

## ANALYTICAL REPORT

Job Number: 280-96392-2

Job Description: Camp Ravenna, OH

For:

Cardno TEC, Inc  
1658 Cole Boulevard  
Suite 190  
Golden, CO 80401

Attention: Ms. Heather Miner



Approved for release.  
Patrick J McEntee  
Manager of Project Management  
5/10/2017 8:09 PM

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Patrick J McEntee, Manager of Project Management  
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05/10/2017

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.

**TestAmerica Laboratories, Inc.**

TestAmerica Denver 4955 Yarrow Street, Arvada, CO 80002  
Tel (303) 736-0100 Fax (303) 431-7171 [www.testamericainc.com](http://www.testamericainc.com)

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# Definitions/Glossary

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

TestAmerica Job ID: 280-96392-2

## Glossary

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<b>Abbreviation</b>	<b>These commonly used abbreviations may or may not be present in this report.</b>
α	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: Camp Ravenna, OH**

**Report Number: 280-96392-2**

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 4/27/2017 8:55 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 7 coolers at receipt time were 0.1° C, 1.3° C, 1.9° C, 2.4° C, 3.2° C, 3.3° C and 4.9° C.

The non-DOD method SM20 4500\_CN\_I are reported under job 280-96392-2 with standard data qualifiers applied. All DOD methods/analytes are reported under job 280-96392-1.

### **Receipt Exceptions**

The Nitrocellulose 353.2\_Nitrocell and Nitroguanidine 8330\_NGu analyses are performed by TestAmerica Sacramento.

Nine trip blank vials were received at the laboratory; however, as the chain of custody lists only one trip blank sample, and as all of the trip blank vials were received in the same cooler, all trip blank vials were logged as sample TB-042617 (280-96392-9). The client was notified on 4/28/2017.

The chain of custody requests Alkalinity 2320B analysis for the MS/MSD for sample BKGmw-025-042617-GW (280-96392-6); however, TestAmerica Denver does not perform MS/MSDs for this method. BKGmw-025-042617-GW (280-96392-6), BKGmw-025-042617-GW (280-96392-6[MS]) and BKGmw-025-042617-GW (280-96392-6[MSD])

It was noted that the 500mL Nitric Acid (HNO<sub>3</sub>) preserved poly container submitted for Metals analyses for sample FWGmw-007-042617-GW (280-96392-4) was received at the laboratory containing ~400mL of sample. This is sufficient volume for the requested analyses.

One of four containers for the following sample was received broken : BKGmw-025-042617-GW (280-96392-6[MS]).

### **FREE CYANIDE**

Sample LL11mw-005-042617-GW (280-96392-10) was analyzed for Free Cyanide in accordance with SM20 4500\_CN\_I. The samples were prepared on 05/05/2017 and analyzed on 05/06/2017.

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: Camp Ravenna, OH

TestAmerica Job ID: 280-96392-2

**Client Sample ID: LL11mw-005-042617-GW**

**Lab Sample ID: 280-96392-10**

No Detections.

This Detection Summary does not include radiochemical test results.

# Client Sample Results

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

TestAmerica Job ID: 280-96392-2

**Client Sample ID: LL11mw-005-042617-GW**

**Lab Sample ID: 280-96392-10**

**Date Collected: 04/26/17 12:55**

**Matrix: Water**

**Date Received: 04/27/17 08:55**

## General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Free	ND		10	2.0	ug/L		05/05/17 10:45	05/06/17 07:52	1

# Default Detection Limits

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

TestAmerica Job ID: 280-96392-2

## General Chemistry

Prep: SM 4500 CN I

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



# QC Sample Results

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

TestAmerica Job ID: 280-96392-2

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

**Lab Sample ID: MB 280-372393/4-A**  
**Matrix: Water**  
**Analysis Batch: 372488**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 372393**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Free	ND		10	2.0	ug/L		05/05/17 10:45	05/06/17 07:33	1

**Lab Sample ID: HLCS 280-372393/1-A**  
**Matrix: Water**  
**Analysis Batch: 372488**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 372393**

Analyte	Spike Added	HLCS Result	HLCS Qualifier	Unit	D	%Rec	Limits
Cyanide, Free	400	394		ug/L		99	75 - 120

**Lab Sample ID: LCS 280-372393/3-A**  
**Matrix: Water**  
**Analysis Batch: 372488**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 372393**

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

**Lab Sample ID: LLCS 280-372393/2-A**  
**Matrix: Water**  
**Analysis Batch: 372488**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 372393**

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	Limits
Cyanide, Free	100	96.5		ug/L		97	75 - 120

# QC Association Summary

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

TestAmerica Job ID: 280-96392-2

## General Chemistry

### Prep Batch: 372393

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-96392-10	LL11mw-005-042617-GW	Total/NA	Water	SM 4500 CN I	
MB 280-372393/4-A	Method Blank	Total/NA	Water	SM 4500 CN I	
HLCS 280-372393/1-A	Lab Control Sample	Total/NA	Water	SM 4500 CN I	
LCS 280-372393/3-A	Lab Control Sample	Total/NA	Water	SM 4500 CN I	
LLCS 280-372393/2-A	Lab Control Sample	Total/NA	Water	SM 4500 CN I	

### Analysis Batch: 372488

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-96392-10	LL11mw-005-042617-GW	Total/NA	Water	SM 4500 CN I	372393
MB 280-372393/4-A	Method Blank	Total/NA	Water	SM 4500 CN I	372393
HLCS 280-372393/1-A	Lab Control Sample	Total/NA	Water	SM 4500 CN I	372393
LCS 280-372393/3-A	Lab Control Sample	Total/NA	Water	SM 4500 CN I	372393
LLCS 280-372393/2-A	Lab Control Sample	Total/NA	Water	SM 4500 CN I	372393

# Lab Chronicle

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

TestAmerica Job ID: 280-96392-2

**Client Sample ID: LL11mw-005-042617-GW**

**Lab Sample ID: 280-96392-10**

**Date Collected: 04/26/17 12:55**

**Matrix: Water**

**Date Received: 04/27/17 08:55**

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	372393	05/05/17 10:45	JML	TAL DEN
Total/NA	Analysis	SM 4500 CN I		1	50 mL	50 mL	372488	05/06/17 07:52	JML	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: Camp Ravenna, OH

TestAmerica Job ID: 280-96392-2

## 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	10-31-17

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

# Method Summary

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

TestAmerica Job ID: 280-96392-2

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<b>Method</b>	<b>Method Description</b>	<b>Protocol</b>	<b>Laboratory</b>
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: Camp Ravenna, OH

TestAmerica Job ID: 280-96392-2

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<b>Lab Sample ID</b>	<b>Client Sample ID</b>	<b>Matrix</b>	<b>Collected</b>	<b>Received</b>
280-96392-10	LL11mw-005-042617-GW	Water	04/26/17 12:55	04/27/17 08:55

REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Denver

Job No.: 280-96392-2

SDG No.: \_\_\_\_\_

Reagent ID	Exp Date	Prep Date	Dilutant Used	Reagent Final Volume	Parent Reagent		Analyte	Concentration	
					Reagent ID	Volume Added			
<b>CN 10ppm_00252</b>	05/09/17	05/02/17	2% NaOH, Lot 1% NaOH_00256	100 mg/L	CN CAL Std_00053	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_00053	07/31/17	Ricca, Lot 4701B68		(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
<b>CN CAL 1 ppm_01247</b>	05/07/17	05/06/17	1% NaOH, Lot N/A	100 mL	CN 10ppm_00252	10 mL	Cyanide, Free	1 mg/L	
.CN 10ppm_00252	05/09/17	05/02/17	2% NaOH, Lot 1% NaOH_00256	100 mg/L	CN CAL Std_00053	1 mL	Cyanide, Free	10 mg/L	
..CN CAL Std_00053	07/31/17	Ricca, Lot 4701B68		(Purchased Reagent)			Cyanide, Free	1000 mg/L	
<b>CN ICV Daily_01012</b>	05/07/17	05/06/17	1% HNO3, Lot N/A	100 mL	CN ICV Int_00434	1 mL	Cyanide, Free	0.1 mg/L	
.CN ICV Int_00434	05/09/17	05/02/17	1% NaOH, Lot 1% NaOH_00256	100 mL	CN ICV Std_00041	1 mL	Cyanide, Free	10 mg/L	
..CN ICV Std_00041	04/16/18	CPI, Lot 1104086		(Purchased Reagent)			Cyanide, Free	1000 mg/L	
<b>CN ICV Int_00434</b>	05/09/17	05/02/17	1% NaOH, Lot 1% NaOH_00256	100 mL	CN ICV Std_00041	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_00041	04/16/18	CPI, Lot 1104086		(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

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**CN CAL Std\_00053**



# Certificate of Analysis

**Cyanide Standard, 1000 ppm CN<sup>-</sup>**
**Lot Number: 4701B68**
**Product Number: 2543**
**Manufacture Date: JAN 10, 2017**
**Expiration Date: JUL 2017**

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 <sup>-</sup> )	995-1005 ppm	1000 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 <sup>-</sup> )	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 <sup>-</sup> )	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
2543-16	500 mL amber poly	6 months

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

Reagent

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**CN ICV Std\_00041**



USA

5580 Skylane Boulevard P: 707.525.5788  
Santa Rosa, CA 95403 P: 800.878.7654  
F: 707.545.7901

Europe

P.O. Box 2704 P: +31 20 638 05 97  
1000 CS Amsterdam F: +31 20 420 28 36  
The Netherlands

# Certificate of Analysis

Rev 0

## Comment:

### Catalog No:

Z-G34-4400-IC9M

### Lot No:

1104086

### Expiration Date:

2-Sep-2018

### Matrix:

0.179% NaOH

### Description:

ISO Guide 34 - Cyanide, 100 mL  
1,000 mg/L in H<sub>2</sub>O

## Additional Information:

Date Received: \_\_\_\_\_

Container: 4 oz (125 mL) Narrow  
Mouth, HDPE

## Certified Values:

The certified value is based on gravimetric and volumetric preparation of this CRM. This CRM has been confirmed by inductively coupled plasma optical emission spectrometry (ICP-OES) using an internally developed method against an independent source which is directly traceable to the NIST SRM's listed below.

The uncertainty value is calculated for a 95% confidence interval with a *k* value of 2.

Element	Symbol	CAS No	SRM No	NIST Lot No	Source Lot No	Purity %	Concentration mg/L	Uncertainty ± mg/L
Cyanide	CN	151-50-8	N/A	N/A	363.25.1P	98.1	1000	4.5



USA

5580 Skylane Boulevard P: 707.525.5788  
Santa Rosa, CA 95403 P: 800.878.7654  
F: 707.545.7901

Europe

P.O. Box 2704 P: +31 20 638 05 97  
1000 CS Amsterdam F: +31 20 420 28 36  
The Netherlands

# Certificate of Analysis

Rev 0

## Comment:

<b>Catalog No:</b> Z-G34-4400-IC9M	<b>Lot No:</b> 1104086	<b>Expiration Date:</b> 2-Sep-2018	<b>Matrix:</b> 0.179% NaOH	<b>Description:</b> ISO Guide 34 - Cyanide, 100 mL 1,000 mg/L in H <sub>2</sub> O
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## Calculation of Uncertainty

The following equations are used to calculate the value of the expanded uncertainty:

$U = k u_c$  U=Expanded Uncertainty, k= the coverage factor at the 95% confidence level, k=2,  $u_c$  = the combined uncertainty  
 $u_c = \sqrt{\sum u_i^2}$  where  $u_i$  are the individual uncertainty components for raw material, transportation, homogeneity, and shelf life.

## Expiration Information:

The Stability of this product is based upon rigorous short term and long term testing of the solution for the certified value. These tests include the effect of temperature and packaging on the product. This standard is guaranteed until the expiration date listed above.

## Accreditation:

This standard was manufactured by an ISO 17025 Chemical Testing Lab (Certificate number 3031.01) and ISO Guide 34 Reference Material Producer (RMP) Certificate number 3031.02 accredited by The American Association of Laboratory Accreditation (A2LA). Manufacturer's Quality System audited and registered by NSF-ISR to ISO 9001:2008 (Certificate number IZ391-IS4).

**Manufactured By:**

Carrie Bibbins  
Chemist

Manufacture Date: 3/1/2017

**Certified By:**

Cristy Lane  
Chemist

Certified Date: 3/1/2017

**Released By:**

Mark Filla  
Chemist

Original Issue Date: 3/1/2017

# GENERAL CHEMISTRY

COVER PAGE  
GENERAL CHEMISTRY

Lab Name: TestAmerica Denver Job Number: 280-96392-2

SDG No.: \_\_\_\_\_

Project: Camp Ravenna, OH

Client Sample ID  
LL11mw-005-042617-GW

Lab Sample ID  
280-96392-10

Comments:

\_\_\_\_\_

1B-IN  
 INORGANIC ANALYSIS DATA SHEET  
 GENERAL CHEMISTRY

Client Sample ID: LL11mw-005-042617-GW

Lab Sample ID: 280-96392-10

Lab Name: TestAmerica Denver

Job No.: 280-96392-2

SDG ID.: \_\_\_\_\_

Matrix: Water

Date Sampled: 04/26/2017 12:55

Reporting Basis: WET

Date Received: 04/27/2017 08:55

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

2-IN  
CALIBRATION QUALITY CONTROL  
GENERAL CHEMISTRY

Lab Name: TestAmerica Denver Job No.: 280-96392-2

SDG No.: \_\_\_\_\_

Analyst: JML Batch Start Date: 05/06/2017

Reporting Units: mg/L Analytical Batch No.: 372488

Sample Number	QC Type	Time	Analyte	Result	Spike Amount	(%) Recovery	Limits	Qual	Reagent
14	ICV	07:24	Cyanide, Free	0.0980	0.100	98	90-110		CN ICV Daily_01012
15	ICB	07:25	Cyanide, Free	ND					
29	CCV	07:46	Cyanide, Free	0.205	0.200	103	90-110		CN CAL 1 ppm_01247
30	CCB	07:48	Cyanide, Free	ND					
42	CCV	08:06	Cyanide, Free	0.212	0.200	106	90-110		CN CAL 1 ppm_01247
43	CCB	08:07	Cyanide, Free	ND					

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



3-IN  
METHOD BLANK  
GENERAL CHEMISTRY

Lab Name: TestAmerica Denver

Job No.: 280-96392-2

SDG No.: \_\_\_\_\_

Method	Lab Sample ID	Analyte	Result	Qual	Units	RL	Dil
Batch ID: 372488 Date: 05/06/2017 07:33 Prep Batch: 372393 Date: 05/05/2017 10:45							
SM 4500 CN MB 280-372393/4-A I		Cyanide, Free	ND		ug/L	10	1

7A-IN  
LAB CONTROL SAMPLE  
GENERAL CHEMISTRY

Lab Name: TestAmerica Denver Job No.: 280-96392-2

SDG No.: \_\_\_\_\_

Matrix: Water

Method	Lab Sample ID	Analyte	Result	C	Unit	Spike Amount	Pct. Rec.	Limits	RPD	RPD Limit	Q
Batch ID: 372488 Date: 05/06/2017 07:31 Prep Batch: 372393 Date: 05/05/2017 10:45											
LCS Source: CN ICV Int_00434											
SM 4500	LCS	Cyanide, Free	100		ug/L	100	100	75-120			
CN I	280-372393/3-										
	A										

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

7A-IN  
 LOW LEVEL CONTROL SAMPLE  
 GENERAL CHEMISTRY

Lab Name: TestAmerica Denver Job No.: 280-96392-2  
 SDG No.: \_\_\_\_\_  
 Matrix: Water

Method	Lab Sample ID	Analyte	Result	C	Unit	Spike Amount	Pct. Rec.	Limits	RPD	RPD Limit	Q
Batch ID: 372488 Date: 05/06/2017 07:30			Prep Batch: 372393			Date: 05/05/2017 10:45					
			LCS Source: CN 10ppm_00252								
SM 4500	LLCS	Cyanide, Free	96.5		ug/L	100	97	75-120			
CN I	280-372393/2-										
	A										

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

7A-IN  
HIGH LEVEL CONTROL SAMPLE  
GENERAL CHEMISTRY

Lab Name: TestAmerica Denver Job No.: 280-96392-2  
SDG No.: \_\_\_\_\_  
Matrix: Water

Method	Lab Sample ID	Analyte	Result	C	Unit	Spike Amount	Pct. Rec.	Limits	RPD	RPD Limit	Q
Batch ID: 372488 Date: 05/06/2017 07:28 Prep Batch: 372393 Date: 05/05/2017 10:45											
LCS Source: CN 10ppm_00252											
SM 4500	HLCS	Cyanide, Free	394		ug/L	400	99	75-120			
CN I	280-372393/1-										
	A										

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

9-IN  
DETECTION LIMITS  
GENERAL CHEMISTRY

Lab Name: TestAmerica Denver

Job Number: 280-96392-2

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: 280-96392-2  
SDG Number: \_\_\_\_\_  
Matrix: Water Instrument ID: WC\_Alph 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.: 280-96392-2

SDG No.: \_\_\_\_\_

Prep Method: SM 4500 CN I

Lab Sample ID	Preparation Date	Prep Batch	Initial Weight	Initial Volume (mL)	Final Volume (mL)
HLCS 280-372393/1-A	05/05/2017 10:45	372393		50	50
LLCS 280-372393/2-A	05/05/2017 10:45	372393		50	50
LCS 280-372393/3-A	05/05/2017 10:45	372393		50	50
MB 280-372393/4-A	05/05/2017 10:45	372393		50	50
280-96392-10	05/05/2017 10:45	372393		50	50





13-IN  
ANALYSIS RUN LOG  
GENERAL CHEMISTRY

Lab Name: TestAmerica Denver Job No.: 280-96392-2

SDG No.: \_\_\_\_\_

Instrument ID: WC\_Alp 1 Analysis Method: SM 4500 CN I

Start Date: 05/06/2017 07:04 End Date: 05/06/2017 08:09

Lab Sample Id	D/F	Type	Time	Analytes																											
				C	N	F	r	e																							
ZZZZZZ			08:01																												
ZZZZZZ			08:03																												
ZZZZZZ			08:04																												
CCV 280-372488/42		1	08:06	X																											
CCB 280-372488/43		1	08:07	X																											
ZZZZZZ			08:09																												

Prep Types: \_\_\_\_\_  
T = Total/NA

GENERAL CHEMISTRY BATCH WORKSHEET

Lab Name: TestAmerica Denver Job No.: 280-96392-2

SDG No.: \_\_\_\_\_

Batch Number: 372393 Batch Start Date: 05/05/17 10:45 Batch Analyst: Lehman, Jeffrey M

Batch Method: SM 4500 CN I Batch End Date: \_\_\_\_\_

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	DistillpHCheck	SulfideCheck	ChlorineCheck	CN 10ppm 00252
HLCS 280-372393/1		SM 4500 CN I, SM 4500 CN I		50 mL	50 mL	>12	N	N	2 mL
LLCS 280-372393/2		SM 4500 CN I, SM 4500 CN I		50 mL	50 mL	>12	N	N	0.5 mL
LCS 280-372393/3		SM 4500 CN I, SM 4500 CN I		50 mL	50 mL	>12	N	N	
MB 280-372393/4		SM 4500 CN I, SM 4500 CN I		50 mL	50 mL	>12	N	N	
280-96392-B-10	LL11mw-005-04261 7-GW	SM 4500 CN I, SM 4500 CN I	T	50 mL	50 mL	>12	N	N	

Lab Sample ID	Client Sample ID	Method Chain	Basis	CN ICV Int 00434					
HLCS 280-372393/1		SM 4500 CN I, SM 4500 CN I							
LLCS 280-372393/2		SM 4500 CN I, SM 4500 CN I							
LCS 280-372393/3		SM 4500 CN I, SM 4500 CN I		0.5 mL					
MB 280-372393/4		SM 4500 CN I, SM 4500 CN I							
280-96392-B-10	LL11mw-005-04261 7-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.: 280-96392-2

SDG No.: \_\_\_\_\_

Batch Number: 372393 Batch Start Date: 05/05/17 10:45 Batch Analyst: Lehman, Jeffrey M

Batch Method: SM 4500 CN I Batch End Date: \_\_\_\_\_

Batch Notes	
Acetate Buffer ID	WAD Acetate_00010
Methyl Red Indicator ID	METHYL RED_00012
Sodium Hydroxide ID	2% NaOH_00277
Pipette ID	WC T1000
WAD Releasing Agent ID	10% Acetic_00017
Zinc Acetate Buffer ID	ZINC BUFFER_00013

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.: 280-96392-2

SDG No.: \_\_\_\_\_

Batch Number: 372488 Batch Start Date: 05/06/17 07:04 Batch Analyst: Lehman, Jeffrey M

Batch Method: SM 4500 CN I Batch End Date: \_\_\_\_\_

Lab Sample ID	Client Sample ID	Method Chain	Basis	InitialAmount	FinalAmount	CN CAL 1 ppm 01247	CN ICV Daily 01012		
ICV 280-372488/14		SM 4500 CN I		50 mL	50 mL		50 mL		
ICB 280-372488/15		SM 4500 CN I		50 mL	50 mL				
HLCS 280-372393/1-A		SM 4500 CN I		50 mL	50 mL				
LLCS 280-372393/2-A		SM 4500 CN I		50 mL	50 mL				
LCS 280-372393/3-A		SM 4500 CN I		50 mL	50 mL				
MB 280-372393/4-A		SM 4500 CN I		50 mL	50 mL				
CCV 280-372488/29		SM 4500 CN I		50 mL	50 mL	10 mL			
CCB 280-372488/30		SM 4500 CN I		50 mL	50 mL				
280-96392-B-10-A	LL11mw-005-04261 7-GW	SM 4500 CN I	T	50 mL	50 mL				
CCV 280-372488/42		SM 4500 CN I		50 mL	50 mL	10 mL			
CCB 280-372488/43		SM 4500 CN I		50 mL	50 mL				

Batch Notes	
Chloramine-T ID	CN Chloro-T_00780
Pipette ID	WC 5000ELJ WC T1000
Pyridine-Barbituric Acid ID	CN Pyr/Barb_00163
Titrant or Buffer ID	CN Buffer_00094

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.

Facility Name  
 Facility Location  
 Department  
 Operator Name JML  
 Operator ID JML  
 Platform FS III/IV/3100  
 Software Rev Code 222  
 Data system ID 57

Result path C:\FLOW\_4\C050617.RST  
 Sample table path C:\FLOW\_4\c050617.tbl  
 Method path C:\FLOW\_4\cyanide.mth  
 Date acquired 06-May-17  
 Time acquired 08:14

----- Cyanide, Total -----						
Date	Time	Cup	Name	Response	Calc [ppb]	Flags
06-May-17	07:04	107	Sync	274323	392.063	
06-May-17	07:06	0	Carryover	360	-1.247	LO
06-May-17	07:07	0	Carryover	70	-1.662	LO
06-May-17	07:09	0	Baseline	0	-1.763	BL
06-May-17	07:10	101	CAL 0.00 ppb	119	-1.592	LO
06-May-17	07:12	102	CAL 10.0 ppb	7222	8.605	
06-May-17	07:13	103	CAL 20.0 ppb	14121	18.509	
06-May-17	07:15	104	CAL 50.0 ppb	37395	51.922	
06-May-17	07:16	105	CAL 100 ppb	71979	101.572	
06-May-17	07:18	106	Cal 200 ppb	142641	203.016	
06-May-17	07:19	107	Cal 400 ppb	278436	397.968	
06-May-17	07:21	0	BLK	-41	-1.822	LO
06-May-17	07:22	0	Baseline	0	-1.763	BL
06-May-17	07:24	108	ICV 100 ppb	69515	98.034	
06-May-17	07:25	0	ICB	28	-1.723	LO
06-May-17	07:27	0	Baseline	0	-1.763	BL
06-May-17	07:28	113	hlcs 280-372393/1-a	138580	394.373	
06-May-17	07:30	114	llcs 280-372393/2-	68449	96.504	
06-May-17	07:31	115	lcs 280-372393/3-a	71043	100.228	
06-May-17	07:33	116	mb 280-372393/4-a	1413	0.265	
06-May-17	07:34	117	280-96291-h-6-c	987	-0.347	LO
06-May-17	07:36	118	280-96291-l-6-a ms	70357	99.244	
06-May-17	07:37	119	280-96291-l-6-b msd	72551	102.393	
06-May-17	07:39	120	280-96291-a-3-b	2101	1.253	
06-May-17	07:40	121	280-96349-f-10-a	2555	1.904	
06-May-17	07:42	122	280-96349-c-11-a	1742	0.738	
06-May-17	07:43	0	BLK	-16	-1.786	LO
06-May-17	07:45	0	baseline	0	-1.763	BL
06-May-17	07:46	109	CCV 200PPB	144268	205.352	
06-May-17	07:48	0	CCB	92	-1.630	LO
06-May-17	07:49	0	Baseline	0	-1.763	BL
06-May-17	07:51	123	280-96629-c-1-a	2564	1.918	
06-May-17	07:52	124	280-96392-b-10-a	977	-0.361	LO
06-May-17	07:54	125	280-96439-b-11-a	1452	0.321	
06-May-17	07:55	126	680-138109-f-1-a	4433	4.601	
06-May-17	07:57	127	280-96510-a-15-a	2134	1.301	
06-May-17	07:58	128	280-96600-b-3-a	1121	-0.154	LO
06-May-17	08:00	129	280-96600-b-3-b ms	71456	100.821	
06-May-17	08:01	130	280-96600-b-3-c msd	71623	101.061	
06-May-17	08:03	0	BLK	60	-1.678	LO
06-May-17	08:04	0	baseline	0	-1.763	BL
06-May-17	08:06	109	CCV 200PPB	148829	211.900	
06-May-17	08:07	0	CCB	83	-1.644	LO
06-May-17	08:09	0	Baseline	0	-1.763	BL

File name: C:\FLOW\_4\C050617.RST

Date: 06-May-17

Operator: JML

Peak	Cup	Name	R	Type	Dil	Wt	Height	Calc. (ppb)	Flags	
1	107	Sync	1	SYNC		1	274323	392.063141		
2	0	Carryover	1	CO		1	360	-1.246712	LO	
3	0	Carryover	2	CO		1	70	-1.662025	LO	
B	0	Baseline	1	RB		1	0	-1.763209	BL	
5	101	CAL 0.00 ppb	1	C		1	119	-1.592495	LO	
6	102	CAL 10.0 ppb	1	C		1	7222	8.604884		
7	103	CAL 20.0 ppb	1	C		1	14121	18.509214		
8	104	CAL 50.0 ppb	1	C		1	37395	51.922092		
9	105	CAL 100 ppb	1	C		1	71979	101.571938		
10	106	Cal 200 ppb	1	C		1	142641	203.016495		
11	107	Cal 400 ppb	1	C		1	278436	397.967926		
12	0	BLK	1	BLNK		1	-41	-1.821724	LO	
B	0	Baseline	1	RB		1	0	-1.763209	BL	
14	108	ICV 100 ppb	1	CCV		1	69515	98.033783		
15	0	ICB	1	U		1	28	-1.723258	LO	
B	0	Baseline	1	RB		1	0	-1.763209	BL	
17	113	hlcs 280-372393/1-a	1	U		2	1	138580	394.373413	
18	114	llcs 280-372393/2-	1	U		1	1	68449	96.504166	
19	115	lcs 280-372393/3-a	1	U		1	1	71043	100.227707	
20	116	mb 280-372393/4-a	1	U		1	1	1413	0.264625	
21	117	280-96291-h-6-c	1	U		1	1	987	-0.346609	LO
22	118	280-96291-l-6-a ms	1	U		1	1	70357	99.243690	
23	119	280-96291-l-6-b msd	1	U		1	1	72551	102.392593	
24	120	280-96291-a-3-b	1	U		1	1	2101	1.253376	
25	121	280-96349-f-10-a	1	U		1	1	2555	1.904268	
26	122	280-96349-c-11-a	1	U		1	1	1742	0.737613	
27	0	BLK	1	BLNK		1	1	-16	-1.785892	LO
B	0	baseline	1	RB		1	1	0	-1.763209	BL
29	109	CCV 200PPB	1	CCV		1	1	144268	205.352112	
30	0	CCB	1	U		1	1	92	-1.630420	LO
B	0	Baseline	1	RB		1	1	0	-1.763209	BL
32	123	280-96629-c-1-a	1	U		1	1	2564	1.917543	
33	124	280-96392-b-10-a	1	U		1	1	977	-0.361215	LO
34	125	280-96439-b-11-a	1	U		1	1	1452	0.320665	
35	126	680-138109-f-1-a	1	U		1	1	4433	4.601055	
36	127	280-96510-a-15-a	1	U		1	1	2134	1.301098	
37	128	280-96600-b-3-a	1	U		1	1	1121	-0.153673	LO
38	129	280-96600-b-3-b ms	1	U		1	1	71456	100.820900	
39	130	280-96600-b-3-c msd	1	U		1	1	71623	101.060699	
40	0	BLK	1	BLNK		1	1	60	-1.677529	LO
B	0	baseline	1	RB		1	1	0	-1.763209	BL
42	109	CCV 200PPB	1	CCV		1	1	148829	211.899887	
43	0	CCB	1	U		1	1	83	-1.643937	LO
B	0	Baseline	1	RB		1	1	0	-1.763209	BL

File name: C:\FLOW\_4\C050617.RST

Date: 06-May-17

Operator: JML

* Name	Conc	Height
* CAL 0.00 ppb	0.000000	118.912651
* CAL 10.0 ppb	10.000000	7221.990723
* CAL 20.0 ppb	20.000000	14120.943359
* CAL 50.0 ppb	50.000000	37394.988281
* CAL 100 ppb	100.000000	71979.046875
* Cal 200 ppb	200.000000	142641.187500
* Cal 400 ppb	400.000000	278436.406250

Calib Coef:

y=bx+a

a: (intercept) 1.2282e+03

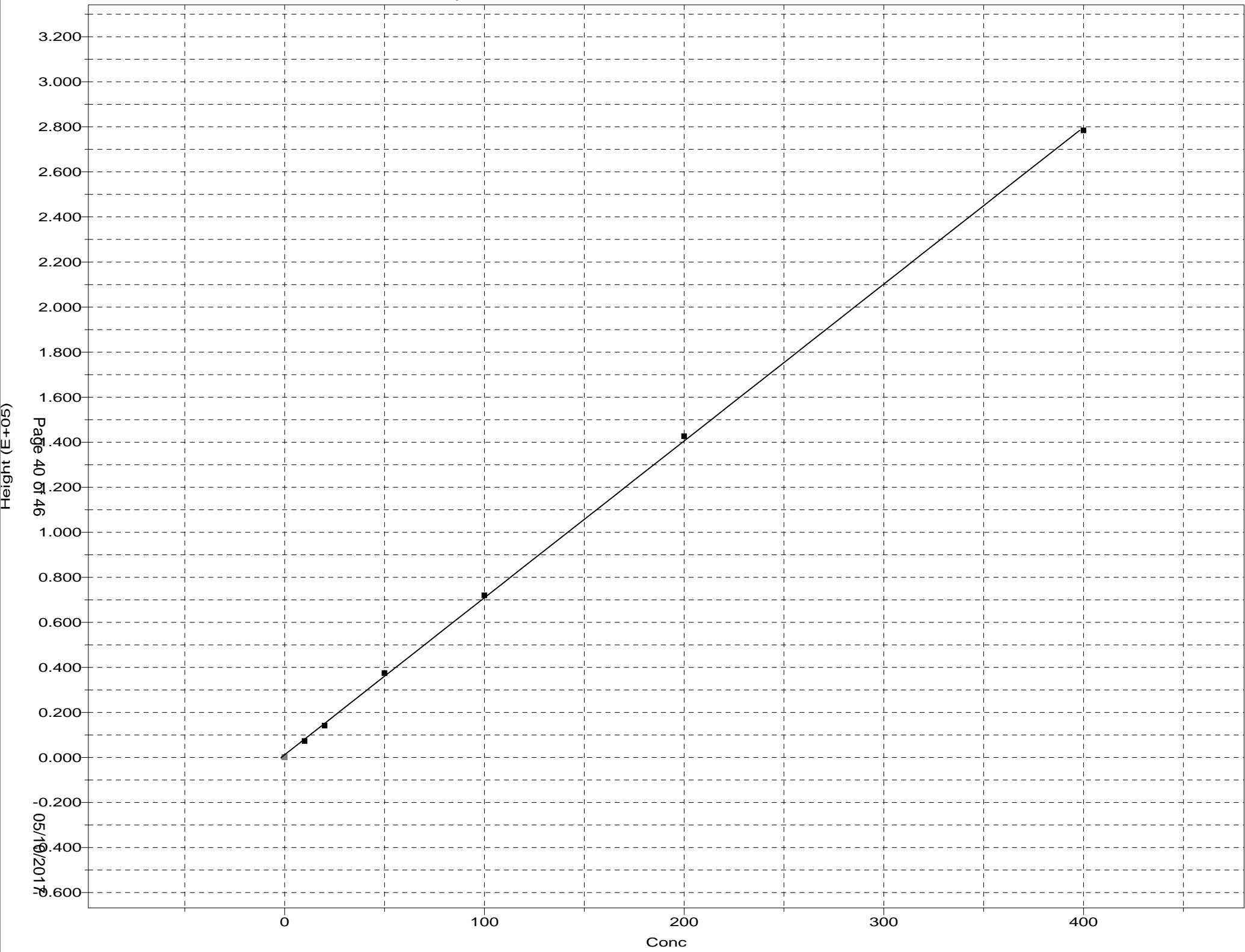
b: 6.9656e+02

Corr Coef: 0.999897

Carryover: 0.131%

No Drift Peaks

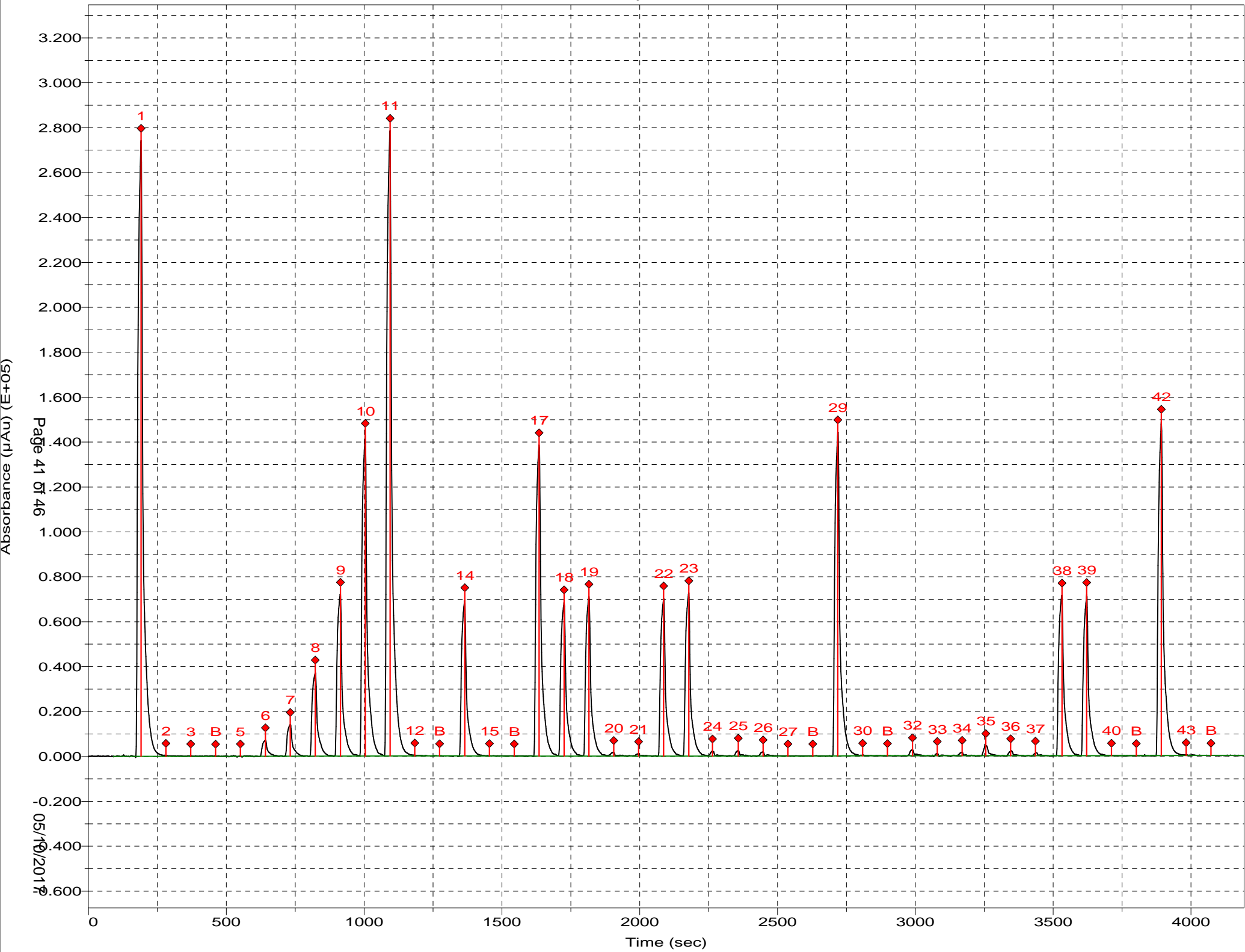
Cyanide, Total:Calibration 1: Peak 5-44



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05/10/2017



# Channel 1: Cyanide, Total



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05/10/2017

# Shipping and Receiving Documents





Chain of Custody Record

<b>Client Information</b> Client Contact: Ms. Heather Miner Company: Cardno TEC, Inc. Address: 1658 Cole Boulevard Suite 190 City: Golden State, Zip: CO, 80401 Phone: [blank] Email: heather.miner@cardno-gs.com Project Name: Ravenna, OH - Load Line 11 Site: [blank]		Lab PM: McEntee, Patrick J E-Mail: patrick.mcEntee@testamericainc.com Carrier Tracking No(s): 810486071252 810486071241	
Due Date Requested: [blank] TAT Requested (days): Standard		Analysis Requested: [blank]	
PO #: 0091979 WO #: 076003.009.007 TestAmerica Project #: 28014271 SSO#: [blank]		Preservation Codes: 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)	
Sample Identification L11mw-005-042617-6W MBSmw-004-042617-6W MBS mw-006-042617-6W		Total Number of containers: 2 3 3	
Sample Date: 4/26/17 Sample Time: 1255 1032 1147		Field Filtered Sample (Yes or No): [blank] Perform MS/MSD (Yes or No): [blank] Total Cyanide 9012B: [blank] Free Cyanide 4500_CN1: [blank]	
Sample Type (C=Comp, G=grab): G G G		Matrix (Water, Swab, On-surface, BT-Tissue, Air): W W W	
Preservation Code: [blank] [blank] [blank]		Special Instructions/Note: Checked by WTW	
Possible Hazard Identification <input type="checkbox"/> Non-Hazard <input type="checkbox"/> Flammable <input type="checkbox"/> Skin Irritant <input type="checkbox"/> Poison B <input type="checkbox"/> Unknown <input type="checkbox"/> Radiological Deliverable Requested: I, II, III, IV, Other (specify)			
Sample Disposal (A fee may be assessed if samples are retained longer than 1 month) <input type="checkbox"/> Return To Client <input type="checkbox"/> Disposal By Lab <input type="checkbox"/> Archive For _____ Months Special Instructions/QC Requirements:			
Empty Kit Relinquished by: [blank] Relinquished by: [blank] Relinquished by: [blank]		Method of Shipment: [blank]	
Date/Time: 4/26/17 1830 Date/Time: [blank] Date/Time: [blank]		Received by: Fed Ex Received by: [blank] Received by: [blank]	
Company: [blank] Company: [blank] Company: [blank]		Company: [blank] Company: TAD Company: [blank]	
Custody Seal No.: [blank]		Cooler Temperature(s) °C and Other Remarks: [blank]	

# Login Sample Receipt Checklist

Client: Cardno TEC, Inc

Job Number: 280-96392-2

**Login Number: 96392**  
**List Number: 1**  
**Creator: Woodworth, Sean P**

**List Source: TestAmerica Denver**

Question	Answer	Comment
Radioactivity wasn't checked or is $\leq$ 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.	False	Refer to Job Narrative for details.
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	