1 May (>4X)
			/ /			
				·		
						,
	•					
5 5	Comments:					

SDG #: 54 CM

VALIDATION FINDINGS WORKSHEET Sample Result Verification

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METHOD: Inorganics, Method Sel www

			(all one of the limit (mile)	AATP King		Qualifications
* -	Sample ID	Analyte L A(/	1, 0 C W.V.	1 Km 100	Put this vake land	1
\pm	, X	V - 400				
				·		
				-		
E O O	Comments:					

SDG #: SLE WAS

VALIDATION FINDINGS WORKSHEET

Overall Assessment of Data

Page: of
Reviewer: WIN
2nd Reviewer:

METHOD: Inorganics, Method くんしい

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.

Was the overall quality and usability of the data acceptable?

Sample ID 1,2 1,9-11 1,9-11 12-11 12-11	Finding Associated Samples Qualifications	CN +/A (for negative)	Co (true Leated)								
		2								12 > 0 > now Lite.	

LDC#: 21257F6 SDG#: See Cover

VALIDATION FINDINGS WORKSHEET Field Duplicates

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2nd Reviewer:	9

Inorganics, Method See Cover

N NA Ý)N NA

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

	Concentration (mg/L)					Qualification
Analyte	1	2	RPD (≤30)	Difference	Limits	(Parent only)
Ammonia as N	1.88	1.95	4			
Bicarbonate Alkalinity	153	152	1			
Total Alkalinity	153	152	1			
Bromide	2880	2780	4			
Chloride	1810	1710	6			
Conductivity (umhos/cm)	10700	10300	4			
Hexavalent Chromium	11.7	12.6	7			
Nitrate as N	27.1	27.5	1			
pH (S.U.)	7.11	7.14	0			
Sulfate	1210	1160	4			
Surfactants	1.71	1.56	9			
Total Cyanide	2.64	3.14	17			
TDS	9520	9410	1			
TOC AVG	1.86	1.00U		0.86	(≤1.00)	

	Concentration (mg/L)					Qualification
Analyte	6	8	RPD (≤30)	Difference	Limits	(Parent only)
Cyanide	0.466	0.459	2			

LDC#: 21257F6 SDG#: See Cover

VALIDATION FINDINGS WORKSHEET Field Duplicates

Reviewer: 2nd Reviewer:

Inorganics, Method See Cover

AN NY N NA

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

	Concentration (mg/L)					Qualification
Analyte	7	9	RPD (≤30)	Difference	Limits	(Parent only)
Cyanide	2.64	3.14	17			

V:\FIELD DUPLICATES\FD_inorganic\21257F6.wpd

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2008 Phase B Investigation,

Henderson, Nevada

Collection Date:

July 7 through July 8, 2008

LDC Report Date:

August 17, 2009

Matrix:

Soil

Parameters:

Wet Chemistry

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R2844862

Sample Identification

SA47-0.5B

SA47-10B

SA47-20B

SA47-30B

SA47-35B

SA183-0.5B

SA67-0.5B

SA67-10B

SA67-20B

SA67-30B

SA67-35B

RSAN2-0.5B

RSAN2-10B

RSAN2-20B

Introduction

This data review covers 14 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 160.3 for Percent Solids, EPA Method 350.1M for Ammonia as Nitrogen, EPA Method 365.1 for Total Phosphorus, EPA SW 846 Method 7199 for Hexavalent Chromium, EPA SW 846 Method 9012 for Total Cyanide, EPA SW 846 Method 9045 for pH, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, Nitrite as Nitrogen, and Sulfate, Standard Method 2320B for Alkalinity, Standard Method 5540C for Surfactants, 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 IX.

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 Extraction Until Analysis	Required Holding Time From Sample Extraction Until Analysis	Flag	A or P
SA67-30B	Nitrite as N	49 hours	48 hours	J- (all detects) UJ (all non-detects)	А
SA67-35B	Nitrite as N	49.25 hours	48 hours	J- (all detects) UJ (all non-detects)	А
RSAN2-10B	Nitrite as N	49.5 hours	48 hours	J- (all detects) UJ (all non-detects)	А
RSAN2-20B	Nitrite as N	49.75 hours	48 hours	J- (all detects) UJ (all non-detects)	А

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 of each method were met.

b. Calibration Verification

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.

No field blanks were identified in this SDG.

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. Sample Result Verification and Project Quantitation Limit

The QAPP PQLs were met with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All samples in SDG R2844862	Alkalinity	Laboratory reporting limit reported at 200 mg/Kg.	PQL should be reported at 2 mg/Kg per the QAPP.	None	Р
All samples in SDG R2844862	Nitrite as N	Laboratory reporting limit reported at 5.0 mg/Kg.	PQL should be reported at 0.1 mg/Kg 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 R2844862	All analytes reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

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

Sample	Compound	Flag	A or P
RSAN2-20B	Sulfate	х	Α
SA47-0.5B SA67-0.5B SA67-35B RSAN2-0.5B RSAN2-10B	Chloride	х	A

The Chloride and Sulfate results for the samples listed above were overdiluted.

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, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R2844862

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R2844862	SA67-30B SA67-35B RSAN2-10B RSAN2-20B	Nitrite as N	J- (all detects) UJ (all non-detects)	А	Technical holding times (h)
R2844862	SA47-0.5B SA47-10B SA47-20B SA47-30B SA47-35B SA183-0.5B SA67-0.5B SA67-10B SA67-20B SA67-30B SA67-30B SA67-35B RSAN2-0.5B RSAN2-10B RSAN2-10B	Alkalinity Nitrite as N	None None	Р	Sample result verification
R2844862	SA47-0.5B SA47-10B SA47-20B SA47-30B SA47-35B SA183-0.5B SA67-0.5B SA67-10B SA67-20B SA67-30B SA67-35B RSAN2-0.5B RSAN2-0.5B	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)
R2844862	RSAN2-20B	Sulfate	х	А	Overall assessment of data (o)
R2844862	SA47-0.5B SA67-0.5B SA67-35B RSAN2-0.5B RSAN2-10B	Chloride	х	А	Overall assessment of data (o)

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R2844862

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R2844862

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #: 21257G6 SDG #: R2844862 Stage 2B

Reviewer:

Laboratory: Columbia Analytical Services

2nd Reviewer:

METHOD: (Analyte) Alkalinity (SM2320B), Ammonia-N (EPA Method 350.1M), Bromide, Chloride, Nitrate-N, Nitrite-N, Sulfate (EPA SW846 Method 9056), Cyanide (EPA SW846 Method 9012), Hexavalent Chromium (EPA SW846 Method 7199), pH (EPA SW846 Method 9045), Surfactants (SM5540C), Total Phosphorus (EPA Method 365.1), Percent Solids (EPA Method 160.3), 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
1.	Technical holding times	WAS SOL	Sampling dates: 7/7/08, 7/8/08
lla.	Initial calibration	A	',','
lib.	Calibration verification	A	
111.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	N	> Client specified.
V	Duplicates	N)
VI.	Laboratory control samples	A	Lez
VII.	Sample result verification	SW	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	Ψ,	
x	Field blanks	N	

Note:

A = Acceptable

N = Not provided/applicable SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

		50,71		water the same and			
1	SA47-0.5B	11	SA67-35B	21	MB	31	
2	SA47-10B	12	RSAN2-0.5B	22		32	
3	SA47-20B	13	RSAN2-10B	23		33	
4	SA47-30B	14	RSAN2-20B	24		34	
5	SA47-35B	15		25		35	
6	SA183-0.5B	16		26		36	
7	SA67-0.5B	17		27	·	37	
8	SA67-10B	18		28		38	
9	SA67-20B	19		29		39	
10	SA67-30B	20		30		40	

Notes:			

LDC #: >1159 96 SDG #: <u>Sel co</u>m

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

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

All circled methods are applicable to each sample.

Sample ID Matrix	
1/14 501	(Alk pH Br Ci NO, NO, SO, NH, TOC CN Cret T-P MBAS) TDS TSS Cond CiO, CiO,
	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 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
y	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
	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:	
	•

VALIDATION FINDINGS WORKSHEET Technical Holding Times

Reviewer: 2nd reviewer:

All circled dates have exceeded the technical holding time.

Y N WA

Were all samples preserved as applicable to Were all samples preserved as applicable to each method? N N/A Were all cooler temperatures within validation criteria?

Vere all cooler temperatures within validation criteria?							
Method:			9086				
Parameters:	·		9.86 1022 48h				
Technical holding tir	ne: #		48h				
Sample ID	Sampling date	Di huction Aπaiysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier
lo	7/8109	7/9/08	date 7/11/08 1 693	(49 L			J-/43/
[]	. 1	1	1617 1617		(492	h	1/2
(3			1632		(49.5 (49.5	6	
14	V	V	1 1646		(49.9)	- 125	1
					(4/5/5)		
						· · · · · · · · · · · · · · · · · · ·	
				·			
				·			
					·		

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HT.6

1DC#: V/75/9/6/b
SDG#: Lee wow

VALIDATION FINDINGS WORKSHEET Sample Result Verification

Page: of Reviewer AM 2nd Reviewer

METHOD: Inorganics, Method

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2008 Phase B Investigation,

Henderson, Nevada

Collection Date:

July 8 through July 11, 2008

LDC Report Date:

August 14, 2009

Matrix:

Water

Parameters:

Wet Chemistry

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R2844866

Sample Identification

M-39B

TR-2B

M-69B

I-BB

M-96BF

M-48B

TR-4B

CLD3-RB

CLD1-RB

M-124B

M-123B

I-BBMS

I-BBDUP

M-96BFMS

M-96BFDUP

Introduction

This data review covers 15 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 120.1 for Conductivity, EPA Method 218.6 for Hexavalent Chromium, EPA Method 350.1M for Ammonia as Nitrogen, EPA Method 365.1 for Total Phosphorus, EPA SW 846 Method 9012 for Total Cyanide, EPA SW 846 Method 9040 for pH, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, Nitrite as Nitrogen, and Sulfate, EPA SW 846 Method 9060 for Total Organic Carbon, Standard Method 2320B for Alkalinity, Standard Method 2540C for Total Dissolved Solids, Standard Method 2540D for Total Suspended Solids, and Standard Method 5540C for Surfactants.

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 IX.

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 of each method were met.

b. Calibration Verification

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.

Sample FB062408GWAREA1 (from SDG R2844650) 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
FB062408GWAREA1	6/24/08	Conductivity pH	1.96 umhos/cm 5.87 S.U.	All samples in SDG R2844866

Sample PB061608B (from SDG R2844538) was identified as a pump blank. No contaminant concentrations were found in this blank with the following exceptions:

Pump Blank ID	Sampling Date	Analyte	Concentration	Associated Samples
PB061608B	6/16/08	Total alkalinity Bicarbonate alkalinity Conductivity pH	2.90 mg/L 2.90 mg/L 1.65 umhos/cm 6.07 S.U.	M-39B TR-2B M-69B I-BB M-96BF M-48B CLD1-RB M-124B M-123B

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

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-96BFMS (M-96BF M-48B TR-4B)	Total cyanide	0 (75-125)	J- (all detects) R (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. Sample Result Verification and Project Quantitation Limit

The QAPP PQLs were met with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All samples in SDG R2844866	Nitrite as N	Laboratory reporting limit reported at 0.05 mg/L.	PQL should be reported at 0.01 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 R2844866	All analytes reported below the PQL.	J (all detects)	А

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, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R2844866

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R2844866	M-96BF M-48B TR-4B	Total cyanide	J- (all detects) R (all non-detects)	А	Matrix spike analysis (%R) (m)
R2844866	M-39B TR-2B M-69B I-BB M-96BF M-48B TR-4B CLD3-RB CLD1-RB M-124B M-123B	Nitrite as N	None	Р	Sample result verification
R2844866	M-39B TR-2B M-69B I-BB M-96BF M-48B TR-4B CLD3-RB CLD1-RB M-124B M-123B	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R2844866

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R2844866

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET LDC #: 21257H6 Stage 2B SDG #: R2844866 Reviewer: Laboratory: Columbia Analytical Services 2nd Reviewer: METHOD: (Analyte) Alkalinity (SM2320B), Ammonia-N (EPA Method 350.1M), Bromide, Chloride, Nitrate-N, Nitrite-N, Sulfate (EPA SW846 Method 9056), Conductivity (EPA Method 120.1) Cyanide (EPA SW846 Method 9012), Hexavalent Chromium (EPA Method 218.6), pH (EPA SW846 Method 9040), Surfactants (SM5540C), Total Phosphorus (EPA Method 365.1), TDS (SM2540C), TSS (SM2540D), TOC (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. Comments Validation Area 7/8/08 - 7/11/08 Sampling dates: Technical holding times Initial calibration lla. IIb. Calibration verification III. Blanks &w IV Matrix Spike/Matrix Spike Duplicates **Duplicates** V VI. Laboratory control samples SW VII. Sample result verification VIII. Overall assessment of data Field duplicates IX. = PBOB1608B (R2844538) Field blanks ND = No compounds detected = FB & Duplicate Note: A = Acceptable TB = Trip blank N = Not provided/applicable R = Rinsate EB = Equipment blank FB = Field blank SW = See worksheet Validated Samples: 31 11 M-123B 21 MB M-39B 32 22 12 I-BBMS TR-2B I-BBDUP 23 33 13 M-69B 34 I-BB 14 M-96BFMS 24 35 M-96BFDUP 25 15 5 M-96BF 26 36 16 M-48B 37 27 TR-4B 17 28 38 18 CLD3-RB 39 29 CLD1-RB 19 40 30 20 M-124B 10

Notes:

LDC #: >1x1 Ho SDG #: See cover

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page:	_of/_
Reviewer:	<u>~</u>
2nd reviewer:	4

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
111	AL	(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
212113	M	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 14.15		Alk pH(B)(C)(NO) (NO) SO) (NH3) TOO (CN (Cr5) T-F(MBAS) TDS TSS Cond CIO3 CIO4
15	V	(Alk) 6H) Br CI NO, NO, SO, NH, TOC CN Cr6+ T-P (MS/S) TOS TSS (Cond) CIO, CIO,
		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 NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		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 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 CI NO3 NO2 SO4 NH3 TOC CN Cr8+ T-P MBAS TDS TSS Cond CIO3 CIO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr ⁶⁺ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr8+ 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 NO3 NO2 SO4 NH3 TOC CN Cr8+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4

Comments:				

LDC #: 21257H6

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET

Field Blanks

Reviewer:_ Page:

2nd Reviewer:_

METHOD: Inorganics, Method See Cover No. N/A Were field blanks identified in this SDG?

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

Associated sample units:_ Blank units:

Sampling date: 6/24/08 Soil factor applied Field blank type: (circle one) Field Blank / Rinsate / Other. FB

Associated Samples: All

Sample Identification were qualified No samples Action Level 19.6 FB062408GW Blank ID AREA1 1.96 5.87 Conductivity (umhos/cm) pH (S.U.) Analyte

Sampling date: 6/16/08 Soil factor applied Field blank type: (circle one) Field Blank / Rinsate / Other: Pump Blank

Associated Samples: 1-6, 9-11

Analyte	Blank ID				Sample Identification	ıtion		
	PB061608B	Action Level	No samples were qualified					
Total Alkalinity (mg/L)	2.90	29.0						
Bicarbonate Alkalinity (mg/L)	2.90	29.0						
Conductivity (umhos/cm)	1.65	16.5						
pH (S.U.)	6.07							

SDG #: LDC #:

VALIDATION FINDINGS WORKSHEET Matrix Spike Analysis

Page: of 2nd Reviewer: Reviewer:

METHOD: Inorganics, Method _____

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A". $\frac{A}{A}$ Was a matrix spike analyzed for each matrix in this SDG? Y MAN

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. LEVEL IV ONLY:

Qualifications	7/k/4 (m)												
Associated Samples	()												
%R	0												
Analyte	CN												
Matrix	He.												
Matrix Spike ID	ታ)												
*	_												

Comments:

SDG #: 2 1 XY 1 14

VALIDATION FINDINGS WORKSHEET Sample Result Verification

Page: Of
Reviewer: MM
2nd Reviewer

METHOD: Inorganics, Method See COMMY

*	Sample ID		Lab Reporting Limit (units)	AATP Kmits	Finding	Qualifications
	2	KAPK	1/1m 200	12m 100	for their > atprachent	
1						
				-		
		,				
				-		
E 00	Comments:					

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2008 Phase B Investigation,

Henderson, Nevada

Collection Date:

July 8 through July 9, 2008

LDC Report Date:

August 17, 2009

Matrix:

Soil

Parameters:

Wet Chemistry

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R2844885

Sample Identification

RSAN2-30B

RSAN2-30BD

RSAN2-35B

RSAO2-0.5B

RSAO2-10B

RSAO2-20B

RSAO2-20BD

RSAO2-30B

RSAO2-33B

SA183-10B

SA183-10BD

SA183-20B

SA183-30B

SA183-33B

RSA04-0.5B

RSA04-10B

RSA04-20B

RSA04-30B

RSA04-36B

Introduction

This data review covers 19 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 350.1M for Ammonia as Nitrogen, EPA Method 365.1 for Total Phosphorus, EPA SW 846 Method 7199 for Hexavalent Chromium, EPA SW 846 Method 9012 for Total Cyanide, EPA SW 846 Method 9045 for pH, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, Nitrite as Nitrogen, and Sulfate, Standard Method 2320B for Alkalinity, Standard Method 5540C for Surfactants, 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 IX.

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 of each method were met.

b. Calibration Verification

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.

No field blanks were identified in this SDG.

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. Sample Result Verification and Project Quantitation Limit

The QAPP PQLs were met with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All samples in SDG R2844885	Alkalinity	Laboratory reporting limit reported at 200 mg/Kg.	PQL should be reported at 2 mg/Kg per the QAPP.	None	Р
All samples in SDG R2844885	Nitrite as N	Laboratory reporting limit reported at 5.0 mg/Kg.	PQL should be reported at 0.1 mg/Kg 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 R2844885	All analytes reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

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

Sample	Compound	Flag	A or P
RSAN2-30B RSAN2-30BD RSAN2-35B RSAO2-30B	Chloride Sulfate	R R	А
RSAO2-0.5B RSAO2-33B	Chloride	R	А
RSAO2-20B RSAO2-20BD SA183-20B SA183-30B RSA04-20B RSA04-30B RSA04-36B	Sulfate	R	А

The Chloride and Sulfate results for the samples listed above were overdiluted.

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

IX. Field Duplicates

Samples RSAN2-30B and RSAN2-30BD, samples RSAO2-20B and RSAO2-20BD, and samples SA183-10B and SA183-10BD were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Conce	ntration				
Analyte	RSAN2-30B	RSAN2-30BD	RPD (Limits)	Difference (Limits)	Flags	A or P
Bicarbonate alkalinity	756 mg/Kg	392 mg/Kg	-	364 (≤333)	J (all detects)	А
Total alkalinity	888 mg/Kg	392 mg/Kg	-	496 (≤333)	J (all detects)	А
рН	8.42 S.U.	8.24 S.U.	2 (≤50)	-	-	-
Total organic carbon	300U mg/Kg	310 mg/Kg	-	10 (≤300)	-	-
Total phosphorus	799 mg/Kg	838 mg/Kg	5 (≤50)	-	-	-

	Сопсе	ntration				
Analyte	RSAO2-20B	RSAO2-20BD	RPD (Limits)	Difference (Limits)	Flags	A or P
Bicarbonate alkalinity	412 mg/Kg	273U mg/Kg	_	139 (≤273)	-	-
Total alkalinity	433 mg/Kg	276 mg/Kg	_	157 (≤273)	-	•
Chloride	142 mg/Kg	74.8 mg/Kg	-	67.2 (≤27.3)	J (all detects)	А
рН	8.44 S.U.	8.25 S.U.	2 (≤50)	-	-	-
Total organic carbon	300U mg/Kg	618 mg/Kg	-	318 (≤300)	J (all detects) UJ (all non-detects)	Α
Total phosphorus	544 mg/Kg	659 mg/Kg	19 (≤50)	•	-	-

	Conce	ntration				
Analyte	SA183-10B	SA183-10BD	RPD (Limits)	Difference (Limits)	Flags	A or P
Bicarbonate alkalinity	268 mg/Kg	262 mg/Kg	•	6 (≤227)	-	-
Total alkalinity	331 mg/Kg	375 mg/Kg	-	44 (≤227)	-	-

	Conce	ntration				
Analyte	SA183-10B	SA183-10BD	RPD (Limits)	Difference (Limits)	Flags	A or P
рН	9.11 S.U.	8.91 S.U.	2 (≤50)	-	-	-
Sulfate	73.5 mg/Kg	69.6 mg/Kg	-	3.9 (≤22.7)	-	-
Total organic carbon	806 mg/Kg	862 mg/Kg	-	56 (≤300)	-	
Total phosphorus	885 mg/Kg	851 mg/Kg	4 (≤50)	-	-	-

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R2844885

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R2844885	RSAN2-30B RSAN2-30BD RSAN2-35B RSAO2-0.5B RSAO2-10B RSAO2-20B RSAO2-20BD RSAO2-30B RSAO2-33B SA183-10B SA183-10BD SA183-30B SA183-30B SA183-30B SA183-30B SA183-30B SA183-30B SA183-30B SA183-30B RSAO4-0.5B RSAO4-10B RSAO4-20B RSAO4-30B RSAO4-30B	Alkalinity Nitrite as N	None None	Р	Sample result verification
R2844885	RSAN2-30B RSAN2-30BD RSAN2-35B RSAO2-0.5B RSAO2-10B RSAO2-20BD RSAO2-30B RSAO2-33B SA183-10B SA183-10BD SA183-10BD SA183-30B SA183-33B RSA04-0.5B RSA04-0.5B RSA04-10B RSA04-20B RSA04-30B RSA04-30B	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)
R2844885	RSAN2-30B RSAN2-30BD RSAN2-35B RSAO2-30B	Chloride Sulfate	R R	А	Overall assessment of data (o)
R2844885	RSAO2-0.5B RSAO2-33B	Chloride	R	А	Overall assessment of data (o)

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R2844885	RSAO2-20B RSAO2-20BD SA183-20B SA183-30B RSA04-20B RSA04-30B RSA04-36B	Sulfate	R	А	Overall assessment of data (o)
R2844885	RSAN2-30B RSAN2-30BD	Bicarbonate alkalinity Total alkalinity	J (all detects) J (all detects)	A	Field duplicates (Difference) (fd)
R2844885	RSAO2-20B RSAO2-20BD	Chloride	J (all detects)	А	Field duplicates (Difference) (fd)
R2844885	RSAO2-20B RSAO2-20BD	Total organic carbon	J (all detects) UJ (all non-detects)	А	Field duplicates (Difference) (fd)

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R2844885

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R2844885

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

SDG #: R2844885

LDC #: 21257I6

Stage 2B

Laboratory: Columbia Analytical Services

Reviewer: 2nd Reviewer:

Total

METHOD: (Analyte) Alkalinity (SM2320B), Ammonia-N (EPA Method 350.1M), Bromide, Chloride, Nitrate-N, Nitrite-N, Sulfate (EPA SW846 Method 9056), Cyanide (EPA SW846 Method 9012), Hexavalent Chromium (EPA SW846 Method 7199), pH (EPA SW846 Method 9045), Surfactants (SM5540C), Total Phosphorus (EPA Method 365.1), Percent Solids (EPA Method) 169:3) 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
I.	Technical holding times	A	Sampling dates: 7/8/08 , 7/9/08
IIa.	Initial calibration	<u> </u>	
IIb.	Calibration verification	<u> </u>	
111.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	N	a client specifical
V	Duplicates	N	3 1 1 1
VI.	Laboratory control samples	A	Les
VII.	Sample result verification	5 var	
VIII.	Overall assessment of data	ΙA	
IX.	Field duplicates	Sw	(1,2) (6,7) (10,11)
L _X	Field blanks		

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: 50;

1	RSAN2-30B	11	SA183-10BD	21	MB	31	
2	RSAN2-30BD	12	SA183-20B	22		32	
3	RSAN2-35B	13	SA183-30B	23		33	
4	RSAO2-0.5B	14	SA183-33B	24		34	
5	RSAO2-10B	15	RSA04-0.5B	25		35	
6	RSAO2-20B	16	RSA04-10B	26		36	
7	RSAO2-20BD	17	RSA04-20B	27		37	
8	RSAO2-30B	18	RSA04-30B	28		38	
9	RSAO2-33B	19	RSA04-36B	29		39	
10	SA183-10B	20		30		40	

Notes:		

LDC #:_	YK	276
SDG #:_		

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

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2nd reviewer:	

All circled methods are applicable to each sample.

Sample ID Matrix	
1-19 501	(Alk pH Br Cl NO, NO, SO, NH, TOC CN Cr6+ T-P MBAS) TDS TSS Cond ClO, ClO,
\ \ .	Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
	Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
	Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
	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 NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
	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 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
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	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
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	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 ^{S+} T-P MBAS TDS TSS Cond ClO ₃ ClO ₄

Comments:	
	•

SDG #: 1859 16

VALIDATION FINDINGS WORKSHEET Sample Result Verification

Page: of Reviewer: MM

METHOD: Inorganics, Method

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*	Sample ID	Analyte	Lab Reporting Limit (units)		Fluding	Qualfications	
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LDC#: <u>21257l6</u> SDG#: <u>See Cover</u>

VALIDATION FINDINGS WORKSHEET Field Duplicates

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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?

	Concentration (mg/Kg)					Qualification
Analyte	1	2	RPD (≤50)	Difference	Limits	(Parent only)
Bicarbonate Alkalinity	756	392		364	(≤333)	J det / A (fd)
Total Alkalinity	888	392		496	(≤333)	J det / A (fd)
pH (S.U.)	8.42	8.24	2			
тос	300U	310		10	(≤300)	
Total Phosphorus	799	838	5			

	Concentration (mg/Kg)					Overliff and an
Analyte	6	7	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Bicarbonate Alkalinity	412	273U		139	(≤273)	
Total Alkalinity	433	276	·	157	(≤273)	
Chloride	142	74.8		67.2	(≤27.3)	J det / A (fd)
pH (S.U.)	8.44	8.25	2			
тос	300U	618		318	(≤300)	J / UJ / A (fd)
Total Phosphorus	544	659	19			

	Concentrat	ion (mg/Kg)				
Analyte	10	11	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Bicarbonate Alkalinity	268	262		6	(≤227)	
Total Alkalinity	331	375		44	(≤227)	
pH (S.U.)	9.11	8.91	2			
Sulfate	73.5	69.6		3.9	(≤22.7)	

LDC#:_	21257 <u>16</u>
SDG#:	See Cover

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

Page: Vof	1
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2nd Poviouer	$\overline{\chi}$

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	on (mg/Kg)				Qualification
Analyte	10	11	RPD (≤50)	Difference	Limits	(Parent only)
тос	806	862		56	(≤300)	
Total Phosphorus	885	851	4			

V:\FIELD DUPLICATES\FD_inorganic\21257l6.wpd

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2008 Phase B Investigation,

Henderson, Nevada

Collection Date:

July 9 through July 10, 2008

LDC Report Date:

August 17, 2009

Matrix:

Soil

Parameters:

Wet Chemistry

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R2844902

Sample Identification

SA46-0.5B

SA46-10B

SA46-20B

SA46-30B

SA46-30BD

SA48-0.5B

SA48-10B

SA48-20B

SA48-30B

SA48-35B

RSAJ7-0.5B

RSAJ7-10B

RSAJ7-20B

RSAK7-0.5B

RSAK7-10B

RSAK7-10BD

RSAK7-20B

RSAK7-27B

Introduction

This data review covers 18 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 350.1M for Ammonia as Nitrogen, EPA Method 365.1 for Total Phosphorus, EPA SW 846 Method 7199 for Hexavalent Chromium, EPA SW 846 Method 9012 for Total Cyanide, EPA SW 846 Method 9045 for pH, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, Nitrite as Nitrogen, and Sulfate, Standard Method 2320B for Alkalinity, Standard Method 5540C for Surfactants, 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 IX.

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

The following are definitions of the data qualifiers:

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- 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 Extraction Until Analysis	Required Holding Time From Sample Extraction Until Analysis	Flag	A or P
SA46-30B	Nitrite as N	54 hours	48 hours	J- (all detects) UJ (all non-detects)	А
SA46-30BD	Nitrite as N	54.25 hours	48 hours	J- (all detects) UJ (all non-detects)	А
SA48-0.5B	Nitrite as N	54.5 hours	48 hours	J- (all detects) UJ (all non-detects)	А

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 of each method were met.

b. Calibration Verification

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.

No field blanks were identified in this SDG.

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. Sample Result Verification and Project Quantitation Limit

The QAPP PQLs were met with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All samples in SDG R2844902	Alkalinity	Laboratory reporting limit reported at 200 mg/Kg.	PQL should be reported at 2 mg/Kg per the QAPP.	None	Р
All samples in SDG R2844902	Nitrite as N	Laboratory reporting limit reported at 5.0 mg/Kg.	PQL should be reported at 0.1 mg/Kg 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 R2844902	All analytes reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

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

Sample	Compound	Flag	A or P
SA46-30BD	Chloride	R	А
SA48-35B	Sulfate	R	

The Chloride and Sulfate results for the samples listed above were overdiluted.

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

IX. Field Duplicates

Samples SA46-30B and SA46-30BD and samples RSAK7-10B and RSAK7-10BD were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Concer	ntration				
Analyte	SA46-30B	SA46-30BD	RPD (Limits)	Difference (Limits)	Flags	A or P
Bicarbonate alkalinity	469 mg/Kg	435 mg/Kg	-	34 (≤300)	-	-
Total alkalinity	637 mg/Kg	645 mg/Kg	-	8 (≤300)	-	
Chloride	1390 mg/Kg	3000U mg/Kg	•	1610 (≤3000)	-	-
Nitrate as N	34.4 mg/Kg	34.7 mg/Kg	1 (≤50)	-	-	-
рН	8.08 S.U.	7.93 S.U.	2 (≤50)	-	-	
Sulfate	1200 mg/Kg	3000U mg/Kg	-	1800 (≤3000)	-	
Total Phosphorus	928 mg/Kg	870 mg/Kg	6 (≤50)	-	-	-

	Concer	ntration	555	D.W		
Analyte	RSAK7-10B	RSAK7-10BD	RPD (Limits)	Difference (Limits)	Flags	A or P
Bicarbonate alkalinity	273 mg/Kg	234 mg/Kg	-	39 (≤219)	-	•
Total alkalinity	419 mg/Kg	286 mg/Kg	-	133 (≤219)	-	-
Chloride	43.5 mg/Kg	109 mg/Kg	-	65.5 (≤21.9)	J (all detects)	А
рН	8.61 S.U.	8.83 S.U	3 (≤50)	-	-	-
Sulfate	172 mg/Kg	324 mg/Kg	61 (≤50)	-	J (all detects)	А
тос	554 mg/Kg	362 mg/Kg	-	192 (≤300)	-	-
Total phosphorus	1100 mg/Kg	888 mg/Kg	21 (≤50)	•	-	-

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R2844902

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R2844902	SA46-30B SA46-30BD SA48-0.5B	Nitrite as N	J- (all detects) UJ (all non-detects)	А	Technical holding times (h)
R2844902	SA46-0.5B SA46-10B SA46-20B SA46-30B SA46-30BD SA48-0.5B SA48-10B SA48-20B SA48-30B SA48-35B RSAJ7-0.5B RSAJ7-10B RSAJ7-10B RSAK7-10B RSAK7-10B RSAK7-10BD RSAK7-20B RSAK7-20B	Alkalinity Nitrite as N	None None	Р	Sample result verification

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R2844902	SA46-0.5B SA46-10B SA46-20B SA46-30B SA46-30BD SA48-0.5B SA48-10B SA48-20B SA48-35B RSAJ7-0.5B RSAJ7-10B RSAJ7-10B RSAK7-10BD RSAK7-10BD RSAK7-27B SA46-10B SA46-20B SA46-30B SA46-30BD SA46-30BD SA48-35B RSAJ7-10B SA48-35B RSAJ7-10B RSAJ7-0.5B RSAJ7-10B RSAJ7-0.5B RSAJ7-10B RSAJ7-10B RSAJ7-10B RSAJ7-10B RSAJ7-10B RSAK7-10B RSAK7-10B RSAK7-10B RSAK7-10B RSAK7-10B RSAK7-10B RSAK7-10B RSAK7-20B RSAK7-20B RSAK7-20B RSAK7-20B RSAK7-20B	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)
R2844902	SA46-30BD SA48-35B	Chloride Sulfate	R R	А	Overall assessment of data (o)
R2844902	RSAK7-10B RSAK7-10BD	Chloride	J (all detects)	А	Field duplicates (Difference) (fd)
R2844902	RSAK7-10B RSAK7-10BD	Sulfate	J (all detects)	А	Field duplicates (RPD) (fd)

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R2844902

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R2844902

No Sample Data Qualified in this SDG

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	Tronox Northgate Trenderson
LDC #: 21257J6	_ VALIDATION COMPLETENESS WORKSHEET
SDG #: R2844902	Stage 2B

Laboratory: Columbia Analytical Services

Date:	8/16/07
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2nd Reviewer:	<u> </u>

METHOD: (Analyte) Alkalinity (SM2320B), Ammonia-N (EPA Method 350.1M), Bromide, Chloride, Nitrate-N, Nitrite-N, Sulfate (EPA SW846 Method 9056), Cyanide (EPA SW846 Method 9012), Hexavalent Chromium (EPA SW846 Method 7199), pH (EPA SW846 Method 9045), Surfactants (SM5540C), Total Phosphorus (EPA Method 365.1), Percent Solids (EPA Method 9045). 160-33, 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
l.	Technical holding times	SW	Sampling dates: 7/9 (08, 7/10/8
lla.	Initial calibration	A	
llb.	Calibration verification	A	
III.	Blanks	Ą	
IV	Matrix Spike/Matrix Spike Duplicates	2	action specified.
V	Duplicates	N	3 , 1
VI.	Laboratory control samples	A	LCS
VII.	Sample result verification	5W	
VIII.	Overall assessment of data	A	
IX.	Field duplicates	5W	(4.5) (15.16)
L _X	Field blanks	W	

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:

	901		· · · · · · · · · · · · · · · · · · ·				
1	SA46-0.5B	11	RSAJ7-0.5B	21	MB	31	
2	SA46-10B	12	RSAJ7-10B	22		32	
3 ′	SA46-20B	13	RSAJ7-20B	23		33	
4'	SA46-30B	14	RSAK7-0.5B	24		34	
5 ′	SA46-30BD	15	RSAK7-10B	25		35	
6	SA48-0.5B	16	RSAK7-10BD	26		36	
7	SA48-10B	17	RSAK7-20B	27		37	
8	SA48-20B	18	RSAK7-27B	28	***	38	
9	SA48-30B	19		29		39	
10	SA48-35B	20		30		40	

Notes:		
	~A	

LDC#: >1159Tb SDG#: See com

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

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2nd reviewer:	0

All circled methods are applicable to each sample.

Sample ID	<u>Matrix</u>	Parameter Parameter
1-18	501	(Alk pH Br Cl NO, NO, SO, NH, TOC CN Cr6+ T-P MBAS) TDS TSS Cond ClO, ClO,
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl 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 NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ 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
	у	Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
		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 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 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 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 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 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 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 #: 15/7/6 SDG #: 522 500

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

Page: of Facilities Page: Page

All circled dates have exceeded the technical holding time.

Y N N/A
Were all samples preserved as applicable to each method?
Were all cooler temperatures within validation criteria?

		I	dation criteria?_				
Method:			9056				
Parameters:			NO2 -N 481-				
Technical holding ti	me: *		486				
Sample ID	Sampling date	бх hut i v Analysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier
4.5	7191.8	9/14108	7/16108 1/16108 1/16108	(54h			J-/w7/A
F	J	ì	7/161-8	15420	his		1 //
6	1/10/08		7/16/5 1538	(54h- (54,75 (54.5	1		
			1378	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	-W)		4
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I from exetrator to analysis

SDG#: VIXYITA

VALIDATION FINDINGS WORKSHEET Sample Result Verification

Page: of Reviewer: MM 2nd Reviewer

METHOD: Inorganics, Method

		9																		
	Qualifications	mare /10	1		(0) //	1														
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	nding	wh lint Janophinit	4		707	SW Kn M														
	Ē	نگا حاص			1	W Ollew Swill M														
OMP LENT	(units)	In/lan	B					·												
0.61																				
	g Limit (units)	m/2m out	70																	
	Lab Reportin	787	5.0																	
	Analyte	4/ Kelonit	10x -N		- 1	784	,													
				-		<u>ম</u>														
	Sample ID	Z				2/2													.0	
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LDC#: <u>21257J6</u> SDG#: <u>See Cover</u>

VALIDATION FINDINGS WORKSHEET Field Duplicates

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_	

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?

	Concentrat	ion (mg/Kg)				
Analyte	4	5	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Bicarbonate Alkalinity	469	435		34	(≤300)	
Total Alkalinity	637	645		8	(≤300)	
Chloride	1390	3000U		1610	(≤3000)	
Nitrate as N	34.4	34.7	1			
pH (S.U.)	8.08	7.93	2	-0.15	<u>(8)</u>	
Suifate	1200	3000U		1800	(≤3000)	
Total Phosphorus	928	870	6			

	Concentrat	ion (mg/Kg)				
Analyte	15	16	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Bicarbonate Alkalinity	273	234		39	(≤219)	
Total Alkalinity	419	286		133	(≤219)	
Chloride	43.5	109		65.5	(≤21.9)	J det / A (fd)
pH (S.U.)	8.61	8.83	3			
Sulfate	172	324	61			J det / A (fd)
тос	554	362		192	(≤300)	
Total Phosphorus	1100	888	21			

V:\FIELD DUPLICATES\FD_inorganic\21257J6.wpd

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2008 Phase B Investigation,

Henderson, Nevada

Collection Date:

July 10 through July 11, 2008

LDC Report Date:

August 17, 2009

Matrix:

Soil

Parameters:

Wet Chemistry

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R2844922

Sample Identification

RSAJ8-0.5B

RSAK2-30B

RSAJ8-10B

RSAK2-35B

RSAJ8-20B

RSA17-32B

RSAJ8-30B

RSAL2-0.5BMS

RSAJ8-33B

RSAL2-0.5BDUP

RSAI7-0.5B

RSAI7-10B

RSAI7-20B

RSAI7-30B

RSAL2-0.5B

RSAL2-10B

RSAL2-20B

RSAL2-20BD

RSAL2-30B

RSAL2-37B

RSAL2-40B

RSAK2-0.5B

RSAK2-10B

RSAK2-20B

RSAK2-20BD

Introduction

This data review covers 25 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 350.1M for Ammonia as Nitrogen, EPA Method 365.1 for Total Phosphorus, EPA SW 846 Method 7199 for Hexavalent Chromium, EPA SW 846 Method 9012 for Total Cyanide, EPA SW 846 Method 9045 for pH, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, Nitrite as Nitrogen, and Sulfate, Standard Method 2320B for Alkalinity, Standard Method 5540C for Surfactants, 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 IX.

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 Extraction Until Analysis	Required Holding Time From Sample Extraction Until Analysis	Flag	A or P
RSAL2-0.5B RSAL2-0.5BMS RSAL2-0.5BDUP	Nitrite as N	8 days	48 hours	J- (all detects) R (all non-detects)	А
RSAL2-10B	Nitrite as N	63 hours	48 hours	J- (all detects) UJ (all non-detects)	А
RSAL2-30B	Nitrite as N	63.25 hours	48 hours	J- (all detects) UJ (all non-detects)	А
RSAL2-37B	Nitrite as N	63.5 hours	48 hours	J- (all detects) UJ (all non-detects)	А
RSAL2-40B	Nitrite as N	63.75 hours	48 hours	J- (all detects) UJ (all non-detects)	А
RSAK2-30B	Nitrite as N	64 hours	48 hours	J- (all detects) UJ (all non-detects)	А
RSAK2-35B	Nitrite as N	64.25 hours	48 hours	J- (all detects) UJ (all non-detects)	А

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 of each method were met.

b. Calibration Verification

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
7/21/08	CCV (#27)	Total organic carbon	88 (90-110)	RSAI7-30B RSAL2-0.5B RSAL2-10B RSAL2-20B RSAL2-20BD RSAL2-30B RSAL2-37B RSAL2-40B RSAK2-0.5B RSAK2-10B RSAK2-20B RSAK2-20B RSAK2-20BD RSAK2-30B RSAK2-35B RSAI7-32B	J- (all detects) UJ (all non-detects)	Р
7/21/08	CCV (#39)	Total organic carbon	86.5 (90-110)	RSAK2-20B RSAK2-20BD RSAK2-30B RSAK2-35B RSA17-32B	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.

No field blanks were identified in this SDG.

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
RSAL2-0.5BMS (RSAJ8-0.5B RSAJ8-0.5B RSAJ8-10B RSAJ8-20B RSAJ8-30B RSAI7-0.5B RSAI7-10B RSAI7-20B RSAI7-20B RSAL2-0.5B RSAL2-10B RSAL2-10B RSAL2-20B RSAL2-20BD RSAL2-30B RSAL2-37B RSAL2-40B)	Bromide	26 (75-125)	J- (all detects) R (all non-detects)	A
RSAL2-0.5BMS (RSAJ8-0.5B RSAJ8-10B RSAJ8-20B RSAJ8-30B RSAJ8-33B RSAI7-0.5B RSAI7-10B RSAI7-20B RSAI7-30B RSAL2-0.5B RSAL2-10B RSAL2-10B RSAL2-20B RSAL2-20BD RSAL2-30B RSAL2-37B RSAL2-37B	Nitrate as N	318 (75-125)	J+ (all 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. Sample Result Verification and Project Quantitation Limit

The QAPP PQLs were met with the following exceptions:

Sample	Analyte	Finding	Criteria	Flag	A or P
All samples in SDG R2844922	Alkalinity	Laboratory reporting limit reported at 200 mg/Kg.	PQL should be reported at 2 mg/Kg per the QAPP.	None	Р
All samples in SDG R2844922	Nitrite as N	Laboratory reporting limit reported at 5.0 mg/Kg.	PQL should be reported at 0.1 mg/Kg 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 R2844922	All analytes reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

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

Sample	Compound	Flag	A or P
RSAL2-37B RSAK2-20BD	Sulfate	R	А

The Sulfate results for the samples listed above were overdiluted.

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

IX. Field Duplicates

Samples RSAL2-20B and RSAL2-20BD and samples RSAK2-20B and RSAK2-20BD were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Concer	ntration	PDD				
Analyte	RSAL2-20B	RSAL2-20BD	RPD (Limits)	Difference (Limits)	Flags	A or P	
Chloride	316 mg/Kg	213 mg/Kg	39 (≤50)	-	-	-	
рН	8.13 S.U.	8.17 S.U.	0 (≤50)	-	-	-	

	Conce	ntration	RPD			
Analyte	RSAL2-20B	RSAL2-20BD RSAL2-20BD		Difference (Limits)	Flags	A or P
Sulfate	7000 mg/Kg	6040 mg/Kg	15 (≤50)	•	-	-
Total organic carbon	849 mg/Kg	740 mg/Kg	-	109 (≤300)	-	-
Total phosphorus	579 mg/Kg	448 mg/Kg	26 (≤50)	•	-	-

	Concer	ntration				
Analyte	RSAK2-20B	RSAK2-20BD	RPD (Limits)	Difference (Limits)	Flags	A or P
Bicarbonate alkalinity	321 mg/Kg	413 mg/Kg	-	92 (≤216)	~	-
Total alkalinity	472 mg/Kg	586 mg/Kg	_	⁷ 114 (≤216)	-	-
Chloride	77.2 mg/Kg	114 mg/Kg	38 (≤50)	-	-	-
рН	9.00 S.U.	9.06 S.U.	1 (≤50)	-	-	
Sulfate	68.8 mg/Kg	86.5U mg/Kg	-	17.7 (≤86.5)	-	-
Surfactants	2.16U mg/Kg	3.04 mg/Kg	-	0.88 (≤2.16)	-	-
Total organic carbon	548 mg/Kg	654 mg/Kg	-	106 (≤300)	-	-
Total Phosphorus	585 mg/Kg	662 mg/Kg	12 (≤50)	-	-	-

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R2844922

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R2844922	RSAL2-0.5B	Nitrite as N	J- (all detects) R (all non-detects)	А	Technical holding times (h)
R2844922	RSAL2-10B RSAL2-30B RSAL2-37B RSAL2-40B RSAK2-30B RSAK2-35B	Nitrite as N	J- (all detects) UJ (all non-detects)	А	Technical holding times (h)
R2844922	RSAI7-30B RSAL2-0.5B RSAL2-10B RSAL2-20B RSAL2-30B RSAL2-37B RSAL2-40B RSAK2-0.5B RSAK2-10B RSAK2-10B RSAK2-20B RSAK2-20B RSAK2-30B RSAK2-30B RSAK2-35B RSAI7-32B	Total organic carbon	J- (all detects) UJ (all non-detects)	Р	Calibration (CCV %R) (c)
R2844922	RSAJ8-0.5B RSAJ8-10B RSAJ8-20B RSAJ8-30B RSAJ8-33B RSAI7-0.5B RSAI7-20B RSAI7-20B RSAL2-20B RSAL2-10B RSAL2-20B RSAL2-20BD RSAL2-30B RSAL2-37B RSAL2-40B	Bromide	J- (all detects) R (all non-detects)	Α	Matrix spike analysis (%R) (m)

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R2844922	RSAJ8-0.5B RSAJ8-10B RSAJ8-20B RSAJ8-30B RSAJ8-33B RSAI7-0.5B RSAI7-10B RSAI7-20B RSAL2-0.5B RSAL2-10B RSAL2-20B RSAL2-20B RSAL2-20B RSAL2-30B RSAL2-30B RSAL2-37B RSAL2-40B	Nitrate as N	J+ (all detects)	A	Matrix spike analysis (%R) (m)
R2844922	RSAJ8-0.5B RSAJ8-10B RSAJ8-20B RSAJ8-30B RSAJ8-33B RSAI7-0.5B RSAI7-20B RSAI7-20B RSAL2-0.5B RSAL2-10B RSAL2-20B RSAL2-20BD RSAL2-30B RSAL2-37B RSAL2-37B RSAL2-40B RSAL2-40B RSAK2-10B RSAK2-10B RSAK2-20BD RSAK2-20BD RSAK2-20BD RSAK2-20BD RSAK2-30B RSAK2-30B RSAK2-30B RSAK2-35B RSAK2-35B	Alkalinity Nitrite as N	None None	P	Sample result verification

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R2844922	RSAJ8-0.5B RSAJ8-10B RSAJ8-20B RSAJ8-30B RSAJ8-33B RSAJ7-0.5B RSAI7-10B RSAI7-20B RSAL2-0.5B RSAL2-10B RSAL2-20B RSAL2-20B RSAL2-20B RSAL2-30B RSAL2-37B RSAL2-37B RSAL2-40B RSAK2-0.5B RSAK2-0.5B RSAK2-10B RSAK2-20B RSAK2-20B RSAK2-20B RSAK2-35B RSAK2-35B RSAK2-35B RSAK2-35B	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)
R2844922	RSAL2-37B RSAK2-20BD	Sulfate	R	А	Overall assessment of data (o)

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R2844922

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R2844922

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #: 21257K6 SDG #: R2844922

Stage 2B

Laboratory: Columbia Analytical Services

Reviewer: 2nd Reviewer:

IMS

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METHOD: (Analyte) Alkalinit (SM2320B), Ammonia-N (EPA Method 350.1M), Bromide, Chloride, Nitrate-N, Nitrite-N, Sulfate (EPA SW846 Method 9056), Cyanide (EPA SW846 Method 9012), Hexavalent Chromium (EPA SW846 Method 7199), pH (EPA SW846 Method 9045), Surfactants (SM5540C), Total Phosphorus (EPA Method 365.1); Percent Solids (EPA Method 160.37, 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
I.	Technical holding times	7W	Sampling dates: 7/10/08 . 7/11/08
IIa.	Initial calibration	A	,
IIb.	Calibration verification	SW	
111.	Blanks	A	
IV	Matrix Spike/Matrix Spike Duplicates	5W	2 M5/000
٧	Duplicates	A) ', \
VI.	Laboratory control samples	A	Lus
VII.	Sample result verification	SW	,
VIII.	Overall assessment of data	A	
IX.	Field duplicates	5W	(12, 13) (19, 20)
_ x	Field blanks	N	

Note:

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A = Acceptable

N = Not provided/applicable

Soi

SW = See worksheet

ND = No compounds detected

R = Rinsate FB = Field blank

RSAL2-37B

RSAL2-40B

RSAK2-0.5B

RSAK2-10B

RSAK2-20B

RSAK2-20BD

16

17

19

D = Duplicate

TB = Trip blank EB = Equipment blank

RSAL2-0.5BDUP

Validated Samples:

RSAJ8-33B

RSAI7-0.5B

RSAI7-10B

RSAI7-20B

RSAI7-30B

RSAL2-0.5B

RSAJ8-0.5B 11 RSAL2-10B 21 RSAK2-30B 31 RSAJ8-10B 12 RSAL2-20B 22 RSAK2-35B 32 RSAJ8-20B 13 RSAL2-20BD 23 RSA17-32B 33 RSAJ8-30B 14 RSAL2-30B 24 RSAL2-0.5BMS 34

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Notes:

LDC #:_	NK Mb	,
	se imi	

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page:	<u>lof</u>
Reviewer:_	V~
2nd reviewer:	9

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter Parameter
1-23	501	(Alk pH Br CI NO, NO, SO, NH, TOC CN Cr6+ T-P MBAS) TDS TSS Cond CIO, CIO,
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO, SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
~ 74, VS	<u> </u>	(Alk) pH BI CI (NO) NO) SO (NH) (TOO (CN) CP T-PMBAS TDS TSS Cond CIO3 CIO4
VYS	<u> </u>	Alk pH) Br CI NO, NO, SO, NH, TOC CN Crot T-P MBAS TDS TSS Cond CIO, CIO,
		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 NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
	a .	Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
	,	Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr5+ 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 ⁵⁺ 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 NO3 NO2 SO4 NH3 TOC CN Cr8+ T-P MBAS TDS TSS Cond ClO3 ClO4
		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

Comments:	

LDC #:_	2/201	16
SDG #:_	Su	_cov

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VALIDATION FINDINGS WORKSHEET Technical Holding Times

Page:_	of
Reviewer:_	W-/
2nd reviewer:	a

All circled dates have exceeded the technical holding time.

Y N N/A

Were all samples preserved as applicable to each method?

Y N N/A Were all	cooler tempera	tures within vali	dation criteria?_				
Method:			9056				
Parameters:			NO2-N				
Technical holding tir	ne: #		481				
Sample ID	Sampling date	To hut iv Analysis date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier
10	7/10/-8	1/10/08	7/23/28	(84	m)		J-/R/A
11	7/1108			(63h			3-/43/A
14			7/18/-8	(63,	2+42		1
15			7/18/-8	(63,	5h-)		
<u>Jo</u>			1 9711	(63.	15hm)		
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\			7/181-80301	164	h_)		
\frac{\fir}}}}}{\frac}}}}}}}}{\frac{\fir}}}}}}}}{\firac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac}}}}}}}{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac}}}}}}}}{\frac{\frac{\	<i>y</i>	X	71181-8 0315	(64	vsh)		V
\\\ 	7/10/5	7/15/08/100	1/131-8	(8)	ap)		J/R/A
25	¥	<u> </u>	<u> </u>		'		1
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DC #	SDG 3

VALIDATION FINDINGS WORKSHEET Calibration

Page: Reviewer:__ 2nd Reviewer:

METHOD: Inorganics, EPA Method_

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".

| N | N | Were all initial and continuing calibration verification percent recoveries (%R) within the control

Are all correlation coefficients >0.995 ? M N/A Are a

Y N X

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?

YNWA z >

*	Date	Calibration ID	Analyte	%R	Associated Samples	Qualifications
	80/12/4	(**) MO		8-8	9-73	J-/MJ/P(C)
		70511/1/	1	4 /8	10 23	3
7	7	CCV (#54))	80.5	7	
<u></u>						
<u> </u>					**	
E S S	Comments:					

र्ट टक्टर LDC #: 2/75/ Kb SDG #:

VALIDATION FINDINGS WORKSHEET Matrix Spike Analysis

Reviewer: Page: 1 of

METHOD: Inorganics, Method _

Y-NNA 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 KM Were recalculated results accounts for a concentration and the spike concentration by a factor of 4 or more, no action was taken.

*	Matrix Spike ID	Matrix	Analyte	%R	Associated Samples	Qualifications
	え	(.'05	78	27	91-1	J-/R/A (m)
			NO2-K/	318		FIFTA M
			,			
Ì						
Co	Comments:					
	And a second sec					

SDG #: 1254 126 SDG #: 150 SDG

VALIDATION FINDINGS WORKSHEET Sample Result Verification

Page: of Reviewer: WM 2nd Reviewer

METHOD: Inorganics, Method

LDC#: <u>21257K6</u> SDG#: <u>See Cover</u>

VALIDATION FINDINGS WORKSHEET Field Duplicates

Page:_	<u>(</u> of_//_
Reviewer:_	
2nd Reviewer:_	a l

Inorganics, Method See Cover

M NA

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

	Concentrati	ion (mg/Kg)				Over US and and
Analyte	12	13	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Chloride	316	213	39			
pH (S.U.)	8.13	8.17	0			
Sulfate	7000	6040	15			
тос	849	740		109	(≤300)	
Total Phosphorus	579	448	26			

	Concentrati	ion (mg/Kg)				
Analyte	19	20	RPD (≤50)	Difference	Limits	Qualification (Parent only)
Bicarbonate Alkalinity	321	413		92	(≤216)	
Total Alkalinity	472	586		114	(≤216)	
Chloride	77.2	114	38			
pH (S.U.)	9.00	9.06	1			
Sulfate	68.8	86.5U		17.7	(≤86.5)	
Surfactants	2.16U	3.04		0.88	(≤2.16)	
тос	548	654		106	(≤300)	
Total Phosphorus	585	662	12			

V:\FIELD DUPLICATES\FD_inorganic\21257K6.wpd

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2008 Phase B Investigation,

Henderson, Nevada

Collection Date:

July 11, 2008

LDC Report Date:

August 17, 2009

Matrix:

Soil

Parameters:

Wet Chemistry

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): R2845025

Sample Identification

RSAI7-10B(119156) RSAI7-10B(119157)

RSAI7-10B(119157)RE

Introduction

This data review covers 3 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 120.1 for Conductivity, EPA SW 846 Method 7199 for Hexavalent Chromium, EPA Method 350.1M for Ammonia as Nitrogen, EPA Method 365.1 for Total Phosphorus, EPA SW 846 Method 9012 for Total Cyanide, EPA SW 846 Method 9040 for pH, EPA SW 846 Method 9056 for Bromide, Chloride, Nitrate as Nitrogen, Nitrite as Nitrogen, and Sulfate, EPA SW 846 Method 9060 for Total Organic Carbon, Standard Method 2320B for Alkalinity, Standard Method 2540C for Total Dissolved Solids, and Standard Method 5540C for Surfactants.

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 IX.

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 of each method were met.

b. Calibration Verification

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
SPLP BLK #2	Chloride Nitrate as N Total alkalinity	0.276 mg/L 0.113 mg/L 2.50 mg/L	RSAI7-10B(119156)
SPLP BLK #3	Chloride Nitrate as N Total alkalinity	0.328 mg/L 0.060 mg/L 8.80 mg/L	RSAI7-10B(119157)
SPLP BLK #3RE	Total alkalinity	8.00 mg/L	RSAI7-10B(119157)RE

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
RSAI7-10B(119156)	Nitrate as N	0.335 mg/L	0.335J+ 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. 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 R2845025	All analytes reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

VIII. Overall Assessment of Data

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

Sample	Analyte	Flag	A or P
RSAI7-10B(119157)	Carbonate alkalinity Bicarbonate alkalinity	X X	А

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, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG R2845025

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
R2845025	RSAI7-10B(119156) RSAI7-10B(119157) RSAI7-10B(119157)RE	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)
R2845025	RSAI7-10B(119157)	Carbonate alkalinity Bicarbonate alkalinity	X	A	Overall assessment of data (o)

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG R2845025

SDG	Sample	Analyte	Modified Final Concentration	A or P	Code
R2845025	RSAI7-10B(119156)	Nitrate as N	0.335J+ mg/L	А	bl

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG R2845025

No Sample Data Qualified in this SDG

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	Honox Northgate Henderson
LDC #: 21257L6	VALIDATION COMPLETENESS WORKSHEET
SDG #: R2845025	Stage 2B

Laboratory: Columbia Analytical Services , SW 846 7199

2nd Reviewer:

METHOD: (Analyte) Alkalinity (SM2320B), Ammonia-N (EPA Method 350.1M), Bromide, Chloride, Nitrate-N, Nitrite-N, Sulfate (EPA SW846 Method 9056), Conductivity (EPA Method 120.1), Cyanide (EPA SW846 Method 9012), Hexavalent Chromium (EPA Method 218.8), pH (EPA SW846 Method 9040), Surfactants (SM5540C), Total Phosphorus (EPA Method 365.1), TDS (SM2540C), TOC (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
1.	Technical holding times	4	Sampling dates: 7/11/08
lla.	Initial calibration	A	,
IIb.	Calibration verification	4	
III.	Blanks	SW/	
IV	Matrix Spike/Matrix Spike Duplicates	μ	2 client specifics
V	Duplicates	N	
VI.	Laboratory control samples	A	Les
VII.	Sample result verification	N	/
VIII.	Overall assessment of data	SVA	
IX.	Field duplicates	N,	
x	Field blanks	\sim	

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

TB = Trip blank

EB = Equipment blank

Validated Samples:

1	RSAI7-10B(119156)	11	by Spet Much 122	21	31	
2	RSAI7-10B(119157)	12	1 #3	22	32	
3	L RE	13	MN	23	33	
4		14	/	24	34	
5		15		25	35	
6		16		26	36	
7		17		27	37	
8		18		28	38	
9		19		29	39	
10		20		30	40	

Notes:	Earnles in	the	>467	melinet	SYLP	actuation	
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SDG #: See com

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

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Reviewer:_	V-
2nd reviewer:_	4

All circled methods are applicable to each sample.

Sample ID	Matrix	Parameter
1,2	501	TAIK PH Br CI NO, NO, SO, NH, TOC CN Cr5+ T-P MBAS TDS TSS COND CIO, CIO,
3	Y	Alk pH Br CI NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond CIO3 CIO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Ci NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond CIO3 CIO4
		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 NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond CIO3 CIO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		Alk pH Br Cl NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		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 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 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 Cl 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 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 NO3 NO2 SO4 NH3 TOC CN Cr6+ T-P MBAS TDS TSS Cond ClO3 ClO4
		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 Ci NO3 NO2 SO4 NH3 TOC CN Cr8+ T-P MBAS TDS TSS Cond CIO3 CIO4

Comments:	
	·

LDC #: 21257L6

SDG #: See Cover

VALIDATION FINDINGS WORKSHEET Blanks

Page: (Reviewer:_

2nd Reviewer.

2

METHOD: Inorganics, Method See Cover

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

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/L

Associated Samples: 1

Analyte	Blank ID	Maximum	Blank	Sample Identification
44 4	SPLP BLK #2	ICB/CCB	Action Limit	1
ō	0.276		2.76	
NO3-N	0.113		1.13	0.335 J+
Total Alk	2.50		25.0	
Conc. units: mg/L	ts: mg/L			Associated Samples: $2(7/ ^{\circ} \lambda_{-})$
Analyte	Blank ID	Maximum		Sample Identification
Septiment of the septim	SPLP BLK #3	ICB/CCB	Action Limit	
ರ	0.328		3.28	
NO3-N	090.0		09:0	
Total Alk	8.80		88.0	
Conc. units: mg/L	ts: mg/L			Associated Samples: 3 (>10X)

of Ship Blue nouting. Done from now that, not provided by the lab. Sample Identification Blank Action Limit 80.0 Maximum ICB/CCB SPLP BLK #3 RE Blank ID 8.00 Analyte Total Alk

SDG #: 5 2 600

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.

Was the overall quality and usability of the data acceptable?

			1		
*	Date	Sample ID	Finding	Associated Samples	Qualifications
		7 28	~ ## Calmit AIK		X/A (0)
-			Bicabat Alk	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	÷
			V (Total All was not	almar	
			the safe		7 . 11. + 11. r. for 7
			(Bigal rue Ha	tailes to tailes	1
			will Alk war	withis content	duit star
			The miles	7	
Comments:	ents:				

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2008 Phase B Investigation,

Henderson, Nevada

Collection Date:

June 16 through June 24, 2008

LDC Report Date:

August 14, 2009

Matrix:

Water

Parameters:

Wet Chemistry

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): K0805394

Sample Identification

PB061608B

PC-40B

H-48B

MC-66B

MC-66BD

MC-65B

PC-37B

M-44B

M-94BX

MC-62B

PC-72B

PC-40BMS

PC-40BDUP

Introduction

This data review covers 13 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 300.1 for Chlorate and EPA Method 314.0 for Perchlorate.

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

b. Calibration Verification

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.

Sample FB062408GWarea1 (K0805722) was identified as a field blank. No contaminant concentrations were found in this blank.

Sample PB061608B was identified as a pump blank. No contaminant concentrations were found in this blank.

IV. Surrogate Spikes

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

V. Matrix Spike/Matrix Spike Duplicates

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

VI. Duplicates

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

VII. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent 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 K0805394	All analytes reported below the PQL.	J (all detects)	А

Raw data were not reviewed for this SDG.

IX. Overall Assessment of Data

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

X. Field Duplicates

Samples MC-66B and MC-66BD were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Concentration (ug/L)		222	5.77		
Analyte	MC-66B	MC-66BD	RPD (Limits)	Difference (Limits)	Flags	A or P
Chlorate	470000	523000	11 (≤30)	-	-	-
Perchlorate	364000	406000	11 (≤30)	-	-	-

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG K0805394

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
K0805394	PB061608B PC-40B H-48B MC-66B MC-66BD MC-65B PC-37B M-44B M-94BX MC-62B PC-72B	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG K0805394

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG K0805394

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #: 21257W6 Stage 2B SDG #: K0805394

Date: 0 - 19-0
Page: <u>\</u> of \
Reviewer: CR
2nd Reviewer: 1

Laboratory: Columbia Analytical Services

METHOD:	Chlorate	(EPA Method 300.1),	Perchlorate (I	<u>EPA Method 314.0)</u>

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 6/16/08 - 6/24/08
IIa.	Initial calibration	A	
lib.	Calibration verification	A	
III.	Blanks	A	
IV	Surrogate Spikes	A	
٧	Matrix Spike/Matrix Spike Duplicates	A	ms
VI.	Duplicates	A	Dg
VII.	Laboratory control samples	A	(C)
VIII.	Sample result verification	N	
IX.	Overall assessment of data	A	
X.	Field duplicates	SW	(4,5)
ΧI	Field blanks		PB=1, FB=FB062408GWarea1(SDGA K0805722

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

BB= Pmp blank

Validated Samples:

	evano o						
1	PB061608B	11	PC-72B	21	PBW1	31	
2	PC-40B	12	PC-40BMS	22	PBWZ	32	
3	H-48B	13	PC-40BDUP	23		33	
4	MC-66B	14		24		34	
5	MC-66BD	15		25		35	
6	MC-65B	16		26		36	
7	PC-37B	17		27		37	
8	M-44B	18		28		38	
9	M-94BX	19		29		39	
10	MC-62B	20		30		40	

Notes:	

LDC #: 21257W6 SDG #: See COVER

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page:___of__ Reviewer:_____ 2nd reviewer:____

All circled methods are applicable to each sample.

Sample ID	Parameter
- \ \	PH TDS CI F NO, NO, SO, PO, ALK CN' NH, TKN TOC CROCON
QC12,13	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN' NH ₃ TKN TOC CR°+ (CI) 3 (CIO ₄)
90150	ph tds ci f No ₃ No ₂ so ₄ po ₄ alk cn Nh ₃ tkn toc cr ⁶⁺
	PH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR°+
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR8+
	PH TDS CLF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR8+
,	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR8+
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR8+
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR8+
	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+
	pH TDS CI F NO, NO, SO, PO, ALK CN NH, TKN TOC CR8+
	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+
	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁸⁺
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN' NH ₃ TKN TOC CR ⁶⁺
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁸⁺
	PH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁸⁺
	ph tds ci f no, no, so, po, alk cn nh, tkn toc cre+
	PH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺
	pH TDS CI F NO, NO, SO, PO, ALK CN' NH, TKN TOC CRe+

Comments:	

LDC#: 21257W6 SDG#: See Cover

VALIDATION FINDINGS WORKSHEET

Field Duplicates

	Page:	of_\
	Reviewer:	CR
2nd	Reviewer:	

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 (ug/L)				Qualification
Analyte	4	5	RPD (≤30)	Difference	Limits	(Parent only)
Chlorate	470000	523000	11			
Perchlorate	364000	406000	11			

V:\FIELD DUPLICATES\FD_inorganic\21257W6.wpd

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2008 Phase B Investigation,

Henderson, Nevada

Collection Date:

June 24 through June 26, 2008

LDC Report Date:

August 14, 2009

Matrix:

Water

Parameters:

Wet Chemistry

Validation Level:

Stage 4

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): K0805722

Sample Identification

H-49AB

FB062408GWarea1

M-23B

MC-53B

MC-97B

MC-45B

M-7BB

M-88BB

M-61B

MC-94B

M-5AB

MW-16B

EB062608GW3

M-6AB

M-67B

M-68B

M-95B

M-57AB

M-7BBMS

M-7BBDUP

Introduction

This data review covers 20 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 300.1 for Chlorate and EPA Method 314.0 for Perchlorate.

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

- 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 of each method were met.

b. Calibration Verification

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.

Sample EB062608GW3 was identified as an equipment blank. No contaminant concentrations were found in this blank.

Sample FB062408GWarea1 was identified as a field blank. No contaminant concentrations were found in this blank.

Sample PB061608B (from SDG K0805394) was identified as a pump blank. No contaminant concentrations were found in this blank.

IV. Surrogate Spikes

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

V. Matrix Spike/Matrix Spike Duplicates

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

VI. Duplicates

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

VII. Laboratory Control Samples

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

VIII. Sample Result Verification and Project Quantitation Limit

All sample result verifications were acceptable.

All analytes reported below the PQL were qualified as follows:

Sample	Finding	Flag	A or P
All samples in SDG K0805722	All analytes reported below the PQL.	J (all detects)	А

IX. Overall Assessment of Data

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, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG K0805722

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
K0805722	H-49AB FB062408GWarea1 M-23B MC-53B MC-97B MC-45B M-7BB M-88BB M-61B MC-94B M-5AB MW-16B EB062608GW3 M-6AB M-67B M-68B M-68B M-95B	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG K0805722

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG K0805722

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET Stage 4

LDC #: <u>21257X6</u> SDG #: <u>K0805722</u>

Laboratory: Columbia Analytical Services

	Date:	8	7	77
	Page:_	L	of_	<u>J</u>
	Reviewer:_	(E	2
2nd	Reviewer:_		V	_

METHOD: Chlorate (EPA Method 300.1), Perchlorate (EPA Method 314.0)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 6/24/08 - 6/24/08
lla.	Initial calibration	A	
lib.	Calibration verification	<i>A</i>	
III.	Blanks	A	
IV	Surrogate Spikes	A	
V	Matrix Spike/Matrix Spike Duplicates	A	W2
VI.	Duplicates	A	0-0
VII.	Laboratory control samples	A	LCS
VIII.	Sample result verification	A	
IX.	Overall assessment of data	1	
Х.	Field duplicates	N	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
ΧI	Field blanks	IW	FB=Z, EB=13, PB=PBOH608B(5044 Y08053)

Note:

A = Acceptable

N = Not provided/applicable

SW = See worksheet

ND = No compounds detected

R = Rinsate

FB = Field blank

D = Duplicate

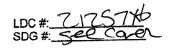
TB = Trip blank

EB = Equipment blank

Validated Samples:

	0001100					
1	H-49AB	11	M-5AB	21 PB4	√ \ 31	
2	FB062408GWarea1	12	MW-16B	22	32	
3	M-23B	13	EB062608GW3	23	33	
4	MC-53B	14	M-6AB	24	34	
5	MC-97B	15	M-67B	25	35	
6	MC-45B	16	M-68B	26	36	,
7	M-7BB	17	M-95B	27	37	
8	M-88BB	18	M-57AB	28	38	
9	M-61B	19	M-7BBMS	29	39	
10	MC-94B	20	M-7BBDUP	30	40	

Notes:	



VALIDATION FINDINGS CHECKLIST

Page: Of Z Reviewer: Of Z 2nd Reviewer:

Method:Inorganics (EPA Method Second)

	T	T	T	
Validation Area	Yes	No	NA	Findings/Comments
1. Technical holding times 124				
All technical holding times were met.	<u> </u>	<u> </u>		
Coolor temperature criteria was met.	/	<u> </u>		
JI: Calle/auon: "a san a s				
Were all instruments calibrated daily, each set-up time?		<u> </u>		
Were the proper number of standards used?		<u></u>		
Were all initial calibration correlation coefficients > 0.995?		<u></u>		
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	/			
Were titrant checks performed as required? (Level IV only)	<u> </u>	<u> </u>		
Were balance checks performed as required? (Level IV only)				
III Blands and the second seco				
Was a method blank associated with every sample in this SDG?				
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.			_	
ny-matrix-pikenyaux-spike duplicates and paplicates secondaria.				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.				·
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	_			
Were the MS/MSD or duplicate relative percent differences (RPD) ≤ 20% for waters and ≤ 35% for soil samples? A control limit of ≤ CRDL(≤ 2X CRDL for soil) was used for samples that were ≤ 5X the CRDL, including when only one of the duplicate sample values were ≤ 5X the CRDL.		-		
V capped by solid shiples is the solid shiples in t				
Was an LCS anayized for this SDG?	1			
Was an LCS analyzed per extraction batch?	14		_	
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?			×1-1-1-0-1	18-2011
VI Regional Quality Assurance and Quality Control				The state of the s
Were performance evaluation (PE) samples performed?		1		
Were the performance evaluation (PF) samples within the acceptance limits?			1	

LDC #: 2/257X6 SDG #: <u>See caret</u>

VALIDATION FINDINGS CHECKLIST

	Page:	Zof Z
	Reviewer:	ورو
2nd	Reviewer:	W

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Vertication				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	_	-		
Were detection limits < RL?	_			
VIII. Overall essessment of date				and the second second
Overall assessment of data was found to be acceptable.	/			
IX Field duplicaties				
Field duplicate pairs were identified in this SDG.		/	_	
Target analytes were detected in the field duplicates.				
X. Field plenks				
Field blanks were identified in this SDG.				
Target analytes were detected in the field blanks.				

LDC #: 2257X6 SDG #: 5ee COVEL

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page: of Reviewer: 2nd reviewer:

All circled methods are applicable to each sample.

	
Sample ID	Parameter
1-18	PH TDS CI F NO, NO, SO, PO, ALK CN' NH, TKN TOC CRO+ CIO3/CIO4)
0:19,20	
90170	PH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺
	PH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁰⁺
	PH TDS CIF NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR8+
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR8+
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR8+
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR8+
	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR6+
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+
	PH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁸⁺
	ph TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺
	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CRO+
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺
	ph tds ci f no, no, so, po, alk cn nh, tkn toc cre+
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN. NH ₃ TKN TOC CR ⁶⁺
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN' NH ₃ TKN TOC CR ⁶⁺
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺
	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺
	ph tds ci f No ₃ No ₂ So ₄ Po ₄ Alk cn' NH ₃ TKN toc cr ⁶⁺
	pH TDS CI F NO, NO, SO, PO, ALK CN' NH, TKN TOC CRe+

Comments:		

SDG #: LDC #:

VALIDATION FINDINGS WORKSHEET Level IV Recalculation Worksheet

2nd Reviewer:

METHOD: Inorganics, Method Seccover

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

Where, %R = Found x 100

Found =

concentration of each analyte measured in the analysis of the sample. For the matrix spike calculation,

Found = SSR (spiked sample result) - SR (sample result). concentration of each analyte in the source. True ==

RPD = $\frac{|S-D|}{(S+D)/2}$ x 100 Where, $\frac{(S+D)/2}{(S+D)}$

|| || || 0

Original sample concentration

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

Duplicate sample concentration

		-			Recalculated	Reported	-
Sample ID	Type of Analysis	Element	Found / S (units) VQ	True / D (units)/Q	%R / RPD	%R / RPD	Acceptable (Y/N)
527	Laboratory control sample	C 103	b11.	521	2.5	4	7
19	Matrix spike semple	100 hQl	(ssn.sn)	(2000)	<i>hb</i>	56	
8	Duplicate sample	610	00 hII	0) 11	~ ~	~	

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

LDC#: 21257X6 SDG#: <u>SECOL</u>OL

Initial and Continuing Calibration Calculation Verification Validatin Findings Worksheet

Page: of Reviewer: 02 2nd Reviewer:

Method: Inorganics, Method <u>3た</u>1 / シピノ

The correlation coefficient (r) for the calibration of $\frac{COS}{COS}$ was recalculated.Calibration date: $\frac{S/2COS}{S}$

An initial or continuing calibration verification percent recovery (%R) was recalculated for each type of analysis using the following formula:

%R = Found X 100

Where,

Found = concentration of each analyte measured in the analysis of the ICV or CCV solution

True = concentration of each analyte in the ICV or CCV source

					Recalculated	Reported	Acceptable
Type of analysis	Analyte	Standard	Conc. (ug/l)	Area	r or r²	r or r²	(Y/N)
Initial calibration		s1	10	0.001			
	-	s2	20	0.002	0.999398	0.999882	
	<u> </u>	83	50	0.004			
	(C1C)	84	100	0.009)-
		s5	200	0.019			_
		gs	200	0.051			
				Formal Cupics			
Calibration verification	Clos	ICV	123	119	97%	976	
olibration varification	010H	CCV	0,01	10,1	101%	9,101	
Calibration verification	C104	000	8	26	9.76	%26)

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

LDC #: 21	257X+
LDC #:	~
SDG #: <u>See</u>	OB L

VALIDATION FINDINGS WORKSHEET

Page:_	of
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nd reviewer:	

SDG #: <u>See(0</u>)	Sample Calculation Vernical	2nd reviewer:
METHOD: Inorganics, Method	Secret	
/ ∨ N N/A Have results been re	Il questions answered "N". Not applicate ported and calculated correctly? a calibrated range of the instruments? ts below the CRQL?	ole questions are identified as "N/A".
Compound (analyte) results for recalculated and verified using the f	ollowing equation:	reported with a positive detect were
Concentration = (Ala DF Slope) DF	Recalculation: 0.029 0.0001 0.0001)1000 = 290,000 mg/L 1=11500 mg/L

#	Sample ID	Analyte	Reported Concentration (Ug L)	Calculated Concentration (Mg/L)	Acceptable (Y/N)
	\	. C103	793000	790,000 208000	4
	,	C104	210000	208000	
		•			·
	7	C103	11400	11500	7
		C104	55700	54000	4
				·	
<u></u>				·	
			·		
 					
 					

Note:	

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2008 Phase B Investigation,

Henderson, Nevada

Collection Date:

June 25 through June 26, 2008

LDC Report Date:

August 14, 2009

Matrix:

Soil

Parameters:

Wet Chemistry

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): K0805780

Sample Identification

SA87-0.5B

SA87-10B

SA87-20B

SA87-30B

SA87-25B

SA180-0.5B

SA180-10B

SA180-20B

SA180-30B

SA57-0.5B

SA57-10B

SA57-20B

SA57-30B

SA87-10BMS

SA87-10BDUP

SA180-10BMS

SA180-10BDUP

Introduction

This data review covers 17 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 300.1 for Chlorate and EPA Method 314.0 for Perchlorate.

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

b. Calibration Verification

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.

No field blanks were identified in this SDG.

IV. Surrogate Spikes

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

V. Matrix Spike/Matrix Spike Duplicates

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

VI. Duplicates

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

VII. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent 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 K0805780	All analytes reported below the PQL.	J (all detects)	А	

Raw data were not reviewed for this SDG.

IX. Overall Assessment of Data

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, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG K0805780

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
K0805780	SA87-0.5B SA87-10B SA87-20B SA87-30B SA87-25B SA180-0.5B SA180-10B SA180-20B SA180-30B SA57-0.5B SA57-10B SA57-10B SA57-30B	All analytes reported below the PQL.	J (all detects)	Α	Sample result verification (PQL) (sp)

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG K0805780

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG K0805780

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #: <u>21257Y6</u> SDG #: K0805780

Stage 2B

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Date: <u>〈</u>	5-17-0
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Reviewer:	2
2nd Reviewer:_	

METHOD: Chlorate (EPA Method 300.1), Perchlorate (EPA Method 314.0)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 6/25/08 - 6/26/08
IIa.	Initial calibration	A	
lib.	Calibration verification	A	
III.	Blanks	A	
IV	Surrogate Spikes	A	
V	Matrix Spike/Matrix Spike Duplicates	A	ms
VI.	Duplicates	A	OR
VII.	Laboratory control samples	A	LCS
VIII.	Sample result verification	N	
IX.	Overall assessment of data	A	
Χ.	Field duplicates	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	
ΧI	Field blanks	<u> </u>	

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	SA87-0.5B	11	SA57-10B	21	PBS 1	31	
2	SA87-10B	12	SA57-20B	22		32	
3	SA87-20B	13	SA57-30B	23		33	
4	SA87-30B	14	SA87-10BMS	24		34	
5	SA87-25B	15	SA87-10BDUP	25		35	
6	SA180-0.5B	16	SA180-10BMS	26		36	
7	SA180-10B	17	SA180-10BDUP	27		37	
8	SA180-20B	18		28	and the second s	38	
9	SA180-30B	19		29		39	
10	SA57-0.5B	20		30		40	

Notes:	

LDC #: 21257 Y6 SDG #: See COVEL

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

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2nd reviewer:	

All circled methods are applicable to each sample.

Sample ID	Parameter
1-12	PH TDS CI F NO, NO, SO, PO, ALK CN' NH, TKN TOC CRO+ COSCIOG
00:14,15	PH TDS CI F NO, NO, SO, PO, ALK CN' NH, TKN TOC CR" (103) (104)
QC: 16,17	PH TDS CI F NO, NO, SO, PO, ALK CN' NH, TKN TOC CRO+ CIO, CIO
-10 10,11	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CROT
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR8+
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+
	ph tds ci f no, no, so, po, alk cn nh, tkn toc cr°+
	ph tds ci f No ₃ No ₂ So ₄ Po ₄ Alk Cn' Nh ₃ TKN toc CR ⁶⁺
	PH TDS CLF NO ₃ NO ₂ SO ₄ PO ₄ ALK CN' NH ₃ TKN TOC CR ⁸⁺
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺
	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+
	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CRO+
	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR6+
	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN ⁻ NH ₃ TKN TOC CR ⁶⁺
	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR8+
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR8+
	ph tds ci f No ₃ No ₂ So ₄ Po ₄ Alk Cn Nh ₃ TKN TOC CR ⁶⁺
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺
	ph TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CRS+
	ph tds ci f No ₃ No ₂ So ₄ Po ₄ Alk Cn Nh ₃ TKN TOC CR ⁶⁺
	ph tds ci f No ₃ No ₂ So ₄ Po ₄ Alk cn Nh ₃ TKN Toc CR ⁸⁺
	pH TDS CI F NO, NO, SO, PO, ALK CN NH, TKN TOC CRO+

Comments:	

Laboratory Data Consultants, Inc. Data Validation Report

Project/Site Name:

Tronox LLC Facility, 2008 Phase B Investigation,

Henderson, Nevada

Collection Date:

June 29 through June 30, 2008

LDC Report Date:

August 14, 2009

Matrix:

Water

Parameters:

Wet Chemistry

Validation Level:

Stage 2B

Laboratory:

Columbia Analytical Services, Inc.

Sample Delivery Group (SDG): K0805919

Sample Identification

M-79B

M-84B

M-126B

M-14ABF

M-14ADBF

Introduction

This data review covers 5 water samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 300.1 for Chlorate and EPA Method 314.0 for Perchlorate.

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

b. Calibration Verification

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.

Sample FB062408GWarea1 (K0805722) was identified as a field blank. No contaminant concentrations were found in this blank.

Sample PB061608B (from SDG K0805394) was identified as a pump blank. No contaminant concentrations were found in this blank.

IV. Surrogate Spikes

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

V. Matrix Spike/Matrix Spike Duplicates

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

VI. Duplicates

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

VII. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent 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 K0805919	All analytes reported below the PQL.	J (all detects)	Α

Raw data were not reviewed for this SDG.

IX. Overall Assessment of Data

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

X. Field Duplicates

Samples M-14ABF and M-14ADBF were identified as field duplicates. No contaminant concentrations were detected in any of the samples with the following exceptions:

	Concentra	Concentration (ug/L)		—		
Analyte	M-14ABF	M-14ADBF	RPD (Limits)	Difference (Limits)	Flags	A or P
Chlorate	19500	19500	0 (≤30)	-	-	_
Perchlorate	26700	26600	0 (≤30)	-	-	-

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Data Qualification Summary - SDG K0805919

SDG	Sample	Analyte	Flag	A or P	Reason (Code)
K0805919	M-79B M-84B M-126B M-14ABF M-14ADBF	All analytes reported below the PQL.	J (all detects)	A	Sample result verification (PQL) (sp)

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG K0805919

No Sample Data Qualified in this SDG

Tronox LLC Facility, 2008 Phase B Investigation, Henderson, Nevada Wet Chemistry - Field Blank Data Qualification Summary - SDG K0805919

No Sample Data Qualified in this SDG

Tronox Northgate Henderson VALIDATION COMPLETENESS WORKSHEET

LDC #: <u>21257Z6</u> SDG #: K0805919

Stage 2B

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Reviewer:	
2nd Reviewer:	1~

Date 8-14-09

Laboratory: Columbia Analytical Services

METHOD: Chlorate (EPA Method 300.1), Perchlorate (EPA Method 314.0)

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

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 6/79/08 - 6/30/08
IIa.	Initial calibration	A	
lib.	Calibration verification	A	
III.	Blanks	A	
IV	Surrogate Spikes	<u> </u>	100 E /0 1 1 C C 301 1 1 0 0 0 0 0 777
V	Matrix Spike/Matrix Spike Duplicates	JAMSA	MS (SDG & KO805394, KO805722)
VI.	Duplicates	04000A	DR V
VII.	Laboratory control samples	<u> </u>	LCS
VIII.	Sample result verification	N A	
IX.	Overall assessment of data	A	
X.	Field duplicates	SW	(4,5)
ΧI	Field blanks	ND	PB=PB061608B , FB=FB062408GWarea 1 (5064: K0805394) (5064: K0805722)
L			(5064: K0805394) (5064 K0805722)

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

BB=Prop Blank

Validated Samples: (Water

	0000				1	
1	M-79B	11_	PBW	21	31	
2	M-84B	12		22	32	
3	M-126B	13		23	33	
4	M-14ABF	14		24	34	
5	M-14ADBF	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 #: 2125126 SDG #: Seecal

VALIDATION FINDINGS WORKSHEET Sample Specific Analysis Reference

Page: of Reviewer: 2nd reviewer:

All circled methods are applicable to each sample.

Sample ID	Parameter					
1-5	PH TDS CI F NO, NO, SO, PO, ALK CN' NH, TKN TOC CROCO					
	ph TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺					
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺					
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CRO+					
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+					
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+					
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+					
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺					
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺					
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺					
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+					
	PH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺					
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+					
	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR6+					
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CR8+					
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN NH3 TKN TOC CRS+					
	ph tds ci f No3 No2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+					
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN' NH ₃ TKN TOC CR ⁸⁺					
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺					
	pH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁶⁺					
	PH TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+					
	pH TDS CI F NO3 NO2 SO4 PO4 ALK CN' NH3 TKN TOC CR8+					
	PH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN NH ₃ TKN TOC CR ⁸⁺					
	PH TDS CI F NO ₃ NO ₂ SO ₄ PO ₄ ALK CN' NH ₃ TKN TOC CR ⁶⁺					
	pH TDS CI F NO, NO, SO, PO, ALK CN NH, TKN TOC CR8+					

Comments:	184

LDC#:_	<u>21257Z6</u>
SDG#	See Cover

VALIDATION FINDINGS WORKSHEET

Field Duplicates

Page:of
Reviewer:
2nd Reviewer:

Inorganics, Method See Cover

 $\begin{pmatrix} Y N NA \\ Y N NA \end{pmatrix}$

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

	Concentra	tion (ug/L)				Qualification
Analyte	4	5	RPD (≤30)	Difference	Limits	(Parent only)
Chlorate	19500	19500	0			
Perchlorate	26700	26600	0			

V:\FIELD DUPLICATES\FD_inorganic\21257Z6.wpd