TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

Job Number: 280-104281-2

Job Description: Ravenna, OH

For:
Cardno TEC, Inc
2496 Old Ivy Road
Suite 300
Charlottesville, VA 22903

Attention: Mr. Peter Chapman

Approved for release.
Patrick J McEntee
Manager of Project Management
12/19/2017 8:13 PM

Patrick J McEntee, Manager of Project Management
4955 Yarrow Street, Arvada, CO, 80002
(303)736-0107
patrick.mcentee@testamericainc.com
12/19/2017

The test results in this report relate only to the samples in this report and meet all requirements of NELAC, with any exceptions noted. Pursuant to NELAP, this report shall not be reproduced except in full, without the written approval of the laboratory. All questions regarding this report should be directed to the TestAmerica Denver Project Manager.

The Lab Certification ID# is 4025.

Reporting limits are adjusted for sample size used, dilutions and moisture content if applicable.

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Table of Contents

Qualifiers

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

CASE NARRATIVE

Client: Cardno TEC, Inc

Project: Ravenna, OH

Report Number: 280-104281-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

RECEIPT

The samples were received on 12/5/2017 9:25 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 10 coolers at receipt time were 0.6º C, 0.8º C, 0.9º C, 1.2º C, 1.2º C, 1.3º C, 2.2º C, 2.8º C, 3.6º C and 3.8º C.

Receipt Exceptions

The requested 4500_CN_I Free Cyanide analyses are reported under a separate job series, 280-104281-2, with TestAmerica's standard formatting and reporting limits as the laboratory does not hold DOD certification for this method.

The requested 8330 Nitroguanidine and 353.2 Nitrocellulose analyses were subcontracted to TestAmerica's Sacramento laboratory.

The chain of custody requests 7196A Hexavalent Chromium analysis for samples FWGmw-024-120217-GW (280-104281-19) and FWGmw-021-120217-GW (280-104281-26). The laboratory did not log these analyses under this job number as sample volume for these analyses was delivered directly to TestAmerica Canton on 12/2/2017 and were logged under job number 240-88785. The client was notified on 12/6/2017.

The chain of custody requests the laboratory to perform MS/MSD analysis on sample FWGmw-020-120217-GW (280-104281-27). However, the laboratory did not receive triplicate sample volume to perform MS/MSD for the analyses listed. The laboratory did not log the parent sample for MS/MSD analyses. The client was notified on 12/6/2017.

FREE CYANIDE

Samples FBQmw-172-120417-GW (280-104281-7), NTAmw-118-120417-GW (280-104281-12) and LL11mw-005-120417-GW (280-104281-15) were analyzed for Free Cyanide in accordance with SM20 4500_CN_I. The samples were prepared on 12/12/2017 and analyzed on 12/13/2017.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: Cardno TEC, Inc
Project/Site: Ravenna, OH

TestAmerica Job ID: 280-104281-2

Client Sample ID: FBQmw-172-120417-GW — Lab Sample ID: 280-104281-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cyanide, Free	4.5	J	10	2.0	ug/L	1		SM 4500 CN I	Total/NA

Client Sample ID: NTAmw-118-120417-GW — Lab Sample ID: 280-104281-12

No Detections.

Client Sample ID: LL11mw-005-120417-GW — Lab Sample ID: 280-104281-15

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cyanide, Free	4.0	J	10	2.0	ug/L	1		SM 4500 CN I	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: FBQmw-172-120417-GW

Lab Sample ID: 280-104281-7

Date Collected: 12/04/17 10:23

Matrix: Water

Date Received: 12/05/17 09:25

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Free	**4.5**	**J**	10	2.0	ug/L		12/12/17 16:51	12/13/17 16:39	1

Client Sample ID: NTAmw-118-120417-GW

Lab Sample ID: 280-104281-12

Date Collected: 12/04/17 11:52

Matrix: Water

Date Received: 12/05/17 09:25

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Free	ND		10	2.0	ug/L		12/12/17 16:51	12/13/17 16:40	1

Client Sample ID: LL11mw-005-120417-GW

Lab Sample ID: 280-104281-15

Date Collected: 12/04/17 09:35

Matrix: Water

Date Received: 12/05/17 09:25

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Free	**4.0**	**J**	10	2.0	ug/L		12/12/17 16:51	12/13/17 16:42	1

Default Detection Limits

Client: Cardno TEC, Inc
Project/Site: Ravenna, OH

TestAmerica Job ID: 280-104281-2

General Chemistry

Prep: SM 4500 CN I

Analyte	RL	MDL	Units	Method
Cyanide, Free	10	2.0	ug/L	SM 4500 CN I

Method: SM 4500 CN I - Cyanide, Weak Acid Dissociable

Lab Sample ID: MB 280-398462/4-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 398637 — **Prep Batch: 398462**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Free	ND		10	2.0	ug/L		12/12/17 16:51	12/13/17 16:20	1

Lab Sample ID: HLCS 280-398462/1-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 398637 — **Prep Batch: 398462**

Analyte	Spike Added	HLCS Result	HLCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cyanide, Free	350	362		ug/L		103	75 - 120

Lab Sample ID: LCS 280-398462/3-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 398637 — **Prep Batch: 398462**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cyanide, Free	100	97.2		ug/L		97	75 - 120

Lab Sample ID: LLCS 280-398462/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 398637 — **Prep Batch: 398462**

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cyanide, Free	100	101		ug/L		101	75 - 120

QC Association Summary

Client: Cardno TEC, Inc
Project/Site: Ravenna, OH

TestAmerica Job ID: 280-104281-2

General Chemistry

Prep Batch: 398462

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-104281-7	FBQmw-172-120417-GW	Total/NA	Water	SM 4500 CN I	
280-104281-12	NTAmw-118-120417-GW	Total/NA	Water	SM 4500 CN I	
280-104281-15	LL11mw-005-120417-GW	Total/NA	Water	SM 4500 CN I	
MB 280-398462/4-A	Method Blank	Total/NA	Water	SM 4500 CN I	
HLCS 280-398462/1-A	Lab Control Sample	Total/NA	Water	SM 4500 CN I	
LCS 280-398462/3-A	Lab Control Sample	Total/NA	Water	SM 4500 CN I	
LLCS 280-398462/2-A	Lab Control Sample	Total/NA	Water	SM 4500 CN I	

Analysis Batch: 398637

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-104281-7	FBQmw-172-120417-GW	Total/NA	Water	SM 4500 CN I	398462
280-104281-12	NTAmw-118-120417-GW	Total/NA	Water	SM 4500 CN I	398462
280-104281-15	LL11mw-005-120417-GW	Total/NA	Water	SM 4500 CN I	398462
MB 280-398462/4-A	Method Blank	Total/NA	Water	SM 4500 CN I	398462
HLCS 280-398462/1-A	Lab Control Sample	Total/NA	Water	SM 4500 CN I	398462
LCS 280-398462/3-A	Lab Control Sample	Total/NA	Water	SM 4500 CN I	398462
LLCS 280-398462/2-A	Lab Control Sample	Total/NA	Water	SM 4500 CN I	398462

Client Sample ID: FBQmw-172-120417-GW

Lab Sample ID: 280-104281-7

Date Collected: 12/04/17 10:23

Matrix: Water

Date Received: 12/05/17 09:25

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SM 4500 CN I			50 mL	50 mL	398462	12/12/17 16:51	ALS	TAL DEN
Total/NA	Analysis	SM 4500 CN I		1	50 mL	50 mL	398637	12/13/17 16:39	ALS	TAL DEN

Client Sample ID: NTAmw-118-120417-GW

Lab Sample ID: 280-104281-12

Date Collected: 12/04/17 11:52

Matrix: Water

Date Received: 12/05/17 09:25

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SM 4500 CN I			50 mL	50 mL	398462	12/12/17 16:51	ALS	TAL DEN
Total/NA	Analysis	SM 4500 CN I		1	50 mL	50 mL	398637	12/13/17 16:40	ALS	TAL DEN

Client Sample ID: LL11mw-005-120417-GW

Lab Sample ID: 280-104281-15

Date Collected: 12/04/17 09:35

Matrix: Water

Date Received: 12/05/17 09:25

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	SM 4500 CN I			50 mL	50 mL	398462	12/12/17 16:51	ALS	TAL DEN
Total/NA	Analysis	SM 4500 CN I		1	50 mL	50 mL	398637	12/13/17 16:42	ALS	TAL DEN

Laboratory References:

TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

Accreditation/Certification Summary

Client: Cardno TEC, Inc
Project/Site: Ravenna, OH

TestAmerica Job ID: 280-104281-2

Laboratory: TestAmerica Denver

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
A2LA	DoD ELAP		2907.01	10-31-19 *

The following analytes are included in this report, but accreditation/certification is not offered by the governing authority:

Analysis Method	Prep Method	Matrix	Analyte
SM 4500 CN I	SM 4500 CN I	Water	Cyanide, Free

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Method Summary

Client: Cardno TEC, Inc
Project/Site: Ravenna, OH

TestAmerica Job ID: 280-104281-2

Method	Method Description	Protocol	Laboratory
SM 4500 CN I	Cyanide, Weak Acid Dissociable	SM	TAL DEN

Protocol References:

SM = "Standard Methods For The Examination Of Water And Wastewater",

Laboratory References:

TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

Sample Summary

Client: Cardno TEC, Inc
Project/Site: Ravenna, OH

TestAmerica Job ID: 280-104281-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
280-104281-7	FBQmw-172-120417-GW	Water	12/04/17 10:23	12/05/17 09:25
280-104281-12	NTAmw-118-120417-GW	Water	12/04/17 11:52	12/05/17 09:25
280-104281-15	LL11mw-005-120417-GW	Water	12/04/17 09:35	12/05/17 09:25

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver Job No.: 280-104281-2

SDG No.:

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration
					Reagent ID	Volume Added		
CN 10ppm_00279	12/17/17	12/10/17	2% NaOH, Lot 1% NaOH_00256	100 mg/L	CN CAL Std_00058	1 mL	Cyanide, Amenable	10 mg/L
							Cyanide, Free	10 mg/L
							Cyanide, Non-amenable	10 mg/L
							Cyanide, Total	10 mg/L
							Cyanide, Weak Acid Dissociable	10 mg/L
.CN CAL Std_00058	03/31/18		Ricca, Lot 1709G34		(Purchased Reagent)		Cyanide, Amenable	1000 mg/L
							Cyanide, Free	1000 mg/L
							Cyanide, Non-amenable	1000 mg/L
							Cyanide, Total	1000 mg/L
							Cyanide, Weak Acid Dissociable	1000 mg/L
CN CAL 1 ppm_01330	12/14/17	12/13/17	1% NaOH, Lot N/A	100 mL	CN 10ppm_00279	10 mL	Cyanide, Free	1 mg/L
.CN 10ppm_00279	12/17/17	12/10/17	2% NaOH, Lot 1% NaOH_00256	100 mg/L	CN CAL Std_00058	1 mL	Cyanide, Free	10 mg/L
..CN CAL Std_00058	03/31/18		Ricca, Lot 1709G34		(Purchased Reagent)		Cyanide, Free	1000 mg/L
CN ICV Daily_01097	12/14/17	12/13/17	1% HNO3, Lot N/A	100 mL	CN ICV Int_00462	1 mL	Cyanide, Free	0.1 mg/L
.CN ICV Int_00462	12/17/17	12/10/17	1% NaOH, Lot 1% NaOH_00256	100 mL	CN ICV Std_00047	1 mL	Cyanide, Free	10 mg/L
..CN ICV Std_00047	02/28/18		SPEX, Lot 13-55YPX		(Purchased Reagent)		Cyanide, Free	1000 mg/L
CN ICV Int_00462	12/17/17	12/10/17	1% NaOH, Lot 1% NaOH_00256	100 mL	CN ICV Std_00047	1 mL	Cyanide, Amenable	10 mg/L
							Cyanide, Free	10 mg/L
							Cyanide, Non-amenable	0 mg/L
							Cyanide, Total	10 mg/L
							Cyanide, Weak Acid Dissociable	10 mg/L
.CN ICV Std_00047	02/28/18		SPEX, Lot 13-55YPX		(Purchased Reagent)		Cyanide, Amenable	1000 mg/L
							Cyanide, Free	1000 mg/L
							Cyanide, Non-amenable	0 mg/L
							Cyanide, Total	1000 mg/L
							Cyanide, Weak Acid Dissociable	1000 mg/L

Reagent

CN CAL Std_00058

RICCA CHEMICAL COMPANY®

Arlington, TX 76012
Pocomoke City, MD 21851
Batesville, IN 47006
http://www.riccachemical.com
1-888-GO-RICCA
customerservice@riccachemical.com

Certificate of Analysis

Cyanide Standard, 1000 ppm CN^-

Lot Number: 1709G34 **Product Number:** 2543

Manufacture Date: SEP 22, 2017
Expiration Date: MAR 2018

This standard is prepared using accurate volumetric techniques from material that has been assayed against Silver Nitrate solution certified traceable to NIST Standard Reference Material 999. The certified value reported is the prepared value based upon the method of preparation of the material. The uncertainty in the prepared value is the combined uncertainty based on the stability of the assayed Potassium Cyanide, and the uncertainty in the mass and volume measurements.
Use 0.16% (w/v) (0.04 N) Sodium Hydroxide or 0.225 % (w/v) (0.04 N) Potassium Hydroxide to make dilutions of this standard. Restandardize weekly if extreme accuracy is required.

Name	CAS#	Grade
Water	7732-18-5	ACS/ASTM/USP/EP
Potassium Cyanide	151-50-8	ACS
Sodium Hydroxide	1310-73-2	Reagent

Test	Specification	Result
Appearance	Colorless liquid	Passed
Cyanide (CN^-)	995-1005 ppm	1003 ppm

Specification	Reference
Stock Standard Cyanide Solution	APHA (4500-CN- F)
Stock Cyanide Solution	APHA (4500-CN- E)
Stock Cyanide Solution	APHA (4500-CN- K)
Stock Cyanide Solution	APHA (4500-CN- H)
Cyanide Reference Solution (1000 mg/L)	EPA (SW-846) (7.3.3.2)
Cyanide Calibration Stock Solution (1,000 mg/L CN-)	EPA (SW-846) (9213)
Stock Cyanide Solution	EPA (335.3)
Stock Cyanide Solution	EPA (335.2)
Cyanide Solution Stock	ASTM (D 4282)
Simple Cyanide Solution, Stock (1.0 g/L CN)	ASTM (D 4374)

Volumetric glassware complies with Class A tolerance requirements of ASTM E 288 and NIST Circular 434; it is calibrated before first use and recalibrated regularly in accordance with ASTM E 542 and NIST Procedure NBSIR 74-461. Balances are calibrated regularly with weights certified traceable to the NIST national mass standard. Thermometers and temperature probes are calibrated before first use and recalibrated regularly with a thermometer traceable to NIST standards. All products are prepared according to master documents that assure manufacture according to validated methods. Batch records document raw material traceability and production and testing history for each lot manufactured.

Part Number	Size / Package Type	Shelf Life (Unopened Container)
2543-4	120 mL amber poly	6 months

Recommended Storage: 2°C - 8°C (36°F - 46°F)

Israel Alamudun (09/22/2017)
Quality Control Supervisor
This Certificate of Analysis is designed to comply with ISO Guide 31 "Reference Materials -- Contents of Certificates and Labels."

Reagent

CN ICV Std_00047

12/5/17 ALS

CN ICV std_00047

$AgNO_3$ – 00004
CN Color – 00006

Blank
0 mL $AgNO_3$

T:
10 mL – 0 mL > 10 mL $AgNO_3$
10 mL std

I_2
19.3 mL – 9.3 mL : 10 mL $AgNO_3$
10 mL std

$$\frac{(10-0)\,1000}{10} = 1000 \text{ mg/L}$$

ACCREDITED
Reference Materials Producer
Cert #2495.01

SPEXertificate®

Certificate of Reference Material

ACCREDITED
Chemical Testing
Cert #2495.02

Catalog Number: RSCN9-2X **Lot No.** 13-55YPX

Description: 1000 µg/mL Simple Cyanide

Matrix: 2% KOH

This Cyanide Certified Reference Material, CRM, is intended primarily for use as a calibration standard or quality control standard for titrimetric method. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.

Certified Value: 1000 µg/mL ±50 µg/mL

The CRM is prepared gravimetrically using high purity Potassium Cyanide, Lot# K43296567. See side 2 for details of certification.

Certified By:

Titration with $AgNO_3$ using Rhodanine as indicator. $AgNO_3$ standardized against NaCl NIST SRM #919b.

Uncertified Properties:

Trace Impurities in the Solution (derived from starting material):

Ion	µg/mL	Ion	µg/mL
Cl^-	<0.5	SCN^-	<0.3
$PO4^{-3}$	<0.1	$SO4^{-2}$	<1
S^{-2}	<0.01		

Balances are calibrated regularly with weight sets traceable to NIST #32856, #32867 and others. This CRM is guaranteed stable and accurate to ±5% of certified concentration for a period of three months from the date of certification. This includes uncertainty components associated with measurements, homogeneity by the most precise method, and short-term and long-term stability. For these solutions, we use high purity reagents, 18 megohm double deionized water, and triple rinsed bottles. All glassware used is Class A. This guarantee is valid only when the material is unopened and stored under laboratory conditions.

Date of Certification: NOV - - 2017 Certifying Officer: Kathleen Cullen

Report of Certification

This Certified Reference Material (CRM) has been prepared and certified under an ISO 9001:2008, ISO 17025:2005, and ISO Guide 34:2009 quality system consistent with the following guides:

- ISO 9001: Quality management systems – Requirements – certified by UL-DQS
- ISO 17025: General requirements for the competence of testing and calibration laboratories – accredited by A2LA
- ISO Guide 34: General requirements for the competence of reference material producers – accredited by A2LA
- ISO Guide 31: Reference Materials – Contents of certificates and labels
- ISO Guide 35: Reference Materials – General & Statistical Principals for Certification
- Guide To The Expression Of Uncertainty In Measurement 1997
- EURACHEM/CITAC Guide: Quantifying Uncertainty in Analytical Measurement – Second Edition
- ASTM Guide D6362-98
- NIST Technical Note 1297
- ILAC-G12-2000: Guidelines for the requirements for the competence of reference materials producers
- ISO/REMCO N280

Material Source:

All analytes and matrix materials are obtained and verified by SPEX CertiPrep from pre-qualified vendors as per ISO 9001:2008, ISO 17025:2005, and ISO Guide 34:2009 guidelines. Vendor identifications are proprietary, however sources of all materials used in the preparation and testing of SPEX CertiPrep CRMs are tracked and documented. For further assistance, please contact the Sales Support Department at crmsales@spexcsp.com.

Instructions for Use:

Primary usage of this CRM is in neat form or diluted serially with matrix of a purity at or greater than the purity of the original matrix solution. If dilution is required the diluent must be compatible with all certified analytes and contain stabilizers appropriate for the period of intended use. The CRM can also be used as a spike or with a spike, again with appropriate compatibility considerations. All solutions should be thoroughly mixed, by shaking, prior to use and never pipetted directly from the bottle. All surfaces that come in contact with the solution must be thoroughly cleaned and leached prior to use. Dilutions should be performed only with Class A volumetric glassware.

Method of Preparation:

Clean laboratory procedures and techniques have been used throughout the preparation. All materials, equipment, analytical instrumentation and personnel have been qualified prior to use. The highest purity acids applicable, 18 megohm, double deionized water, acid-leached triple-rinsed bottles (where appropriate), and Class A/calibrated volumetrics have been used in all preparations.

Homogeneity:

The homogeneity of the CRM has been confirmed by procedures consistent with ISO 17025:2005, ISO Guide 34:2009, and ASTM D6362-98 Appendix X2. Random, replicate samples of the final, packaged material have been analyzed to prove homogeneity in accordance with our internal procedure 4600-HOMOGEN-1A. Since the product is highly homogeneous, any sample size taken for analysis would be within the uncertainty budget. This is consistent with the intended use of the CRM.

Statistical Estimator and Confidence Limits:

The certified value 'X' listed on the reverse of this document is at the 95% level of confidence and can be expressed as:

- $X = x \pm U$ where X = certified value, U = expanded uncertainty, x = property value
- $U = ku_c$ where $k = 2$ is the coverage factor at the 95% confidence level
- u_c is obtained by combining the individual element standard uncertainty components u_i, and $u_c = \sqrt{\sum u_i^2}$

Certification Traveler Report:

All certified values reported were derived from the Traveler Report (SPEX CertiPrep's traceability documentation) identified by the lot number of this CRM. During the stated period of validity, the purchaser will be notified if this product is recalled due to any significant changes in the stability of the solution. For further assistance, please contact the Sales Support Department at crmsales@spexcsp.com.

Legal Notice:

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Accredited to 17025 & Guide 34 ISO Certified to 9001

GENERAL CHEMISTRY

COVER PAGE
GENERAL CHEMISTRY

Lab Name: TestAmerica Denver Job Number: 280-104281-2

SDG No.:

Project: Ravenna, OH

Client Sample ID	Lab Sample ID
FBQmw-172-120417-GW	280-104281-7
NTAmw-118-120417-GW	280-104281-12
LL11mw-005-120417-GW	280-104281-15

Comments:

1B-IN
INORGANIC ANALYSIS DATA SHEET
GENERAL CHEMISTRY

Client Sample ID: FBQmw-172-120417-GW
Lab Sample ID: 280-104281-7
Lab Name: TestAmerica Denver
Job No.: 280-104281-2
SDG ID.:
Matrix: Water
Date Sampled: 12/04/2017 10:23
Reporting Basis: WET
Date Received: 12/05/2017 09:25

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
	Cyanide, Free	4.5	10	2.0	ug/L	J		1	SM 4500 CN I

1B-IN
INORGANIC ANALYSIS DATA SHEET
GENERAL CHEMISTRY

Client Sample ID: NTAmw-118-120417-GW
Lab Sample ID: 280-104281-12
Lab Name: TestAmerica Denver
Job No.: 280-104281-2
SDG ID.:
Matrix: Water
Date Sampled: 12/04/2017 11:52
Reporting Basis: WET
Date Received: 12/05/2017 09:25

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
	Cyanide, Free	ND	10	2.0	ug/L			1	SM 4500 CN I

1B-IN
INORGANIC ANALYSIS DATA SHEET
GENERAL CHEMISTRY

Client Sample ID: LL11mw-005-120417-GW
Lab Sample ID: 280-104281-15
Lab Name: TestAmerica Denver
Job No.: 280-104281-2
SDG ID.:
Matrix: Water
Date Sampled: 12/04/2017 09:35
Reporting Basis: WET
Date Received: 12/05/2017 09:25

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
	Cyanide, Free	4.0	10	2.0	ug/L	J		1	SM 4500 CN I

2-IN
CALIBRATION QUALITY CONTROL
GENERAL CHEMISTRY

Lab Name: TestAmerica Denver Job No.: 280-104281-2

SDG No.:

Analyst: ALS Batch Start Date: 12/13/2017

Reporting Units: mg/L Analytical Batch No.: 398637

Sample Number	QC Type	Time	Analyte	Result	Spike Amount	(%) Recovery	Limits	Qual	Reagent
14	ICV	16:11	Cyanide, Free	0.100	0.100	100	90-110		CN ICV Daily_01097
15	ICB	16:13	Cyanide, Free	ND					
29	CCV	16:34	Cyanide, Free	0.201	0.200	101	90-110		CN CAL 1 ppm_01330
30	CCB	16:36	Cyanide, Free	ND					
44	CCV	16:57	Cyanide, Free	0.206	0.200	103	90-110		CN CAL 1 ppm_01330
45	CCB	16:58	Cyanide, Free	ND					

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM II-IN

3-IN
METHOD BLANK
GENERAL CHEMISTRY

Lab Name: TestAmerica Denver Job No.: 280-104281-2

SDG No.:

Method	Lab Sample ID	Analyte	Result	Qual	Units	RL	Dil
Batch ID: 398637	Date: 12/13/2017 16:20	Prep Batch: 398462	Date: 12/12/2017 16:51				
SM 4500 CN I	MB 280-398462/4-A	Cyanide, Free	ND		ug/L	10	1

7A-IN
LAB CONTROL SAMPLE
GENERAL CHEMISTRY

Lab Name: TestAmerica Denver Job No.: 280-104281-2

SDG No.:

Matrix: Water

Method	Lab Sample ID	Analyte	Result	C	Unit	Spike Amount	Pct. Rec.	Limits	RPD	RPD Limit	Q
Batch ID: 398637	Date: 12/13/2017 16:19		Prep Batch: 398462			Date: 12/12/2017 16:51					
						LCS Source: CN ICV Int_00462					
SM 4500 CN I	LCS 280-398462/3-A	Cyanide, Free	97.2		ug/L	100	97	75-120			

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VIIA-IN

7A-IN
LOW LEVEL CONTROL SAMPLE
GENERAL CHEMISTRY

Lab Name: TestAmerica Denver Job No.: 280-104281-2

SDG No.:

Matrix: Water

Method	Lab Sample ID	Analyte	Result	C	Unit	Spike Amount	Pct. Rec.	Limits	RPD	RPD Limit	Q
Batch ID: 398637	Date: 12/13/2017 16:17		Prep Batch: 398462		Date: 12/12/2017 16:51						
					LCS Source: CN 10ppm_00279						
SM 4500 CN I	LLCS 280-398462/2-A	Cyanide, Free	101		ug/L	100	101	75-120			

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VIIA-IN

7A-IN
HIGH LEVEL CONTROL SAMPLE
GENERAL CHEMISTRY

Lab Name: TestAmerica Denver Job No.: 280-104281-2

SDG No.:

Matrix: Water

Method	Lab Sample ID	Analyte	Result	C	Unit	Spike Amount	Pct. Rec.	Limits	RPD	RPD Limit	Q
Batch ID: 398637 Date: 12/13/2017 16:16			Prep Batch: 398462 Date: 12/12/2017 16:51								
						LCS Source: CN 10ppm_00279					
SM 4500 CN I	HLCS 280-398462/1-A	Cyanide, Free	362		ug/L	350	103	75-120			

Calculations are performed before rounding to avoid round-off errors in calculated results.

FORM VIIA-IN

9-IN
DETECTION LIMITS
GENERAL CHEMISTRY

Lab Name: TestAmerica Denver Job Number: 280-104281-2

SDG Number:

Matrix: Water Instrument ID: WC_Alp 1

Method: SM 4500 CN I MDL Date: 10/11/2010 11:56

Prep Method: SM 4500 CN I

Analyte	Wavelength/ Mass	RL (mg/L)	MDL (mg/L)
Cyanide, Free		0.01	0.002

9-IN
CALIBRATION BLANK DETECTION LIMITS
GENERAL CHEMISTRY

Lab Name: TestAmerica Denver Job Number: 280-104281-2

SDG Number:

Matrix: Water Instrument ID: WC_Alp 1

Method: SM 4500 CN I XMDL Date: 10/11/2010 11:56

Analyte	Wavelength/ Mass	XRL (mg/L)	XMDL (mg/L)
Cyanide, Free		0.01	0.002

12-IN
PREPARATION LOG
GENERAL CHEMISTRY

Lab Name: TestAmerica Denver Job No.: 280-104281-2

SDG No.:

Prep Method: SM 4500 CN I

Lab Sample ID	Preparation Date	Prep Batch	Initial Weight	Initial Volume (mL)	Final Volume (mL)
HLCS 280-398462/1-A	12/12/2017 16:51	398462		50	50
LLCS 280-398462/2-A	12/12/2017 16:51	398462		50	50
LCS 280-398462/3-A	12/12/2017 16:51	398462		50	50
MB 280-398462/4-A	12/12/2017 16:51	398462		50	50
280-104281-7	12/12/2017 16:51	398462		50	50
280-104281-12	12/12/2017 16:51	398462		50	50
280-104281-15	12/12/2017 16:51	398462		50	50

13-IN
ANALYSIS RUN LOG
GENERAL CHEMISTRY

Lab Name: TestAmerica Denver Job No.: 280-104281-2

SDG No.:

Instrument ID: WC_Alp 1 Analysis Method: SM 4500 CN I

Start Date: 12/13/2017 15:52 End Date: 12/13/2017 18:49

Lab Sample Id	D/F	Type	Time	Analytes
				CNFree
ZZZZZZ			15:52	
ZZZZZZ			15:53	
ZZZZZZ			15:55	
ZZZZZZ			15:56	
IC 280-398637/5			15:58	X
IC 280-398637/6			15:59	X
IC 280-398637/7			16:01	X
IC 280-398637/8			16:02	X
IC 280-398637/9			16:04	X
IC 280-398637/10			16:05	X
IC 280-398637/11			16:07	X
ZZZZZZ			16:08	
ZZZZZZ			16:10	
ICV 280-398637/14	1		16:11	X
ICB 280-398637/15	1		16:13	X
ZZZZZZ			16:14	
HLCS 280-398462/1-A	1	T	16:16	X
LLCS 280-398462/2-A	1	T	16:17	X
LCS 280-398462/3-A	1	T	16:19	X
MB 280-398462/4-A	1	T	16:20	X
ZZZZZZ			16:22	
ZZZZZZ			16:24	
ZZZZZZ			16:25	
ZZZZZZ			16:27	
ZZZZZZ			16:28	
ZZZZZZ			16:30	
ZZZZZZ			16:31	
ZZZZZZ			16:33	
CCV 280-398637/29	1		16:34	X
CCB 280-398637/30	1		16:36	X
ZZZZZZ			16:37	
280-104281-7	1	T	16:39	X
280-104281-12	1	T	16:40	X
280-104281-15	1	T	16:42	X
ZZZZZZ			16:43	
ZZZZZZ			16:45	
ZZZZZZ			16:46	
ZZZZZZ			16:48	

FORM XIII-IN

13-IN
ANALYSIS RUN LOG
GENERAL CHEMISTRY

Lab Name: TestAmerica Denver Job No.: 280-104281-2

SDG No.:

Instrument ID: WC_Alp 1 Analysis Method: SM 4500 CN I

Start Date: 12/13/2017 15:52 End Date: 12/13/2017 18:49

Lab Sample Id	D/F	Type	Time	Analytes
				CN Free
ZZZZZZ			16:49	
ZZZZZZ			16:51	
ZZZZZZ			16:52	
ZZZZZZ			16:54	
ZZZZZZ			16:55	
CCV 280-398637/44	1		16:57	X
CCB 280-398637/45	1		16:58	X
ZZZZZZ			17:00	
ZZZZZZ			17:01	
ZZZZZZ			17:03	
ZZZZZZ			17:04	
ZZZZZZ			17:06	
ZZZZZZ			17:07	
ZZZZZZ			17:09	
ZZZZZZ			17:10	
ZZZZZZ			17:12	
ZZZZZZ			17:13	
ZZZZZZ			17:15	
ZZZZZZ			17:16	
ZZZZZZ			17:18	
CCV 280-398637/59			17:19	
CCB 280-398637/60			17:21	
ZZZZZZ			17:22	
ZZZZZZ			17:24	
ZZZZZZ			17:25	
ZZZZZZ			17:27	
ZZZZZZ			17:28	
ZZZZZZ			17:30	
ZZZZZZ			17:31	
ZZZZZZ			17:33	
ZZZZZZ			17:34	
ZZZZZZ			17:36	
ZZZZZZ			17:37	
ZZZZZZ			17:39	
ZZZZZZ			17:40	
CCV 280-398637/74			17:42	
CCB 280-398637/75			17:43	
ZZZZZZ			17:45	

FORM XIII-IN

13-IN
ANALYSIS RUN LOG
GENERAL CHEMISTRY

Lab Name: TestAmerica Denver Job No.: 280-104281-2

SDG No.:

Instrument ID: WC_Alp 1 Analysis Method: SM 4500 CN I

Start Date: 12/13/2017 15:52 End Date: 12/13/2017 18:49

Lab Sample Id	D/F	Type	Time	Analytes
				CNFree
ZZZZZZ			17:46	
ZZZZZZ			17:48	
ZZZZZZ			17:49	
ZZZZZZ			17:51	
ZZZZZZ			17:52	
ZZZZZZ			17:54	
ZZZZZZ			17:55	
ZZZZZZ			17:57	
ZZZZZZ			17:58	
ZZZZZZ			18:00	
ZZZZZZ			18:01	
ZZZZZZ			18:03	
CCV 280-398637/89			18:04	
CCB 280-398637/90			18:06	
ZZZZZZ			18:07	
ZZZZZZ			18:09	
ZZZZZZ			18:10	
ZZZZZZ			18:12	
ZZZZZZ			18:13	
ZZZZZZ			18:15	
ZZZZZZ			18:16	
ZZZZZZ			18:18	
ZZZZZZ			18:19	
ZZZZZZ			18:21	
ZZZZZZ			18:22	
ZZZZZZ			18:24	
ZZZZZZ			18:31	
CCV 280-398637/104			18:33	
CCB 280-398637/105			18:34	
ZZZZZZ			18:36	
ZZZZZZ			18:37	
ZZZZZZ			18:39	
ZZZZZZ			18:40	
ZZZZZZ			18:42	
ZZZZZZ			18:43	
ZZZZZZ			18:45	
CCV 280-398637/113			18:46	
CCB 280-398637/114			18:48	

FORM XIII-IN

13-IN
ANALYSIS RUN LOG
GENERAL CHEMISTRY

Lab Name: TestAmerica Denver Job No.: 280-104281-2

SDG No.:

Instrument ID: WC_Alp 1 Analysis Method: SM 4500 CN I

Start Date: 12/13/2017 15:52 End Date: 12/13/2017 18:49

Lab Sample Id	D/F	Type	Time	Analytes																									
				CNFree																									
ZZZZZZ			18:49																										

Prep Types:
T = Total/NA

GENERAL CHEMISTRY BATCH WORKSHEET

Lab Name: TestAmerica Denver Job No.: 280-104281-2

SDG No.:

Batch Number: 398462 Batch Start Date: 12/12/17 17:55 Batch Analyst: Schroder, Aaron L

Batch Method: SM 4500 CN I Batch End Date: 12/12/17 22:05

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	DistillpHCheck	SulfideCheck	ChlorineCheck	DigestBlockPos
HLCS 280-398462/1		SM 4500 CN I, SM 4500 CN I		50 mL	50 mL				1
LLCS 280-398462/2		SM 4500 CN I, SM 4500 CN I		50 mL	50 mL				2
LCS 280-398462/3		SM 4500 CN I, SM 4500 CN I		50 mL	50 mL				3
MB 280-398462/4		SM 4500 CN I, SM 4500 CN I		50 mL	50 mL				4
280-104281-B-7	FBQmw-172-120417-GW	SM 4500 CN I, SM 4500 CN I	T	50 mL	50 mL	>12	N	N	11
280-104281-B-12	NTAmw-118-120417-GW	SM 4500 CN I, SM 4500 CN I	T	50 mL	50 mL	>12	N	N	12
280-104281-B-15	LL11mw-005-120417-GW	SM 4500 CN I, SM 4500 CN I	T	50 mL	50 mL	>12	N	N	13

Lab Sample ID	Client Sample ID	Method Chain	Basis	CN 10ppm 00279	CN ICV Int 00462				
HLCS 280-398462/1		SM 4500 CN I, SM 4500 CN I		1.75 mL					
LLCS 280-398462/2		SM 4500 CN I, SM 4500 CN I		0.5 mL					
LCS 280-398462/3		SM 4500 CN I, SM 4500 CN I			0.5 mL				
MB 280-398462/4		SM 4500 CN I, SM 4500 CN I							
280-104281-B-7	FBQmw-172-120417-GW	SM 4500 CN I, SM 4500 CN I	T						
280-104281-B-12	NTAmw-118-120417-GW	SM 4500 CN I, SM 4500 CN I	T						

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GENERAL CHEMISTRY BATCH WORKSHEET

Lab Name: TestAmerica Denver Job No.: 280-104281-2

SDG No.:

Batch Number: 398462 Batch Start Date: 12/12/17 17:55 Batch Analyst: Schroder, Aaron L

Batch Method: SM 4500 CN I Batch End Date: 12/12/17 22:05

Lab Sample ID	Client Sample ID	Method Chain	Basis	CN 10ppm 00279	CN ICV Int 00462				
280-104281-B-15	LL11mw-005-120417-GW	SM 4500 CN I, SM 4500 CN I	T						

Batch Notes	
Acetate Buffer ID	Acetate Buffer_00001
Methyl Red Indicator ID	METHYL RED_00014
Sodium Hydroxide ID	2% NaOH_00308
Pipette ID	T1000, 5000XX
WAD Releasing Agent ID	10% Acetic_00018
Zinc Acetate Buffer ID	ZINC BUFFER_00015

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

GENERAL CHEMISTRY BATCH WORKSHEET

Lab Name: TestAmerica Denver Job No.: 280-104281-2

SDG No.:

Batch Number: 398637 Batch Start Date: 12/13/17 15:52 Batch Analyst: Schroder, Aaron L

Batch Method: SM 4500 CN I Batch End Date:

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	CN CAL 1 ppm 01330	CN ICV Daily 01097		
ICV 280-398637/14		SM 4500 CN I		50 mL	50 mL		50 mL		
ICB 280-398637/15		SM 4500 CN I		50 mL	50 mL				
HLCS 280-398462/1-A		SM 4500 CN I		50 mL	50 mL				
LLCS 280-398462/2-A		SM 4500 CN I		50 mL	50 mL				
LCS 280-398462/3-A		SM 4500 CN I		50 mL	50 mL				
MB 280-398462/4-A		SM 4500 CN I		50 mL	50 mL				
CCV 280-398637/29		SM 4500 CN I		50 mL	50 mL	10 mL			
CCB 280-398637/30		SM 4500 CN I		50 mL	50 mL				
280-104281-B-7-B	FBQmw-172-120417-GW	SM 4500 CN I	T	50 mL	50 mL				
280-104281-B-12-B	NTAmw-118-120417-GW	SM 4500 CN I	T	50 mL	50 mL				
280-104281-B-15-B	LL11mw-005-120417-GW	SM 4500 CN I	T	50 mL	50 mL				
CCV 280-398637/44		SM 4500 CN I		50 mL	50 mL	10 mL			
CCB 280-398637/45		SM 4500 CN I		50 mL	50 mL				

Batch Notes	
Buffer Reagent ID Number	CN Buffer_00104
Chloramine-T ID	CN Chlor-T_00886
NaOH Lot #	1% NaOH_00307
Pipette ID	T1000, 5000XX
Pyridine-Barbituric Acid ID	CN Pyr/Barb_00180

Basis	Basis Description
T	Total/NA

The pound sign (#) in the amount added field denotes that the reagent was used undiluted. All calculations are performed using the stated concentration for this reagent.

Run Results Report

Facility Name	
Facility Location	
Department	
Operator Name	ALS
Operator ID	ALS
Platform	FS III/IV/3100
Software Rev Code	222
Data system ID	57
Result path	C:\FLOW_4\C121317.RST
Sample table path	C:\FLOW_4\c121317.tbl
Method path	C:\FLOW_4\cyanide.mth
Date acquired	13-Dec-17
Time acquired	18:53

				Cyanide, Total		
Date	Time	Cup	Name	Response	Calc [ppb]	Flags
13-Dec-17	15:52	107	Sync	293698	392.022	
13-Dec-17	15:53	0	Carryover	262	-1.102	LO
13-Dec-17	15:55	0	Carryover	150	-1.252	LO
13-Dec-17	15:56	0	Baseline	0	-1.453	BL
13-Dec-17	15:58	101	CAL 0.00 ppb	381	-0.942	LO
13-Dec-17	15:59	102	CAL 10.0 ppb	7792	8.986	
13-Dec-17	16:01	103	CAL 20.0 ppb	15347	19.108	
13-Dec-17	16:02	104	CAL 50.0 ppb	39238	51.115	
13-Dec-17	16:04	105	CAL 100 ppb	76285	100.748	
13-Dec-17	16:05	106	Cal 200 ppb	152221	202.482	
13-Dec-17	16:07	107	Cal 400 ppb	298535	398.502	
13-Dec-17	16:08	0	BLK	-87	-1.569	LO
13-Dec-17	16:10	0	Baseline	0	-1.453	BL
13-Dec-17	16:11	108	ICV 100 ppb	76058	100.444	
13-Dec-17	16:13	0	ICB	-8	-1.464	LO
13-Dec-17	16:14	0	Baseline	0	-1.453	BL
13-Dec-17	16:16	113	hlcs 280-398462/1-a	271147	361.811	
13-Dec-17	16:17	114	llcs 280-398462/2-a	76300	100.769	
13-Dec-17	16:19	115	lcs 280-398462/3-a	73633	97.195	
13-Dec-17	16:20	116	mb 280-398462/4-a	647	-0.585	LO
13-Dec-17	16:22	117	280-104058-g-1-a	1087	0.004	
13-Dec-17	16:24	118	280-104058-g-1-b ms	73680	97.258	
13-Dec-17	16:25	119	280-104058-g-1-c msd	72986	96.328	
13-Dec-17	16:27	120	280-104058-g-2-a	1177	0.125	
13-Dec-17	16:28	121	280-104243-l-1-a	3107	2.709	
13-Dec-17	16:30	122	280-104244-h-1-a	1545	0.617	
13-Dec-17	16:31	0	BLK	48	-1.389	LO
13-Dec-17	16:33	0	baseline	0	-1.453	BL
13-Dec-17	16:34	109	CCV 200PPB	151480	201.489	
13-Dec-17	16:36	0	CCB	18	-1.429	LO
13-Dec-17	16:37	0	Baseline	0	-1.453	BL
13-Dec-17	16:39	123	280-104281-b-7-b	4457	4.519	
13-Dec-17	16:40	124	280-104281-b-12-b	2450	1.830	
13-Dec-17	16:42	125	280-104281-b-15-b	4075	4.007	
13-Dec-17	16:43	126	280-104384-b-5-a	4290	4.295	
13-Dec-17	16:45	127	280-104384-g-8-a	4783	4.955	
13-Dec-17	16:46	128	280-104433-a-2-a	3938	3.823	
13-Dec-17	16:48	129	280-104483-b-14-a	5134	5.425	
13-Dec-17	16:49	130	280-104483-b-14-b ms	80438	106.313	
13-Dec-17	16:51	131	280-104483-b-14-c ms	78225	103.347	
13-Dec-17	16:52	132	280-104552-b-8-a	8116	9.420	
13-Dec-17	16:54	0	BLK	53	-1.381	LO
13-Dec-17	16:55	0	baseline	0	-1.453	BL
13-Dec-17	16:57	109	CCV 200PPB	154847	206.001	
13-Dec-17	16:58	0	CCB	-102	-1.590	LO
13-Dec-17	17:00	0	Baseline	0	-1.453	BL

Result path	C:\FLOW_4\C121317.RST
Sample table path	C:\FLOW_4\c121317.tbl
Method path	C:\FLOW_4\cyanide.mth
Date acquired	13-Dec-17
Time acquired	18:53

				Cyanide, Total		
Date	Time	Cup	Name	Response	Calc [ppb]	Flags
13-Dec-17	17:01	133	400-146814-a-1-a	4655	4.783	
13-Dec-17	17:03	134	400-146814-a-2-a	9276	10.975	
13-Dec-17	17:04	135	hlcs 280-398463/1-a	265167	353.798	
13-Dec-17	17:06	136	llcs 280-398463/2-a	74346	98.151	
13-Dec-17	17:07	137	lcs 280-398463/3-a	75596	99.825	
13-Dec-17	17:09	138	mb 280-398463/4-a	1175	0.122	
13-Dec-17	17:10	139	280-104282-b-1-a	18859	23.813	
13-Dec-17	17:12	140	280-104282-b-1-b ms	53786	70.606	
13-Dec-17	17:13	141	280-104282-b-1-c msd	45307	59.246	
13-Dec-17	17:15	142	280-104295-i-1-a	1144	0.080	
13-Dec-17	17:16	0	BLK	-3	-1.456	LO
13-Dec-17	17:18	0	baseline	0	-1.453	BL
13-Dec-17	17:19	109	CCV 200PPB	159717	212.524	
13-Dec-17	17:21	0	CCB	-17	-1.475	LO
13-Dec-17	17:22	0	Baseline	0	-1.453	BL
13-Dec-17	17:24	143	280-104295-h-2-a	3428	3.140	
13-Dec-17	17:25	144	280-104297-i-1-a	4158	4.118	
13-Dec-17	17:27	145	280-104307-b-1-a	3706	3.512	
13-Dec-17	17:28	146	280-104307-b-2-a	2684	2.143	
13-Dec-17	17:30	147	280-104307-b-3-a	3404	3.107	
13-Dec-17	17:31	148	280-104316-p-1-a	2127	1.396	
13-Dec-17	17:33	149	280-104316-p-2-a	2728	2.202	
13-Dec-17	17:34	150	280-104320-o-3-a	4133	4.084	
13-Dec-17	17:36	151	280-104320-al-9-a	2580	2.003	
13-Dec-17	17:37	152	280-104320-al-9-b ms	83120	109.905	
13-Dec-17	17:39	0	BLK	107	-1.309	LO
13-Dec-17	17:40	0	baseline	0	-1.453	BL
13-Dec-17	17:42	109	CCV 200PPB	162245	215.911	
13-Dec-17	17:43	0	CCB	-35	-1.500	LO
13-Dec-17	17:45	0	Baseline	0	-1.453	BL
13-Dec-17	17:46	153	280-104320-al-9-c ms	86950	115.037	
13-Dec-17	17:48	154	280-104320-o-6-a	1848	1.024	
13-Dec-17	17:49	155	280-104320-o-7-a	2493	1.887	
13-Dec-17	17:51	156	280-104320-o-8-a	1641	0.746	
13-Dec-17	17:52	157	280-104320-a-19-a	3047	2.629	
13-Dec-17	17:54	158	280-104320-f-20-a	1314	0.308	
13-Dec-17	17:55	159	280-104320-l-21-a	5625	6.084	
13-Dec-17	17:57	160	280-104320-a-26-a	4787	4.961	
13-Dec-17	17:58	201	280-104324-m-1-a	4690	4.831	
13-Dec-17	18:00	202	280-104366-d-5-a	784	-0.402	LO
13-Dec-17	18:01	0	BLK	-15	-1.473	LO
13-Dec-17	18:03	0	baseline	0	-1.453	BL
13-Dec-17	18:04	109	CCV 200PPB	165637	220.456	
13-Dec-17	18:06	0	CCB	-34	-1.498	LO
13-Dec-17	18:07	0	Baseline	0	-1.453	BL
13-Dec-17	18:09	203	xhlcs 280-398485/1-a	291946	389.675	
13-Dec-17	18:10	204	llcs 280-398485/2-a	82264	108.758	
13-Dec-17	18:12	205	lcs 280-398485/3-a	83523	110.446	
13-Dec-17	18:13	206	mb 280-398485/4-a	2900	2.433	
13-Dec-17	18:15	207	280-104331-a-1-a	1164	0.106	
13-Dec-17	18:16	208	280-104331-a-1-b ms	24897	31.903	
13-Dec-17	18:18	209	280-104331-a-1-c msd	29581	38.177	
13-Dec-17	18:19	210	280-104338-a-1-a	1332	0.331	
13-Dec-17	18:21	211	280-104338-a-2-a	332666	444.229	HI
13-Dec-17	18:22	212	280-104425-i-1-a	6320	7.014	FL
13-Dec-17	18:24	0	BLK	18	-1.428	LO
13-Dec-17	18:31	0	baseline	0	-1.453	BL

Result path	C:\FLOW_4\C121317.RST
Sample table path	C:\FLOW_4\c121317.tbl
Method path	C:\FLOW_4\cyanide.mth
Date acquired	13-Dec-17
Time acquired	18:53

				Cyanide, Total		
Date	Time	Cup	Name	Response	Calc [ppb]	Flags
13-Dec-17	18:33	109	CCV 200PPB	165256	219.945	
13-Dec-17	18:34	0	CCB	-60	-1.533	LO
13-Dec-17	18:36	0	Baseline	0	-1.453	BL
13-Dec-17	18:37	203	hlcs 280-398485/1-a	289214	386.015	
13-Dec-17	18:39	205	lcs 280-398485/3-a	80653	106.600	
13-Dec-17	18:40	213	280-104338-a-2-a	162745	433.162	
13-Dec-17	18:42	214	280-104425-i-1-a	6216	6.875	
13-Dec-17	18:43	0	BLK	50	-1.385	LO
13-Dec-17	18:45	0	baseline	0	-1.453	BL
13-Dec-17	18:46	109	CCV 200PPB	165349	220.070	
13-Dec-17	18:48	0	CCB	-46	-1.515	LO
13-Dec-17	18:49	0	Baseline	0	-1.453	BL

Peak Table:Cyanide, Total

File name: C:\FLOW_4\C121317.RST
Date: 13-Dec-17
Operator: ALS

Peak	Cup	Name	R	Type	Dil	Wt	Height	Calc. (ppb)	Flags
1	107	Sync	1	SYNC	1	1	293698	392.022003	
2	0	Carryover	1	CO	1	1	262	-1.101530	LO
3	0	Carryover	2	CO	1	1	150	-1.252310	LO
B	0	Baseline	1	RB	1	1	0	-1.452854	BL
5	101	CAL 0.00 ppb	1	C	1	1	381	-0.942087	LO
6	102	CAL 10.0 ppb	1	C	1	1	7792	8.986279	
7	103	CAL 20.0 ppb	1	C	1	1	15347	19.108154	
8	104	CAL 50.0 ppb	1	C	1	1	39238	51.115257	
9	105	CAL 100 ppb	1	C	1	1	76285	100.747734	
10	106	Cal 200 ppb	1	C	1	1	152221	202.482193	
11	107	Cal 400 ppb	1	C	1	1	298535	398.502472	
12	0	BLK	1	BLNK	1	1	-87	-1.569268	LO
B	0	Baseline	1	RB	1	1	0	-1.452854	BL
14	108	ICV 100 ppb	1	CCV	1	1	76058	100.443893	
15	0	ICB	1	U	1	1	-8	-1.463646	LO
B	0	Baseline	1	RB	1	1	0	-1.452854	BL
17	113	hlcs 280-398462/1-a 1	U		1	1	271147	361.811005	
18	114	llcs 280-398462/2-a 1	U		1	1	76300	100.768654	
19	115	lcs 280-398462/3-a 1	U		1	1	73633	97.194946	
20	116	mb 280-398462/4-a 1	U		1	1	647	-0.585455	LO
21	117	280-104058-g-1-a 1	U		1	1	1087	0.003924	
22	118	280-104058-g-1-b ms 1	U		1	1	73680	97.258156	
23	119	280-104058-g-1-c msd 1	U		1	1	72986	96.328362	
24	120	280-104058-g-2-a 1	U		1	1	1177	0.124620	
25	121	280-104243-l-1-a 1	U		1	1	3107	2.709233	
26	122	280-104244-h-1-a 1	U		1	1	1545	0.617384	
27	0	BLK	1	BLNK	1	1	48	-1.389042	LO
B	0	baseline	1	RB	1	1	0	-1.452854	BL
29	109	CCV 200PPB	1	CCV	1	1	151480	201.489334	
30	0	CCB	1	U	1	1	18	-1.429177	LO
B	0	Baseline	1	RB	1	1	0	-1.452854	BL
32	123	280-104281-b-7-b 1	U		1	1	4457	4.518932	
33	124	280-104281-b-12-b 1	U		1	1	2450	1.829968	
34	125	280-104281-b-15-b 1	U		1	1	4075	4.007151	
35	126	280-104384-b-5-a 1	U		1	1	4290	4.294894	
36	127	280-104384-g-8-a 1	U		1	1	4783	4.954997	
37	128	280-104433-a-2-a 1	U		1	1	3938	3.822639	
38	129	280-104483-b-14-a 1	U		1	1	5134	5.424736	
39	130	280-104483-b-14-b ms 1	U		1	1	80438	106.312630	
40	131	280-104483-b-14-c ms 1	U		1	1	78225	103.346756	
41	132	280-104552-b-8-a 1	U		1	1	8116	9.419929	
42	0	BLK	1	BLNK	1	1	53	-1.381405	LO
B	0	baseline	1	RB	1	1	0	-1.452854	BL
44	109	CCV 200PPB	1	CCV	1	1	154847	206.000641	
45	0	CCB	1	U	1	1	-102	-1.590131	LO
B	0	Baseline	1	RB	1	1	0	-1.452854	BL
47	133	400-146814-a-1-a 1	U		1	1	4655	4.782978	
48	134	400-146814-a-2-a 1	U		1	1	9276	10.974651	
49	135	hlcs 280-398463/1-a 1	U		1	1	265167	353.798279	
50	136	llcs 280-398463/2-a 1	U		1	1	74346	98.150963	
51	137	lcs 280-398463/3-a 1	U		1	1	75596	99.824722	
52	138	mb 280-398463/4-a 1	U		1	1	1175	0.121938	
53	139	280-104282-b-1-a 1	U		1	1	18859	23.813353	
54	140	280-104282-b-1-b ms 1	U		1	1	53786	70.605629	
55	141	280-104282-b-1-c msd 1	U		1	1	45307	59.245922	
56	142	280-104295-i-1-a 1	U		1	1	1144	0.080033	
57	0	BLK	1	BLNK	1	1	-3	-1.456266	LO
B	0	baseline	1	RB	1	1	0	-1.452854	BL
59	109	CCV 200PPB	1	CCV	1	1	159717	212.524200	
60	0	CCB	1	U	1	1	-17	-1.474994	LO
B	0	Baseline	1	RB	1	1	0	-1.452854	BL
62	143	280-104295-h-2-a 1	U		1	1	3428	3.139970	
63	144	280-104297-i-1-a 1	U		1	1	4158	4.117950	
64	145	280-104307-b-1-a 1	U		1	1	3706	3.512194	
65	146	280-104307-b-2-a 1	U		1	1	2684	2.142712	
66	147	280-104307-b-3-a 1	U		1	1	3404	3.107463	
67	148	280-104316-p-1-a 1	U		1	1	2127	1.396341	
68	149	280-104316-p-2-a 1	U		1	1	2728	2.201901	
69	150	280-104320-o-3-a 1	U		1	1	4133	4.084065	
70	151	280-104320-al-9-a 1	U		1	1	2580	2.002989	

Peak	Cup	Name	R	Type	Dil	Wt	Height	Calc. (ppb)	Flags
71	152	280-104320-al-9-b ms 1	U		1	1	83120	109.905022	
72	0	BLK	1	BLNK	1	1	107	-1.309241	LO
B	0	baseline	1	RB	1	1	0	-1.452854	BL
74	109	CCV 200PPB	1	CCV	1	1	162245	215.911423	
75	0	CCB	1	U	1	1	-35	-1.500205	LO
B	0	Baseline	1	RB	1	1	0	-1.452854	BL
77	153	280-104320-al-9-c ms 1	U		1	1	86950	115.036774	
78	154	280-104320-o-6-a 1	U		1	1	1848	1.023572	
79	155	280-104320-o-7-a 1	U		1	1	2493	1.886860	
80	156	280-104320-o-8-a 1	U		1	1	1641	0.745671	
81	157	280-104320-a-19-a 1	U		1	1	3047	2.629393	
82	158	280-104320-f-20-a 1	U		1	1	1314	0.308078	
83	159	280-104320-l-21-a 1	U		1	1	5625	6.083523	
84	160	280-104320-a-26-a 1	U		1	1	4787	4.960611	
85	201	280-104324-m-1-a 1	U		1	1	4690	4.831056	
86	202	280-104366-d-5-a 1	U		1	1	784	-0.401972	LO
87	0	BLK	1	BLNK	1	1	-15	-1.473148	LO
B	0	baseline	1	RB	1	1	0	-1.452854	BL
89	109	CCV 200PPB	1	CCV	1	1	165637	220.455765	
90	0	CCB	1	U	1	1	-34	-1.498357	LO
B	0	Baseline	1	RB	1	1	0	-1.452854	BL
92	203	xhlcs 280-398485/1-a 1	U		1	1	291946	389.675385	
93	204	llcs 280-398485/2-a 1	U		1	1	82264	108.757889	
94	205	lcs 280-398485/3-a 1	U		1	1	83523	110.445717	
95	206	mb 280-398485/4-a 1	U		1	1	2900	2.433013	
96	207	280-104331-a-1-a 1	U		1	1	1164	0.106242	
97	208	280-104331-a-1-b ms 1	U		1	1	24897	31.902979	
98	209	280-104331-a-1-c msd 1	U		1	1	29581	38.177288	
99	210	280-104338-a-1-a 1	U		1	1	1332	0.331136	
100	211	280-104338-a-2-a 1	U		1	1	332666	444.229248	HI
101	212	280-104425-i-1-a 1	U		1	1	6320	7.013941	FL
102	0	BLK	1	BLNK	1	1	18	-1.428314	LO
B	0	baseline	1	RB	1	1	0	-1.452854	BL
104	109	CCV 200PPB	1	CCV	1	1	165256	219.944977	
105	0	CCB	1	U	1	1	-60	-1.532870	LO
B	0	Baseline	1	RB	1	1	0	-1.452854	BL
107	203	hlcs 280-398485/1-a 1	U		1	1	289214	386.015381	
108	205	lcs 280-398485/3-a 1	U		1	1	80653	106.599815	
109	213	280-104338-a-2-a 1	U		2	1	162745	433.161957	
110	214	280-104425-i-1-a 1	U		1	1	6216	6.875383	
111	0	BLK	1	BLNK	1	1	50	-1.385374	LO
B	0	baseline	1	RB	1	1	0	-1.452854	BL
113	109	CCV 200PPB	1	CCV	1	1	165349	220.070343	
114	0	CCB	1	U	1	1	-46	-1.515111	LO
B	0	Baseline	1	RB	1	1	0	-1.452854	BL

Cyanide, Total:Calibration 1: Peak 5-115

File name: C:\FLOW_4\C121317.RST
Date: 13-Dec-17
Operator: ALS

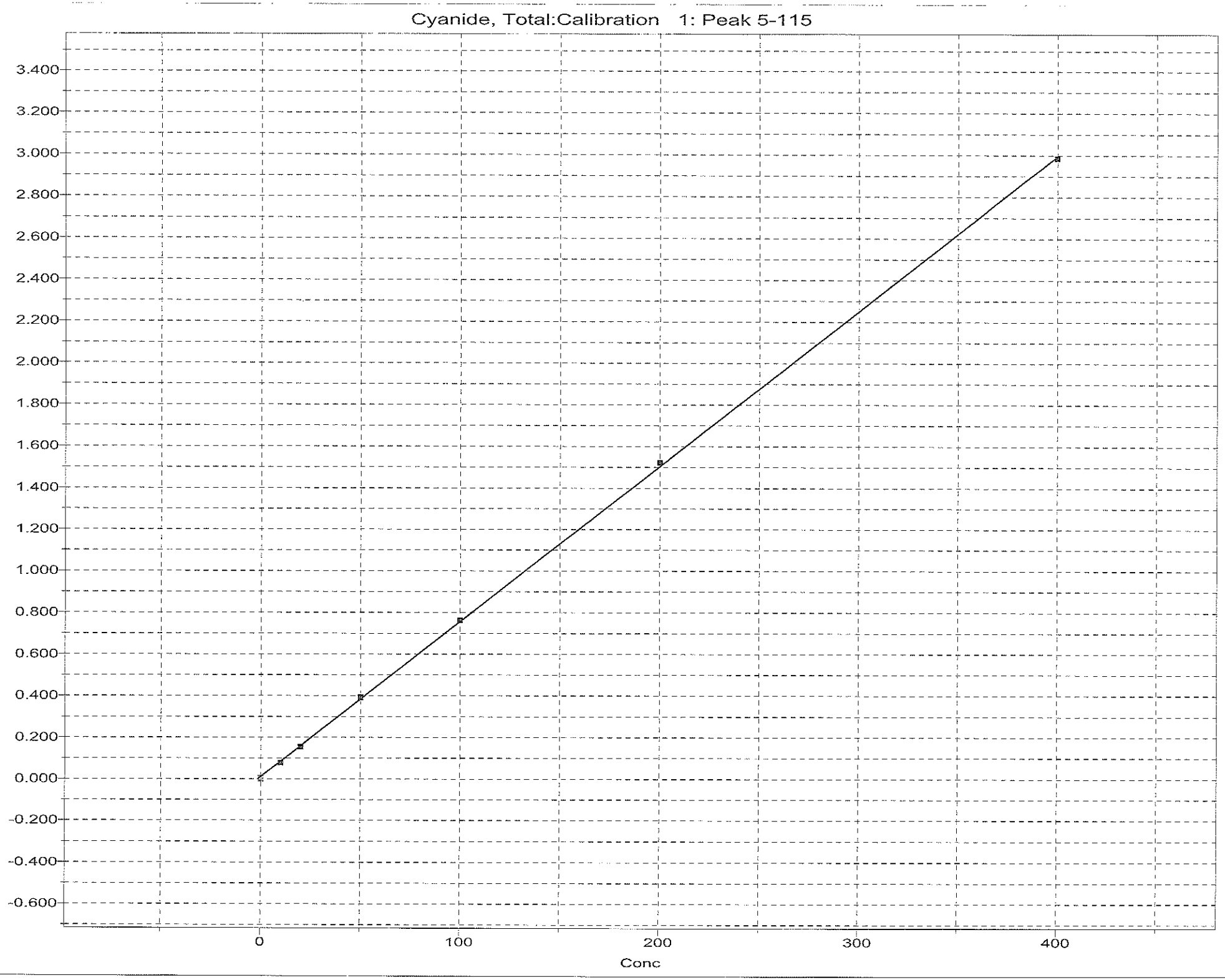
*	Name	Conc	Height
*	CAL 0.00 ppb	0.000000	381.246643
*	CAL 10.0 ppb	10.000000	7791.978516
*	CAL 20.0 ppb	20.000000	15347.149414
*	CAL 50.0 ppb	50.000000	39237.894531
*	CAL 100 ppb	100.000000	76284.570312
*	Cal 200 ppb	200.000000	152221.218750
*	Cal 400 ppb	400.000000	298534.687500

Calib Coef:
y=bx+a
a: (intercept) 1.0844e+03
b: 7.4642e+02

Corr Coef: 0.999949

Carryover: 0.0893%

No Drift Peaks


Cyanide, Total:Calibration 1: Peak 5-115
Height (counts)
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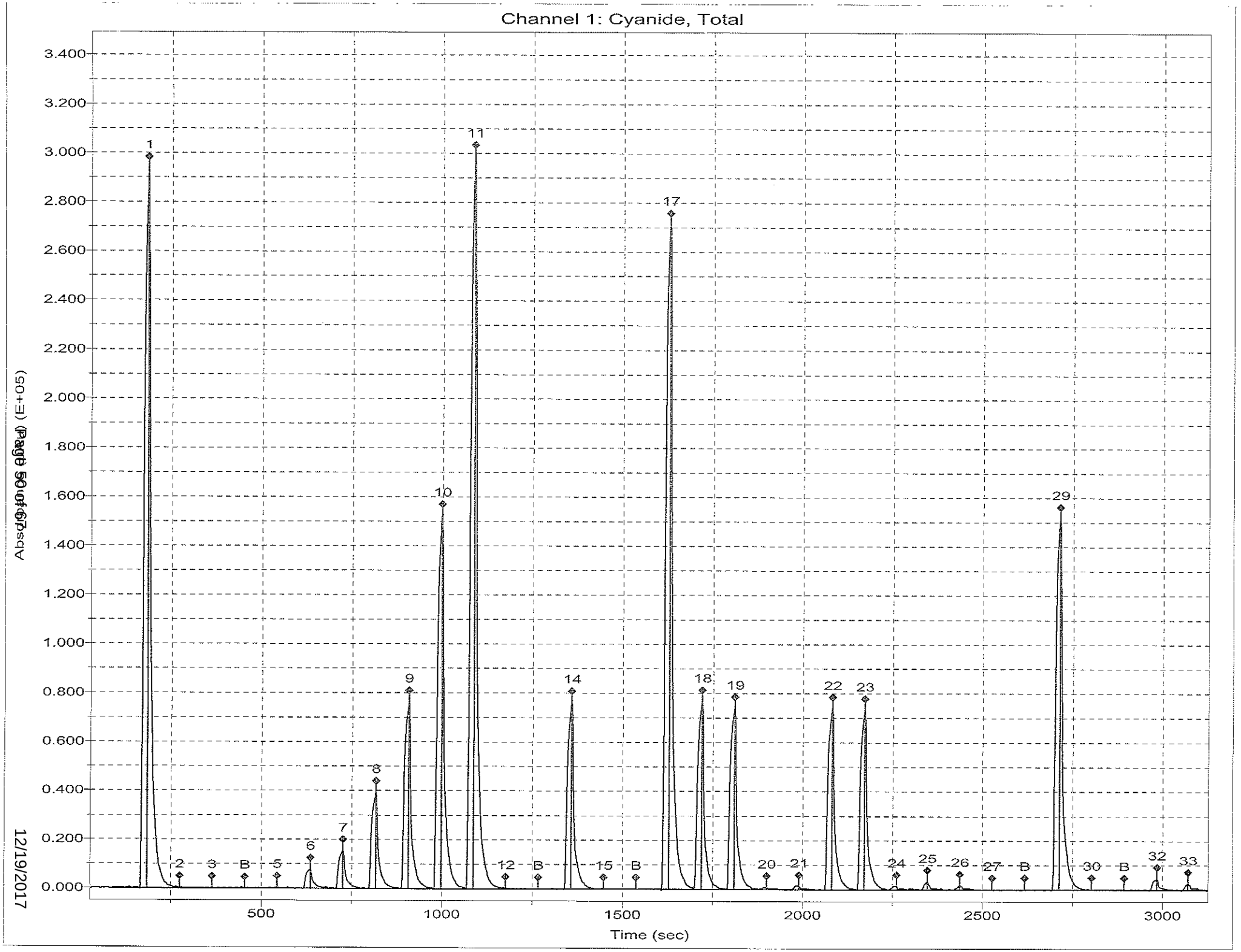
3.200
3.000
2.800
2.600
2.400
2.200
2.000
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
-0.200
-0.400
-0.600
0
100
200
300
400
Conc


Channel 1: Cyanide, Total
Absorbance (E+05)
Time (sec)
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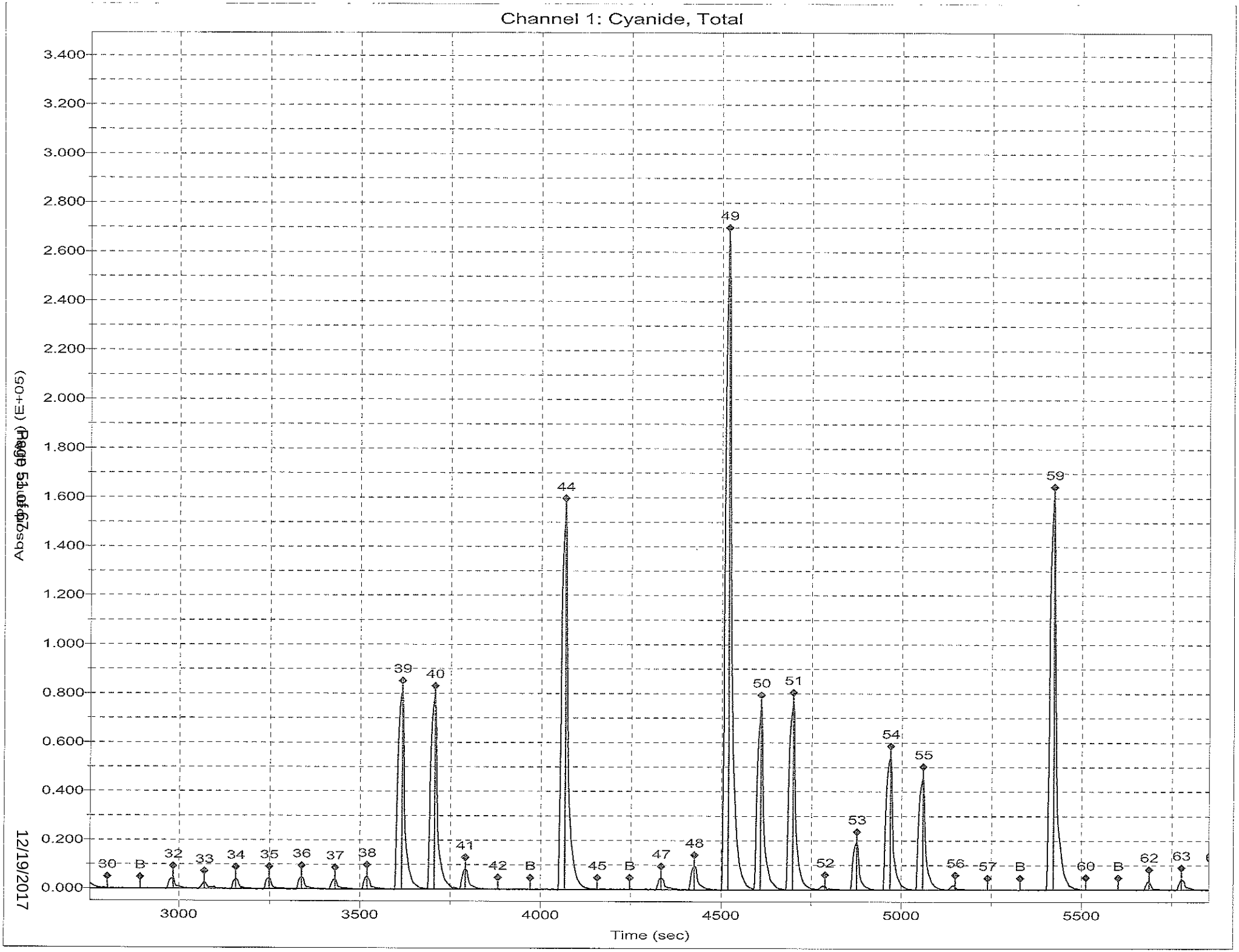
3.200
3.000
2.800
2.600
2.400
2.200
2.000
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
500
1000
1500
2000
2500
3000
1
2
3
B
5
6
7
8
9
10
11
12
B
14
15
B
17
18
19
20
21
22
23
24
25
26
27
B
29
30
B
32
33

12/19/2017


Channel 1: Cyanide, Total
Absorbance (E+05)
Time (sec)
12/19/2017
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3.200
3.000
2.800
2.600
2.400
2.200
2.000
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
3000
3500
4000
4500
5000
5500
30
B
32
33
34
35
36
37
38
39
40
41
42
B
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B
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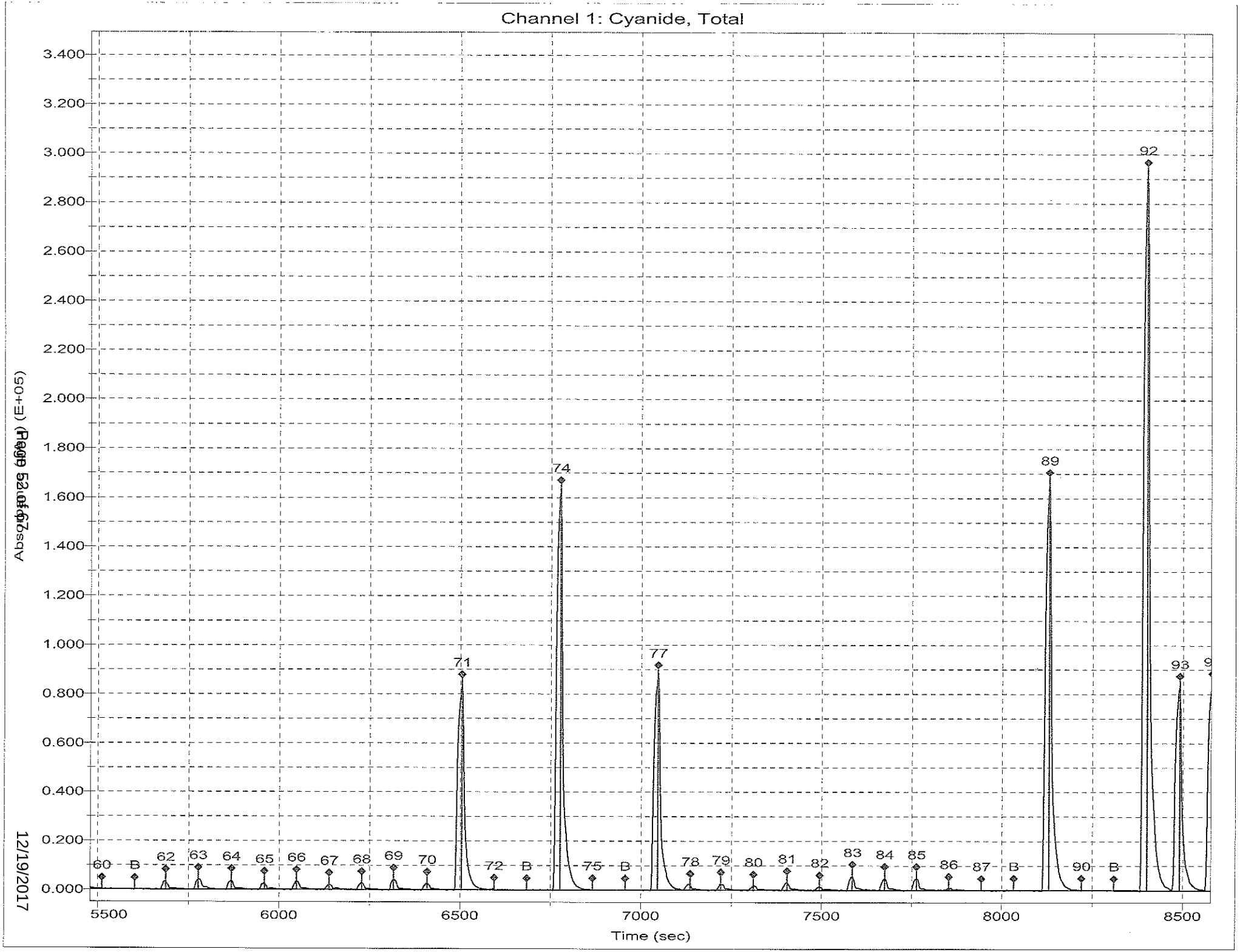
60
B
62
63


Channel 1: Cyanide, Total
Absorbance (E+05)
Time (sec)
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3.200
3.000
2.800
2.600
2.400
2.200
2.000
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
5500
6000
6500
7000
7500
8000
8500
60
B
62
63
64
65
66
67
68
69
70
71
72
B
74
75
B
77
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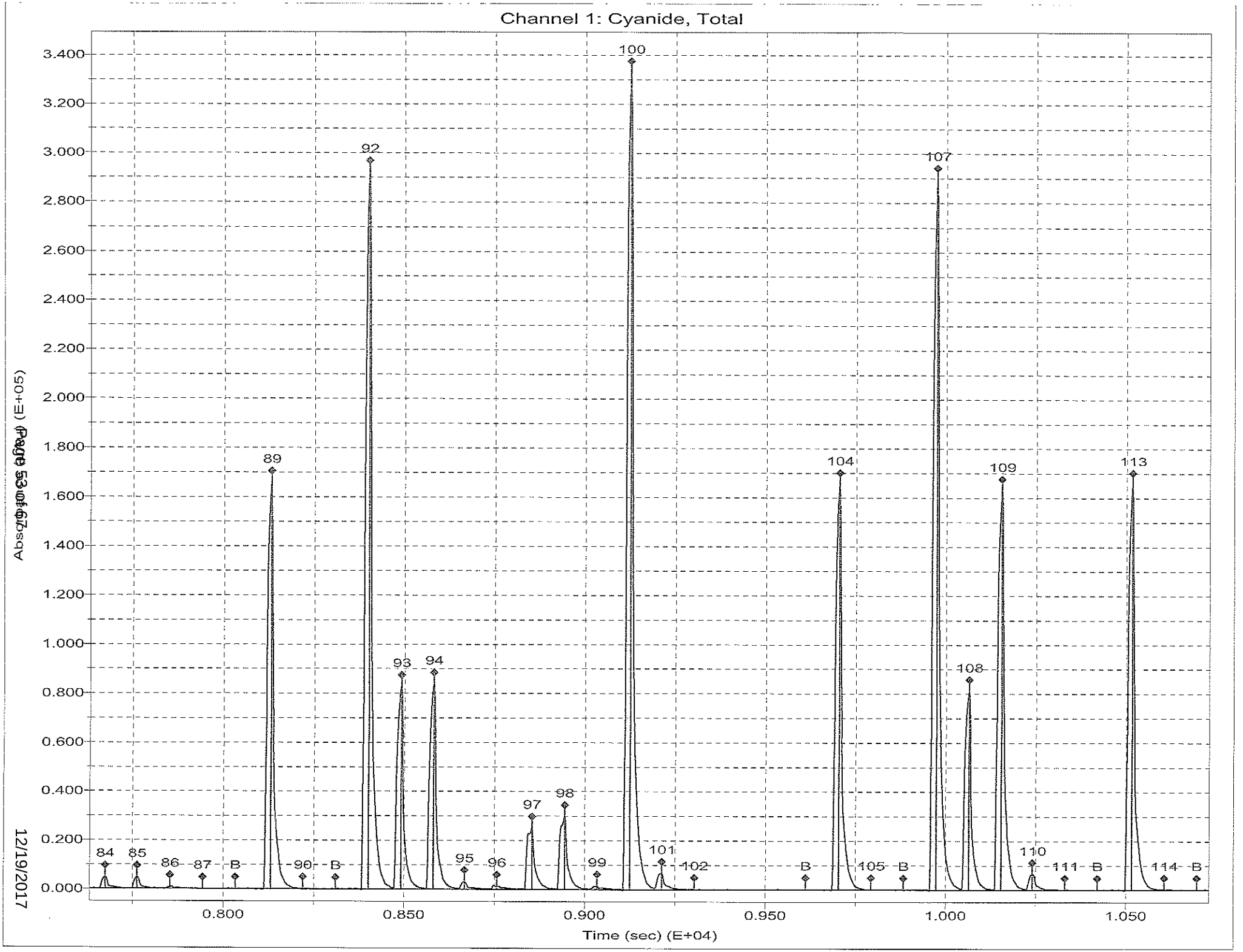
82
83
84
85
86
87
B
89
90
B
92
93
12/19/2017


Channel 1: Cyanide, Total
Absorbance (Peak Height) (E+05)
Time (sec) (E+04)
12/19/2017
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3.200
3.000
2.800
2.600
2.400
2.200
2.000
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
0.800
0.850
0.900
0.950
1.000
1.050
84
85
86
87
B
89
90
B
92
93
94
95
96
97
98
99
100
101
102
B
104
105
B
107
108
109
110
111
B
113
114
B

*** Sample Table from Analysis ***

File name: Operator
Date: 13-Dec-17

Cup	Name	Type	R	Dil	Wt	Vial	Comment
107	Sync	SYNC	1	1	1		
0	Carryover	CO	2	1	1		
0	Baseline	RB	1	1	1		
101	CAL 0.00 ppb	C	1	1	1		
102	CAL 10.0 ppb	C	1	1	1		
103	CAL 20.0 ppb	C	1	1	1		
104	CAL 50.0 ppb	C	1	1	1		
105	CAL 100 ppb	C	1	1	1		
106	Cal 200 ppb	C	1	1	1		
107	Cal 400 ppb	C	1	1	1		
0	BLK	BLNK	1	1	1		
0	Baseline	RB	1	1	1		
108	ICV 100 ppb	CCV	1	1	1		
0	ICB	U	1	1	1		
0	Baseline	RB	1	1	1		
113	hlcs 280-398462/1-a	U	1	1	1		
114	llcs 280-398462/2-a	U	1	1	1		
115	lcs 280-398462/3-a	U	1	1	1		
116	mb 280-398462/4-a	U	1	1	1		
117	280-104058-g-1-a	U	1	1	1		
118	280-104058-g-1-b ms	U	1	1	1		
119	280-104058-g-1-c msd	U	1	1	1		
120	280-104058-g-2-a	U	1	1	1		
121	280-104243-l-1-a	U	1	1	1		
122	280-104244-h-1-a	U	1	1	1		
0	BLK	BLNK	1	1	1		
0	baseline	RB	1	1	1		
109	CCV 200PPB	CCV	1	1	1		
0	CCB	U	1	1	1		
0	Baseline	RB	1	1	1		
123	280-104281-b-7-b	U	1	1	1		
124	280-104281-b-12-b	U	1	1	1		
125	280-104281-b-15-b	U	1	1	1		
126	280-104384-b-5-a	U	1	1	1		
127	280-104384-g-8-a	U	1	1	1		
128	280-104433-a-2-a	U	1	1	1		
129	280-104483-b-14-a	U	1	1	1		
130	280-104483-b-14-b ms	U	1	1	1		
131	280-104483-b-14-c ms	U	1	1	1		
132	280-104552-b-8-a	U	1	1	1		
0	BLK	BLNK	1	1	1		
0	baseline	RB	1	1	1		
109	CCV 200PPB	CCV	1	1	1		
0	CCB	U	1	1	1		
0	Baseline	RB	1	1	1		
133	400-146814-a-1-a	U	1	1	1		
134	400-146814-a-2-a	U	1	1	1		
135	hlcs 280-398463/1-a	U	1	1	1		
136	llcs 280-398463/2-a	U	1	1	1		
137	lcs 280-398463/3-a	U	1	1	1		
138	mb 280-398463/4-a	U	1	1	1		
139	280-104282-b-1-a	U	1	1	1		
140	280-104282-b-1-b ms	U	1	1	1		
141	280-104282-b-1-c msd	U	1	1	1		
142	280-104295-i-1-a	U	1	1	1		
0	BLK	BLNK	1	1	1		
0	baseline	RB	1	1	1		
109	CCV 200PPB	CCV	1	1	1		
0	CCB	U	1	1	1		
0	Baseline	RB	1	1	1		
143	280-104295-h-2-a	U	1	1	1		

12/13/17
AS

Buffer_00104
Pyr/Barb_00180
Chlor-T_00886
1% NaOH_00307

Cup	Name	Type	R	Dil	Wt	Vial	Comment
144	280-104297-i-1-a	U	1		1	1	
145	280-104307-b-1-a	U	1		1	1	
146	280-104307-b-2-a	U	1		1	1	
147	280-104307-b-3-a	U	1		1	1	
148	280-104316-p-1-a	U	1		1	1	
149	280-104316-p-2-a	U	1		1	1	
150	280-104320-o-3-a	U	1		1	1	
151	280-104320-al-9-a	U	1		1	1	
152	280-104320-al-9-b ms	U	1		1	1	
0	BLK	BLNK	1		1	1	
0	baseline	RB	1		1	1	
109	CCV 200PPB	CCV	1		1	1	
0	CCB	U	1		1	1	
0	Baseline	RB	1		1	1	
153	280-104320-al-9-c ms	U	1		1	1	
154	280-104320-o-6-a	U	1		1	1	
155	280-104320-o-7-a	U	1		1	1	
156	280-104320-o-8-a	U	1		1	1	
157	280-104320-a-19-a	U	1		1	1	
158	280-104320-f-20-a	U	1		1	1	
159	280-104320-l-21-a	U	1		1	1	
160	280-104320-a-26-a	U	1		1	1	
201	280-104324-m-1-a	U	1		1	1	
202	280-104366-d-5-a	U	1		1	1	
0	BLK	BLNK	1		1	1	
0	baseline	RB	1		1	1	
109	CCV 200PPB	CCV	1		1	1	
0	CCB	U	1		1	1	
0	Baseline	RB	1		1	1	
203	~~hlcs 280-398485/1-a~~	~~U~~	~~1~~	12/13/17 AES	~~1~~	~~1~~	fail high, re-run to confirm
204	llcs 280-398485/2-a	U	1		1	1	
205	lcs 280-398485/3-a	U	1		1	1	
206	mb 280-398485/4-a	U	1		1	1	
207	280-104331-a-1-a	U	1		1	1	
208	280-104331-a-1-b ms	U	1		1	1	
209	280-104331-a-1-c msd	U	1		1	1	
210	280-104338-a-1-a	U	1		1	1	
211	~~280-104338-a-2-a~~	~~U~~	~~1~~		~~1~~	~~1~~	over cal, re-run @ 2x
212	~~280-104425-i-1-a~~	~~U~~	~~1~~	12/13/17 AES	~~1~~	~~1~~	follow up
0	BLK	BLNK	1		1	1	
0	baseline	RB	1		1	1	
109	CCV 200PPB	CCV	1		1	1	
0	CCB	U	1		1	1	
0	Baseline	RB	1		1	1	

203 HLCS 280-398485/1-a
205 LCS 280-398485/3-a
213 280-104338-a-2-a 2x
214 280-104425-i-1-a

CCV
CCB

Shipping and Receiving Documents

TestAmerica Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: LIZ BUSBY	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Elizabeth Busby	Phone: 303 941 6685	E-Mail: patrick.mcentee@testamericainc.com		Page:
Company: Cardno TEC, Inc				Job #:

Address: 1658 Cole Boulevard Suite 190	Due Date Requested:	
City: Golden	TAT Requested (days): 20 Business Days	
State, Zip: CO 80401		
Phone: 303-273-0231	PO #: 91979	
Email: Elizabeth.Busby@cardno-gs.com	WO #: 076003.009.007	
Project Name: Ravenna, OH - Facility Wide	Project #: 28014271	
Site:	SSOW#:	

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8260B - VOCs	8270D - SVOCs List 1 (Nitroaromatics,Phthalates,Phenols)	8270D - SVOCs List 4 (Phthalates)	8270D_SIM - PAHs (LVI)	8082A - PCBs	8330B - Explosives / Propellants	8081B - Pesticides (LVI)	9012B - Total Cyanide	6010C/6020A/7470A - Total Metals	7196A - Hexavalent Chromium (SHORT HOLD - 24 HR)	2320B - Alkalinity	9056A - Anions (Chloride and Sulfate)	8330 - Nitroguanidine	353.2 - Nitrocellulose	6860 - Perchlorate	Total Number of containers	Special Instructions/Note:
			Preservation Code:				A	N	N	N	N	N	N	B	D	N	N	N	N	N	N		
LL1mw-088-120217-gw	12-2-12	0900	G	W					X			X	X		X	X						8	7196A Hexavalent Chromium = 24 HR HOLD TIME
LL3mw-246-120217-GW	12.02.17	1215	G	W					X			X			X						X	6	

280-104281 Chain of Custody

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Date/Time	Company		Date/Time	Company
Relinquished by: LIZ Busby	1635 12-2-17	Cardno	Received by: FedEx	12-2-17 1500	TAL
Relinquished by:	12-4-17 1330	TAL Canton	Received by: Rachel C	12-5-17 0925	TAL
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks
	0.4, 0.9, 1.8, 2.4	0.5, 0.2, 3.4, 3.2, 0.5, 0.8 IR#5+0-4 Transfer RP 12-5-17

12/19/2017

TestAmerica Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information			
Sampler: LIZ BUSBY	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Elizabeth Busby	Phone: 303 941 6689	E-Mail: patrick.mcentee@testamericainc.com	Page: Page:
Company: Cardno TEC, Inc			Job #:
Address: 1658 Cole Boulevard Suite 190	Due Date Requested:		
City: Golden	TAT Requested (days): 20 Business Days		
State, Zip: CO, 80401			
Phone: 303-273-0231	PO #: 0091979		
Email: Elizabeth.Busby@cardno-gs.com	WO #: 076003.009.007		
Project Name: Ravenna, OH - Fuze and Booster Quarry	TestAmerica Project #: 28014271		
Site:	SSOW#:		

Analysis Requested

Analysis columns: Field Filtered Sample (Yes or No); Perform MS/MSD (Yes or No); 8270D - SVOCs ~~List 1 (Phthalates)~~ LIST 1; 8330B - Explosives / Propellants ✓; 8081B - Pesticides (LVI) (6b) ✓; ~~SM4500_CN_I - Free Cyanide~~ PAHs 8270DSIM; 9012B - Total Cyanide ✓; 7196A - Hexavalent Chromium (SHORT HOLD - 24HR) (6b); ~~2320B - Alkalinity~~ (6b) VOCs 8260; 9056A - Anions (Chloride and Sulfate); ~~9034 - Sulfide~~ (6b) PCBs 8082A; 6860 PERCHLORATE; 353.2 NITROCELLULOSE; 8330 NITROGUANIDINE; 6010C/6020A/7470A TOTAL METALS; Total Number of containers

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered	MS/MSD	8270D LIST 1	8330B	8081B	PAHs 8270DSIM	9012B	7196A	VOCs 8260	9056A	PCBs 8082A	6860	353.2	8330	6010C/6020A/7470A	Total Number of containers	Special Instructions/Note
			Preservation Code:				N	N	N	B	B	N	N/A	N	C/B						
NTA MW-120-120417-GW	12/4/17	1220	G	W	N	N	X	X	X	X	X	X	X		X	X	X	X	X	19	7196A - Hexavalent Chromium = 24 HR HOLD TIME
TB-120417	12/4/17	1215	G	W	N	N							X							2	
NTAMW-119-120417-GW	12/4/17	1315	G	W	N	N							X							3	

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ______ Months

Deliverable Requested: I, II, III, IV, Other (specify)
Special Instructions/QC Requirements:

Empty Kit Relinquished by: | Date: | Time: | Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
[signature]	12-4-17 1530	Cardno	[signature]	12/4/17 1532	TA/KC
[signature]	12/4/17 1625	TA-NC	[signature]	12-5-17 0925	TADN

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks:

TestAmerica Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: LIZ Busby	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Elizabeth Busby	Phone: 3039416689	E-Mail: patrick.mcentee@testamericainc.com		Page:
Company: Cardno TEC, Inc				Job #:

Address: 1658 Cole Boulevard Suite 190	Due Date Requested:	Analysis Requested
City: Golden	TAT Requested (days): 20 Business Days	
State, Zip: CO 80401		
Phone: 303-273-0231	PO #: 91979	
Email: Elizabeth.Busby@cardno-gs.com	WO #: 076003.009.007	
Project Name: Ravenna, OH - Load Line 1	Project #: 28014271	
Site:	SSOW#:	

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (Wwater, Sesolid, Owaste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8260B - VOCs	8270D - SVOCs List 1 (Nitroaromatics,Phthalates,Phenols)	8270D - SVOCs List 4 (Phthalates)	8270D_SIM - PAHs (LVI)	8082A - PCBs	8330B - Explosives / Propellants	8081B - Pesticides (LVI)	SM4500_CN_I - Free Cyanide	9012B - Total Cyanide	6010C/6020A/7470A - Total Metals	7196A - Hexavalent Chromium (SHORT HOLD - 24 HR)	2320B - Alkalinity	9056A - Anions (Chloride and Sulfate)	9034 - Sulfide	8330 - Nitroguanidine	353.2 - Nitrocellulose	6860 - Perchlorate	Total Number of containers	Special Instructions/Note:
			Preservation Code:		X	X	A	N	N	N	N	N	N	B	B	D	N	N	N	C/B	N	N	N	X	
FBQMW-171-120417-GW	12/04/17	0827	G	W	N	N									X		X	X	X	X			45	5	7196A - Hexavalent Chromium = 24 HR HOLD TIME (eb)
FBQMW-172-120417-GW	12/04/17	1023	G	W	N	N								X	X									2	
FBQMW-175-120417-GW	12/04/17	1111	G	W	N	N												X	X	X				3	
FBQMW-176-120417-GW	12/04/17	1258	G	W	N	N						X			X									3	

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ☐ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by: Elizabeth Busby	Date/Time: 12-4-17 1530	Company: Cardno	Received by:	Date/Time: 12/4/17 1532	Company: TA-DC
Relinquished by:	Date/Time: 12/4/17 1629	Company: 240	Received by:	Date/Time: 12-5-17 0925	Company: TAD
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

12/19/2017

TestAmerica Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information			
Client Contact: Elizabeth Busby	Sampler: CJ & DP	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):
	Phone:	E-Mail: patrick.mcentee@testamericainc.com	COC No:
Company: Cardno TEC, Inc			Page:
Address: 1658 Cole Boulevard Suite 190	Due Date Requested:		Job #:
City: Golden	TAT Requested (days): 20 Business Days		
State, Zip: CO 80401			
Phone: 303-273-0231	PO #: 91979		
Email: Elizabeth.Busby@cardno-gs.com	WO #: 076003.009.007		
Project Name: Ravenna, OH - NACA Test Area	Project #: 28014271		
Site:	SSOW#:		

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8260B - VOCs	8270D - SVOCs List 1 (Nitroaromatics,Phthalates,Phenols)	8270D - SVOCs List 2 (Nitroaromatics, Phthalates)	8270D_SIM - PAHs (LVI)	8082A - PCBs	8330B - Explosives / Propellants	8081A - Pesticides (LVI)	SM4500_CN_I - Free Cyanide	9012B - Total Cyanide	6010C/6020A/7470A - Total Metals	7196A - Hexavalent Chromium (SHORT HOLD - 24 HR)	8330 - Nitroguanidine	353.2 - Nitrocellulose	6860 - Perchlorate	9056A_28D - D1DS-Anions	2320B - Alkalinity	8270D SVOCs List 4	Total Number of containers	Special Instructions/Note:
			Preservation Code:		X	X	A	N	N	N	N	N	N	B	B	D	N	N	N	N				X	
BKGmw-016-120417-gw	12-4-17	0915	G	W												X					X	X		3	7196A - Hexavalent Chromium = 24 HR HOLD TIME ; 3; D
DEP ~~BKG~~ NTAmw-117-120417-gw	12-4-17	1122	G	W											X									1	1; B
NTAmw-118-120417-gw	12-4-17	1152	G	W										X	X									2	2; B
NTAmw-119-120417-gw	12-4-17	1315	G	W			X		X	X		X				X								7	10; A, N, D; 7
FWGmw-007-120417-gw	12-4-17	1410	G	W								X				X							X	5	D

DEP

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ☐ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:		Time:		Method of Shipment:	
Relinquished by: E Busby	Date/Time: 12-4-17 1530	Company: Cardno	Received by: [signature]		Date/Time: 12/4/17 1532	Company: TA-XC
Relinquished by: [signature]	Date/Time: 12/4/17 1629	Company: TA-XC	Received by: [signature]		Date/Time: 12-5-17 0925	Company: TAD
Relinquished by:	Date/Time:	Company:	Received by:		Date/Time:	Company:

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

...a Denver
... Street
..., CO 80002
...ne (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler:	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Elizabeth Busby	Phone:	E-Mail: patrick.mcentee@testamericainc.com		Page: Page:
Company: Cardno TEC, Inc				Job #:

Address: 1658 Cole Boulevard Suite 190	Due Date Requested:
City: Golden	TAT Requested (days): 20 Business days
State, Zip: CO, 80401	
Phone: 303-273-0231	PO #: 0091979
Email: Elizabeth.Busby@cardno-gs.com	WO #: 076003.009.007
Project Name: Ravenna, OH - Load Line 7	TestAmerica Project #: 28014271
Site:	SSOW#:

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (Wwater, Ssolid, Owaste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8260B - VOCs	8270D - SVOCs List 4 (Phthalates)	8330B - Explosives / Propellants	6010C/6020A/7470A - Total Metals	Total Cyanide	Free Cyanide	Total Number of containers	Special Instructions/Note:
Preservation Code:							A	N	N	D	B	B		
LL11mw-005-120417-GW	12.04.2017	0935	G	W							X	X	2	
FWGmw-006-120417-GW	12.04.2017	1410						X	X	X			5	
FWGmw-015-120417-GW	12.04.2017	1420						X	X	X			5	
LL7mw-006-1204-GW	12.04.2017	11:20	G	W					X				2	

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by: | Date: | Time: | Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	1530 12/4/17	Cardno		12/4/17 1532	A.NC
Relinquished by:	Date/Time: 12/4/17 1625	Company 248	Received by:	Date/Time: 12-5-17 0925	Company TAN
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks:

12/19/2017

tAmerica Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

VOCs - COC

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Liz Busby	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Elizabeth Busby	Phone: 303 9416689	E-Mail: patrick.mcentee@testamericainc.com		Page: Page:
Company: Cardno TEC, Inc				Job #:
Address: 1658 Cole Boulevard Suite 190	Due Date Requested:			
City: Golden	TAT Requested (days): 20 Business days			
State, Zip: CO, 80401				
Phone: 303-273-0231	PO #: 0091979			
Email: Elizabeth.Busby@cardno-gs.com	WO #: 076003.009.007			
Project Name: Ravenna, OH - Load Line 12	TestAmerica Project #: 28014271			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8270D - SVOCs List 4 (Phthalates)	8270D_SIM - PAHs (LVI)	8330B - Explosives / Propellants	~~SM4500_CN_I - Free Cyanide~~ 6360 - Perchlorate	9012B - Total Cyanide	6010C/6020A/7470A - Total Metals	~~6020A - Total Arsenic Only~~ 8081B - Pesticides	7196 - Hexavalent Chromium (SHORT HOLD - 24 HR)	9056A - Nitrate as N (SHORT HOLD - 48 HR)	8330 - Nitroguanidine	8260B - VOCs	8082A - PCBs	353.2 - Nitrocellulose	Total Number of containers	Special Instructions/Note:
Preservation Code:							N	N	N	N	B	D	D	N	N	N	A	N	N		
FWGmw-024-120217-GW	12.02.17	1056	G	W	N	N	+	+	X	X	X	+	X	X		+	X	X	X	5	7196A Hexavalent Chromium = 24 HR HOLD TIME
TB-120217-1030	12.02.17	1034	G	W	N	N											X			2	9056A Nitrate as N = 48 HR HOLD TIME
FWGmw-017-120217-GW	12.02.17	1005	G	W	N	N											X			3	
FWGmw-021-120217-gw	12-2-17	1246	G	W	N	N											X			3	
FWGmw-020-120217-gw	↓	1411	↓	↓	N	N											X			3	
FWGmw-018-120217-gw	↓	1415	↓	↓	N	N											X			3	

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Liz Busby	1635 12.2.17	Cardno		12.2.17 1635	TA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	12-4-17 1330	TAL Canton		12-5-17 0925	TAL
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks:

12/19/2017

TestAmerica Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler:	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Elizabeth Busby	Phone:	E-Mail: patrick.mcentee@testamericainc.com		Page:
Company: Cardno TEC, Inc				Job #:
Address: 1658 Cole Boulevard Suite 190	Due Date Requested:			
City: Golden	TAT Requested (days): 20 Business Days			
State, Zip: CO 80401				
Phone: 303-273-0231	PO #: 91979			
Email: Elizabeth.Busby@cardno-gs.com	WO #: 076003.009.007			
Project Name: Ravenna, OH - Facility Wide	Project #: 28014271			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8260B - VOCs	8270D - SVOCs List 1 (Nitroaromatics,Phthalates,Phenols)	8270D - SVOCs List 4 (Phthalates)	8270D_SIM - PAHs (LVI)	8082A - PCBs	8330B - Explosives / Propellants	8081B - Pesticides (LVI)	9012B - Total Cyanide	6010C/6020A/7470A - Total Metals	7196A - Hexavalent Chromium (SHORT HOLD - 24 HR)	2320B - Alkalinity	9056A - Anions (Chloride and Sulfate)	8330 - Nitroguanidine	353.2 - Nitrocellulose	6860 - Perchlorate	Total Number of containers	Special Instructions/Note:
			Preservation Code:				A	N	N	N	N	N	N	B	D	N	N	N	N	N	N		
FWGmw-017-120217-gw	12.2.17	1005	G	W				X		X	X	X	X	X	X				X	X	X	12	7196A Hexavalent Chromium = 24 HR HOLD TIME

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ___ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1		1635 12.2.17	Cardno	GOP	12-4-17 1500	TAL
2		12-4-17 1300	TAL Canton		12-5-17 0925	FDX3
3						

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

12/19/2017

TestAmerica Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Liz Busby	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Elizabeth Busby	Phone: 303 941 6689	E-Mail: patrick.mcentee@testamericainc.com		Page:
Company: Cardno TEC, Inc				Job #:
Address: 1658 Cole Boulevard Suite 190	Due Date Requested:			
City: Golden	TAT Requested (days): 20 Business Days			
State, Zip: CO 80401				
Phone: 303-273-0231	PO #: 91979			
Email: Elizabeth.Busby@cardno-gs.com	WO #: 076003.009.007			
Project Name: Ravenna, OH - Facility Wide	Project #: 28014271			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL
B - NaOH
C - Zn Acetate
D - Nitric Acid
E - NaHSO4
F - MeOH
G - Amchlor
H - Ascorbic Acid
I - Ice
J - DI Water
K - EDTA
L - EDA
M - Hexane
N - None
O - AsNaO2
P - Na2O4S
Q - Na2SO3
R - Na2S2SO3
S - H2SO4
T - TSP Dodecahydrate
U - Acetone
V - MCAA
W - ph 4-5
Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8260B - VOCs	8270D - SVOCs List 1 (Nitroaromatics, Phthalates, Phenols)	8270D - SVOCs List 4 (Phthalates)	8270D_SIM - PAHs (LVI)	8082A - PCBs	8330B - Explosives / Propellants	8081B - Pesticides (LVI)	9012B - Total Cyanide	6010C/6020A/7470A - Total Metals	7196A - Hexavalent Chromium (SHORT HOLD - 24 HR)	2320B - Alkalinity	9056A - Anions (Chloride and Sulfate)	8330 - Nitroguanidine	353.2 - Nitrocellulose	6860 - Perchlorate			Total Number of containers	Special Instructions/Note:
				Preservation Code:			A	N	N	N	N	N	N	B	D	N	N	N	N	N	N				
FWGmw-021-120217-GW	12.2.17	1246	G	W	N	N		X		X	X	X	X	X	X	X			X	X	X			11	7196A Hexavalent Chromium = 24 HR HOLD TIME

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ☐ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1		12-2-17 1635	cardno		12-2-14 1635	TA
2		12-4-17 1330	TAL Canton		12-5-17 0925	TAL
3	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks:

TestAmerica Denver
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Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: LIZ BUSBY	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Elizabeth Busby	Phone: 303 941 6689	E-Mail: patrick.mcentee@testamericainc.com		Page:
Company: Cardno TEC, Inc				Job #:

Address: 1658 Cole Boulevard Suite 190	Due Date Requested:	
City: Golden	TAT Requested (days): 20 Business Days	
State, Zip: CO 80401		
Phone: 303-273-0231	PO #: 91979	
Email: Elizabeth.Busby@cardno-gs.com	WO #: 076003.009.007	
Project Name: Ravenna, OH - Facility Wide	Project #: 28014271	
Site:	SSOW#:	

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (Wwater, Ssolid, Owaste/oil, BT=Tissue, AnAir)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8260B - VOCs	8270D - SVOCs List 1 (Nitroaromatics,Phthalates,Phenols)	8270D - SVOCs List 4 (Phthalates)	8270D_SIM - PAHs (LVI)	8082A - PCBs	8330B - Explosives / Propellants	8081B - Pesticides (LVI)	9012B - Total Cyanide	6010C/6020A/7470A - Total Metals	7196A - Hexavalent Chromium (SHORT HOLD - 24 HR)	2320B - Alkalinity	9056A - Anions (Chloride and Sulfate)	8330 - Nitroguanidine	353.2 - Nitrocellulose	6860 - Perchlorate				Total Number of containers	Special Instructions/Note:
			Preservation Code:				A	N	N	N	N	N	N	B	D	N	N	N	N	N	N					
FWGMW-020-120217-GW	12-2-17 ~~1410~~ eb 1411		G	W	X	X		X		X	X	X	X	X	X				X	X	X				11	7196A Hexavalent Chromium = 24 HR HOLD TIME

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2SO3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)

Other:

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time: 12/2/17 1635	Company: Cardno	Received by: POP	Date/Time: 12-2-17 1500	Company: TAL
Relinquished by:	Date/Time: 12-4-17 1330	Company: TAL Canton	Received by:	Date/Time: 12-5-17 0925	Company: TALY
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

TestAmerica Denver
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Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler:	Lab PM: McEntee, Patrick J	Carrier Tracking No(s):	COC No:
Client Contact: Elizabeth Busby	Phone:	E-Mail: patrick.mcentee@testamericainc.com		Page:
Company: Cardno TEC, Inc				Job #:
Address: 1658 Cole Boulevard Suite 190	Due Date Requested:			
City: Golden	TAT Requested (days): 20 Business Days			
State, Zip: CO 80401				
Phone: 303-273-0231	PO #: 91979			
Email: Elizabeth.Busby@cardno-gs.com	WO #: 076003.009.007			
Project Name: Ravenna, OH - Facility Wide	Project #: 28014271			
Site:	SSOW#:			

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8260B - VOCs	8270D - SVOCs List 1 (Nitroaromatics,Phthalates,Phenols)	8270D - SVOCs List 4 (Phthalates)	8270D_SIM - PAHs (LVI)	8082A - PCBs	8330B - Explosives / Propellants	8081B - Pesticides (LVI)	9012B - Total Cyanide	6010C/6020A/7470A - Total Metals	7196A - Hexavalent Chromium (SHORT HOLD – 24 HR)	2320B - Alkalinity	9056A - Anions (Chloride and Sulfate)	8330 - Nitroguanidine	353.2 - Nitrocellulose	6860 - Perchlorate			Total Number of containers	Special Instructions/Note:
			Preservation Code:				A	N	N	N	N	N	N	B	D	N	N	N	N	N	N				
FWGmw-018-120217-GW	12.02.17	14:15	G	W				X		X	X	X	X	X	X	X			X	X	X			11	7196A Hexavalent Chromium = 24 HR HOLD TIME

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2SO3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)

Other:

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ☐ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	[signature]	1635 12-2-17	Cardno	[signature]	12.2.17 1635	TA
	[signature]	12-4-17 1330	TAL Canton	[signature]	12-5-17 0925	TA
	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

Login Sample Receipt Checklist

Client: Cardno TEC, Inc

Job Number: 280-104281-2

Login Number: 104281
List Number: 1
Creator: True, Joshua A

List Source: TestAmerica Denver

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	