TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

# ANALYTICAL REPORT

Job Number: 240-88967-1

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
12/7/2017 8:56 PM

Patrick J McEntee, Manager of Project Management
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12/07/2017

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.

# Table of Contents

# Table of Contents

## 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: 240-88967-1

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 12/6/2017 4:20 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.5º C.

Hexavalent chromium analysis was performed by TestAmerica Canton. TestAmerica Canton is not hold DoD accreditation; therefore, method EPA SW-846 Method 7196A is reported with standard data qualifiers applied.

**HEXAVALENT CHROMIUM**

Samples BKGmw-008-120617-GW (240-88967-1), LL12mw-247-120617-GW (240-88967-2) and LL3mw-244-120617-GW (240-88967-3) were analyzed for hexavalent chromium in accordance with EPA SW-846 Method 7196A. The samples were analyzed on 12/06/2017.

Due to matrix, sample LL12mw-247-120617-GW (240-88967-2)[5X] required dilution prior to analysis. The reporting limits have been adjusted accordingly.

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: 240-88967-1

## Client Sample ID: BKGmw-008-120617-GW — Lab Sample ID: 240-88967-1

No Detections.

## Client Sample ID: LL12mw-247-120617-GW — Lab Sample ID: 240-88967-2

No Detections.

## Client Sample ID: LL3mw-244-120617-GW — Lab Sample ID: 240-88967-3

No Detections.

This Detection Summary does not include radiochemical test results.

## Client Sample ID: BKGmw-008-120617-GW

**Lab Sample ID: 240-88967-1**

**Date Collected: 12/06/17 10:25**

**Matrix: Water**

**Date Received: 12/06/17 16:20**

### General Chemistry

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Hexavalent chromium | ND | | 20 | 3.0 | ug/L | | | 12/06/17 17:16 | 1 |

## Client Sample ID: LL12mw-247-120617-GW

**Lab Sample ID: 240-88967-2**

**Date Collected: 12/06/17 09:48**

**Matrix: Water**

**Date Received: 12/06/17 16:20**

### General Chemistry

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Hexavalent chromium | ND | | 100 | 15 | ug/L | | | 12/06/17 17:15 | 5 |

## Client Sample ID: LL3mw-244-120617-GW

**Lab Sample ID: 240-88967-3**

**Date Collected: 12/06/17 11:10**

**Matrix: Water**

**Date Received: 12/06/17 16:20**

### General Chemistry

| Analyte | Result | Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Hexavalent chromium | ND | | 20 | 3.0 | ug/L | | | 12/06/17 17:14 | 1 |

# Default Detection Limits

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

TestAmerica Job ID: 240-88967-1

## General Chemistry

| Analyte | RL | MDL | Units | Method |
|---|---|---|---|---|
| Hexavalent chromium | 20 | 3.0 | ug/L | 7196A |

## Method: 7196A - Chromium, Hexavalent

**Lab Sample ID: MB 240-306479/3**
**Matrix: Water**
**Analysis Batch: 306479**

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

| Analyte | MB Result | MB Qualifier | RL | MDL | Unit | D | Prepared | Analyzed | Dil Fac |
|---|---|---|---|---|---|---|---|---|---|
| Hexavalent chromium | ND | | 20 | 3.0 | ug/L | | | 12/06/17 10:52 | 1 |

**Lab Sample ID: LCS 240-306479/4**
**Matrix: Water**
**Analysis Batch: 306479**

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

| Analyte | | | Spike Added | LCS Result | LCS Qualifier | Unit | D | %Rec | %Rec. Limits | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hexavalent chromium | | | 250 | 239 | | ug/L | | 96 | 80 - 123 | | |

# QC Association Summary

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

TestAmerica Job ID: 240-88967-1

## General Chemistry

### Analysis Batch: 306479

| Lab Sample ID | Client Sample ID | Prep Type | Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| 240-88967-1 | BKGmw-008-120617-GW | Total/NA | Water | 7196A | |
| 240-88967-2 | LL12mw-247-120617-GW | Total/NA | Water | 7196A | |
| 240-88967-3 | LL3mw-244-120617-GW | Total/NA | Water | 7196A | |
| MB 240-306479/3 | Method Blank | Total/NA | Water | 7196A | |
| LCS 240-306479/4 | Lab Control Sample | Total/NA | Water | 7196A | |

# Lab Chronicle

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

TestAmerica Job ID: 240-88967-1

## Client Sample ID: BKGmw-008-120617-GW — Lab Sample ID: 240-88967-1

**Date Collected: 12/06/17 10:25** — **Matrix: Water**
**Date Received: 12/06/17 16:20**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | 7196A | | 1 | 306479 | 12/06/17 17:16 | JWW | TAL CAN |

## Client Sample ID: LL12mw-247-120617-GW — Lab Sample ID: 240-88967-2

**Date Collected: 12/06/17 09:48** — **Matrix: Water**
**Date Received: 12/06/17 16:20**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | 7196A | | 5 | 306479 | 12/06/17 17:15 | JWW | TAL CAN |

## Client Sample ID: LL3mw-244-120617-GW — Lab Sample ID: 240-88967-3

**Date Collected: 12/06/17 11:10** — **Matrix: Water**
**Date Received: 12/06/17 16:20**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Prepared or Analyzed | Analyst | Lab |
|---|---|---|---|---|---|---|---|---|
| Total/NA | Analysis | 7196A | | 1 | 306479 | 12/06/17 17:14 | JWW | TAL CAN |

**Laboratory References:**

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

# Accreditation/Certification Summary

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

TestAmerica Job ID: 240-88967-1

## Laboratory: TestAmerica Canton

The accreditations/certifications listed below are applicable to this report.

| Authority | Program | EPA Region | Identification Number | Expiration Date |
|---|---|---|---|---|
| Ohio VAP | State Program | 5 | CL0024 | 09-06-19 |

## Laboratory: TestAmerica Denver

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

| Authority | Program | EPA Region | Identification Number | Expiration Date |
|---|---|---|---|---|
| A2LA | DoD ELAP | | 2907.01 | 10-31-19 * |
| A2LA | ISO/IEC 17025 | | 2907.01 | 10-31-19 |
| Alabama | State Program | 4 | 40730 | 09-30-12 * |
| Alaska (UST) | State Program | 10 | UST-30 | 04-05-18 |
| Arkansas DEQ | State Program | 6 | 88-0687 | 06-01-18 |
| California | State Program | 9 | 2513 | 01-08-18 |
| Connecticut | State Program | 1 | PH-0686 | 09-30-18 |
| Florida | NELAP | 4 | E87667 | 06-30-18 |
| Georgia | State Program | 4 | N/A | 01-08-18 |
| Illinois | NELAP | 5 | 200017 | 04-30-18 |
| Iowa | State Program | 7 | 370 | 12-01-18 |
| Kansas | NELAP | 7 | E-10166 | 04-30-18 |
| Louisiana | NELAP | 6 | 02096 | 06-30-18 |
| Maine | State Program | 1 | CO0002 | 03-03-19 |
| Nevada | State Program | 9 | CO0026 | 07-31-18 |
| New Hampshire | NELAP | 1 | 205310 | 04-28-18 |
| New Jersey | NELAP | 2 | CO004 | 06-30-18 |
| New York | NELAP | 2 | 11964 | 04-01-18 |
| North Dakota | State Program | 8 | R-034 | 01-09-18 |
| Oklahoma | State Program | 6 | 8614 | 08-31-18 |
| Oregon | NELAP | 10 | 4025 | 01-08-18 |
| Pennsylvania | NELAP | 3 | 68-00664 | 07-31-18 |
| South Carolina | State Program | 4 | 72002001 | 01-08-18 |
| Texas | NELAP | 6 | T104704183-17-14 | 09-30-18 |
| USDA | Federal | | P330-16-00397 | 12-15-19 |
| Utah | NELAP | 8 | CO00026 | 07-31-18 |
| Virginia | NELAP | 3 | 460232 | 06-14-18 |
| Washington | State Program | 10 | C583 | 08-03-18 |
| West Virginia DEP | State Program | 3 | 354 | 11-30-17 * |
| Wisconsin | State Program | 5 | 999615430 | 08-31-18 |
| Wyoming (UST) | A2LA | 8 | 2907.01 | 10-31-19 |

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

# Method Summary

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

TestAmerica Job ID: 240-88967-1

| Method | Method Description | Protocol | Laboratory |
|---|---|---|---|
| 7196A | Chromium, Hexavalent | SW846 | TAL CAN |

**Protocol References:**

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

**Laboratory References:**

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

# Sample Summary

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

TestAmerica Job ID: 240-88967-1

| Lab Sample ID | Client Sample ID | Matrix | Collected | Received |
|---|---|---|---|---|
| 240-88967-1 | BKGmw-008-120617-GW | Water | 12/06/17 10:25 | 12/06/17 16:20 |
| 240-88967-2 | LL12mw-247-120617-GW | Water | 12/06/17 09:48 | 12/06/17 16:20 |
| 240-88967-3 | LL3mw-244-120617-GW | Water | 12/06/17 11:10 | 12/06/17 16:20 |

# REAGENT TRACEABILITY SUMMARY

Lab Name: TestAmerica Canton Job No.: 240-88967-1

SDG No.:

| Reagent ID | Exp Date | Prep Date | Dilutant Used | Reagent Final Volume | Parent Reagent | | Analyte | Concentration |
|---|---|---|---|---|---|---|---|---|
| | | | | | Reagent ID | Volume Added | | |
| **WCCHROME50PM2_00021** | 03/08/18 | 09/08/17 | DIWATER, Lot 052014 | 1000 mL | WCKDICHROME62_00003 | 0.1414 g | Hexavalent chromium | 49.9764 mg/L |
| .WCKDICHROME62_00003 | 06/06/19 | Fisher, Lot 140919 | | | (Purchased Reagent) | | Hexavalent chromium | 0.35344 g/g |
| **WCCHROME50PPM_00022** | 03/08/18 | 09/08/17 | DIWATER, Lot 052014 | 1000 mL | WCKDICHROME62_00004 | 0.1414 g | Hexavalent chromium | 49.9764 mg/L |
| .WCKDICHROME62_00004 | 09/07/21 | Fisher, Lot 126893 | | | (Purchased Reagent) | | Hexavalent chromium | 0.35344 g/g |

# GENERAL CHEMISTRY

COVER PAGE
GENERAL CHEMISTRY

Lab Name: TestAmerica Canton Job Number: 240-88967-1

SDG No.:

Project: Ravenna, OH

| Client Sample ID | Lab Sample ID |
|---|---|
| BKGmw-008-120617-GW | 240-88967-1 |
| LL12mw-247-120617-GW | 240-88967-2 |
| LL3mw-244-120617-GW | 240-88967-3 |

Comments:

1B-IN
INORGANIC ANALYSIS DATA SHEET
GENERAL CHEMISTRY

Client Sample ID: BKGmw-008-120617-GW
Lab Sample ID: 240-88967-1
Lab Name: TestAmerica Canton
Job No.: 240-88967-1
SDG ID.:
Matrix: Water
Date Sampled: 12/06/2017 10:25
Reporting Basis: WET
Date Received: 12/06/2017 16:20

| CAS No. | Analyte | Result | RL | MDL | Units | C | Q | DIL | Method |
|---|---|---|---|---|---|---|---|---|---|
| 18540-29-9 | Hexavalent chromium | ND | 20 | 3.0 | ug/L | | | 1 | 7196A |

1B-IN
INORGANIC ANALYSIS DATA SHEET
GENERAL CHEMISTRY

Client Sample ID: LL12mw-247-120617-GW
Lab Sample ID: 240-88967-2
Lab Name: TestAmerica Canton
Job No.: 240-88967-1
SDG ID.:
Matrix: Water
Date Sampled: 12/06/2017 09:48
Reporting Basis: WET
Date Received: 12/06/2017 16:20

| CAS No. | Analyte | Result | RL | MDL | Units | C | Q | DIL | Method |
|---|---|---|---|---|---|---|---|---|---|
| 18540-29-9 | Hexavalent chromium | ND | 100 | 15 | ug/L | | | 5 | 7196A |

1B-IN
INORGANIC ANALYSIS DATA SHEET
GENERAL CHEMISTRY

Client Sample ID: LL3mw-244-120617-GW
Lab Sample ID: 240-88967-3
Lab Name: TestAmerica Canton
Job No.: 240-88967-1
SDG ID.:
Matrix: Water
Date Sampled: 12/06/2017 11:10
Reporting Basis: WET
Date Received: 12/06/2017 16:20

| CAS No. | Analyte | Result | RL | MDL | Units | C | Q | DIL | Method |
|---|---|---|---|---|---|---|---|---|---|
| 18540-29-9 | Hexavalent chromium | ND | 20 | 3.0 | ug/L | | | 1 | 7196A |

2-IN
CALIBRATION QUALITY CONTROL
GENERAL CHEMISTRY

Lab Name: TestAmerica Canton  Job No.: 240-88967-1

SDG No.:

Analyst: BLW  Batch Start Date: 11/08/2017

Reporting Units: mg/L  Analytical Batch No.: 302588

| Sample Number | QC Type | Time | Analyte | Result | Spike Amount | (%) Recovery | Limits | Qual | Reagent |
|---|---|---|---|---|---|---|---|---|---|
| 7 | ICV | 09:37 | Hexavalent chromium | 0.269 | 0.250 | 108 | 90-110 | | WCCHROME50PM2_00021 |

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

FORM II-IN

2-IN
CALIBRATION QUALITY CONTROL
GENERAL CHEMISTRY

Lab Name: TestAmerica Canton  Job No.: 240-88967-1

SDG No.:

Analyst: JWW  Batch Start Date: 12/06/2017

Reporting Units: mg/L  Analytical Batch No.: 306479

| Sample Number | QC Type | Time | Analyte | Result | Spike Amount | (%) Recovery | Limits | Qual | Reagent |
|---|---|---|---|---|---|---|---|---|---|
| 1 | CCV | 10:50 | Hexavalent chromium | 0.241 | 0.250 | 97 | 90-110 | | WCCHROME50PPM_00022 |
| 2 | CCB | 10:51 | Hexavalent chromium | ND | | | | | |
| 13 | CCV | 11:03 | Hexavalent chromium | 0.240 | 0.250 | 96 | 90-110 | | WCCHROME50PPM_00022 |
| 14 | CCB | 11:04 | Hexavalent chromium | ND | | | | | |
| 16 | CCV | 11:19 | Hexavalent chromium | 0.240 | 0.250 | 96 | 90-110 | | WCCHROME50PPM_00022 |
| 17 | CCB | 11:22 | Hexavalent chromium | ND | | | | | |
| 21 | CCV | 17:17 | Hexavalent chromium | 0.241 | 0.250 | 97 | 90-110 | | WCCHROME50PPM_00022 |
| 22 | CCB | 17:18 | Hexavalent chromium | 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 Canton Job No.: 240-88967-1

SDG No.:

| Method | Lab Sample ID | Analyte | Result | Qual | Units | RL | Dil |
|---|---|---|---|---|---|---|---|
| Batch ID: 306479 Date: 12/06/2017 10:52 | | | | | | | |
| 7196A | MB 240-306479/3 | Hexavalent chromium | ND | | ug/L | 20 | 1 |

7A-IN
LAB CONTROL SAMPLE
GENERAL CHEMISTRY

Lab Name: TestAmerica Canton  Job No.: 240-88967-1

SDG No.:

Matrix: Water

| Method | Lab Sample ID | Analyte | Result | C | Unit | Spike Amount | Pct. Rec. | Limits | RPD | RPD Limit | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Batch ID: 306479 | Date: 12/06/2017 10:53 | | | | | | | | | | |
| | | | | | | LCS Source: WCCHROME50PM2_00021 | | | | | |
| 7196A | LCS 240-306479/4 | Hexavalent chromium | 239 | | ug/L | 250 | 96 | 80-123 | | | |

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 Canton  Job Number: 240-88967-1

SDG Number:

Matrix: Water  Instrument ID: OSCAR

Method: 7196A  MDL Date: 04/25/2017 11:21

| Analyte | Wavelength/ Mass | RL (mg/L) | MDL (mg/L) |
|---|---|---|---|
| Hexavalent chromium | | 0.02 | 0.003 |

9-IN
CALIBRATION BLANK DETECTION LIMITS
GENERAL CHEMISTRY

Lab Name: TestAmerica Canton  Job Number: 240-88967-1

SDG Number:

Matrix: Water  Instrument ID: OSCAR

Method: 7196A  XMDL Date: 04/25/2017 11:21

| Analyte | Wavelength/ Mass | XRL (mg/L) | XMDL (mg/L) |
|---|---|---|---|
| Hexavalent chromium | | 0.02 | 0.003 |

13-IN
ANALYSIS RUN LOG
GENERAL CHEMISTRY

Lab Name: TestAmerica Canton  Job No.: 240-88967-1

SDG No.:

Instrument ID: OSCAR  Analysis Method: 7196A

Start Date: 11/08/2017 09:37  End Date: 11/09/2017 09:42

| Lab Sample Id | D/F | Type | Time | Analytes | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Cr6 | | | | | | | | | | | | | | | | | | | | | | | | |
| IC 240-302588/1 | 1 | | 09:37 | X | | | | | | | | | | | | | | | | | | | | | | | | |
| IC 240-302588/2 | 1 | | 09:37 | X | | | | | | | | | | | | | | | | | | | | | | | | |
| IC 240-302588/3 | 1 | | 09:37 | X | | | | | | | | | | | | | | | | | | | | | | | | |
| IC 240-302588/4 | 1 | | 09:37 | X | | | | | | | | | | | | | | | | | | | | | | | | |
| IC 240-302588/5 | 1 | | 09:37 | X | | | | | | | | | | | | | | | | | | | | | | | | |
| IC 240-302588/6 | 1 | | 09:37 | X | | | | | | | | | | | | | | | | | | | | | | | | |
| ICV 240-302588/7 | 1 | | 09:37 | X | | | | | | | | | | | | | | | | | | | | | | | | |
| ICB 240-302588/8 | | | 09:38 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 09:39 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 09:40 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 09:41 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 09:42 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 09:43 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 09:44 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 09:45 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 09:46 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 09:47 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CCV 240-302588/18 | | | 09:48 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CCB 240-302588/19 | | | 09:37 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 09:49 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 09:50 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 09:51 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 09:52 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 09:53 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 09:54 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 09:55 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 09:56 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 09:57 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CCV 240-302588/29 | | | 09:58 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CCB 240-302588/30 | | | 09:59 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 10:00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 10:01 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 10:02 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 10:03 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 10:04 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CCV 240-302588/36 | | | 10:05 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CCB 240-302588/37 | | | 10:06 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 11:40 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 11:41 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 11:42 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CCV 240-302588/41 | | | 11:43 | | | | | | | | | | | | | | | | | | | | | | | | | |

FORM XIII-IN

13-IN
ANALYSIS RUN LOG
GENERAL CHEMISTRY

Lab Name: TestAmerica Canton  Job No.: 240-88967-1

SDG No.:

Instrument ID: OSCAR  Analysis Method: 7196A

Start Date: 11/08/2017 09:37  End Date: 11/09/2017 09:42

| Lab Sample Id | D/F | Type | Time | Analytes | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Cr6 | | | | | | | | | | | | | | | | | | | | | | | | |
| CCB 240-302588/42 | | | 11:44 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 11:45 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 11:46 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 11:47 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 11:48 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 11:49 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CCV 240-302588/48 | | | 11:50 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CCB 240-302588/49 | | | 11:51 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 11:43 | | | | | | | | | | | | | | | | | | | | | | | | | |

Prep Types:
=

13-IN
ANALYSIS RUN LOG
GENERAL CHEMISTRY

Lab Name: TestAmerica Canton  Job No.: 240-88967-1

SDG No.:

Instrument ID: OSCAR  Analysis Method: 7196A

Start Date: 12/06/2017 10:50  End Date: 12/06/2017 18:05

| Lab Sample Id | D/F | Type | Time | Analytes | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Cr6 | | | | | | | | | | | | | | | | | | | | | | | | |
| CCV 240-306479/1 | 1 | | 10:50 | X | | | | | | | | | | | | | | | | | | | | | | | | |
| CCB 240-306479/2 | 1 | | 10:51 | X | | | | | | | | | | | | | | | | | | | | | | | | |
| MB 240-306479/3 | 1 | T | 10:52 | X | | | | | | | | | | | | | | | | | | | | | | | | |
| LCS 240-306479/4 | 1 | T | 10:53 | X | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 10:54 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 10:55 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 10:56 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 10:57 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 10:59 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 11:00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 11:01 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 11:02 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CCV 240-306479/13 | 1 | | 11:03 | X | | | | | | | | | | | | | | | | | | | | | | | | |
| CCB 240-306479/14 | 1 | | 11:04 | X | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 11:17 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CCV 240-306479/16 | 1 | | 11:19 | X | | | | | | | | | | | | | | | | | | | | | | | | |
| CCB 240-306479/17 | 1 | | 11:22 | X | | | | | | | | | | | | | | | | | | | | | | | | |
| 240-88967-3 | 1 | T | 17:14 | X | | | | | | | | | | | | | | | | | | | | | | | | |
| 240-88967-2 | 5 | T | 17:15 | X | | | | | | | | | | | | | | | | | | | | | | | | |
| 240-88967-1 | 1 | T | 17:16 | X | | | | | | | | | | | | | | | | | | | | | | | | |
| CCV 240-306479/21 | 1 | | 17:17 | X | | | | | | | | | | | | | | | | | | | | | | | | |
| CCB 240-306479/22 | 1 | | 17:18 | X | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 17:25 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 17:26 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 17:27 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 17:28 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 17:29 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 17:30 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 17:31 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 17:32 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 17:33 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CCV 240-306479/32 | | | 17:34 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CCB 240-306479/33 | | | 17:36 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 17:56 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | | | 18:00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CCV 240-306479/36 | | | 18:03 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CCB 240-306479/37 | | | 18:05 | | | | | | | | | | | | | | | | | | | | | | | | | |

Prep Types:
T = Total/NA

FORM XIII-IN

# GENERAL CHEMISTRY BATCH WORKSHEET

Lab Name: TestAmerica Canton  Job No.: 240-88967-1

SDG No.:

Batch Number: 302588  Batch Start Date: 11/08/17 09:37  Batch Analyst: Woodward, Bruce

Batch Method: 7196A  Batch End Date: 11/08/17 12:00

| Lab Sample ID | Client Sample ID | Method Chain | Basis | InitialAmount | FinalAmount | UnCorResp | WCCHROME50PM2 00021 | WCCHROME50PPM 00022 | |
|---|---|---|---|---|---|---|---|---|---|
| IC 240-302588/1 | | 7196A | | 50 mL | 50 mL | 0 Absorbance | | | |
| IC 240-302588/2 | | 7196A | | 50 mL | 50 mL | 0.010 Absorbance | | 0.005 mL | |
| IC 240-302588/3 | | 7196A | | 50 mL | 50 mL | 0.012 Absorbance | | 0.01 mL | |
| IC 240-302588/4 | | 7196A | | 50 mL | 50 mL | 0.091 Absorbance | | 0.1 mL | |
| IC 240-302588/5 | | 7196A | | 50 mL | 50 mL | 0.207 Absorbance | | 0.25 mL | |
| IC 240-302588/6 | | 7196A | | 50 mL | 50 mL | 0.381 Absorbance | | 0.5 mL | |
| ICV 240-302588/7 | | 7196A | | 50 mL | 50 mL | 0.212 Absorbance | 0.25 mL | | |

| Batch Notes | |
|---|---|
| Acid Used for pH Adjustment ID | 3294428 |
| Spectrophotometer Cell Path Length | 1 cm |
| Color Reagent ID | 3325146 |
| Pipette ID | E11,F1 |

| Basis | Basis Description |
|---|---|
| | |

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 Canton  Job No.: 240-88967-1

SDG No.:

Batch Number: 306479  Batch Start Date: 12/06/17 10:50  Batch Analyst: Weimer, Joshua W

Batch Method: 7196A  Batch End Date: 12/06/17 18:41

| Lab Sample ID | Client Sample ID | Method Chain | Basis | InitialAmount | FinalAmount | ColorBlk | UnCorResp | WCCHROME50PM2 00021 | WCCHROME50PPM 00022 |
|---|---|---|---|---|---|---|---|---|---|
| CCV 240-306479/1 | | 7196A | | 50 mL | 50 mL | | 0.191 Absorbance | | 0.25 mL |
| CCB 240-306479/2 | | 7196A | | 50 mL | 50 mL | | 0.001 Absorbance | | |
| MB 240-306479/3 | | 7196A | | 50 mL | 50 mL | | 0.001 Absorbance | | |
| LCS 240-306479/4 | | 7196A | | 50 mL | 50 mL | | 0.189 Absorbance | 0.25 mL | |
| CCV 240-306479/13 | | 7196A | | 50 mL | 50 mL | | 0.190 Absorbance | | 0.25 mL |
| CCB 240-306479/14 | | 7196A | | 50 mL | 50 mL | | 0 Absorbance | | |
| CCV 240-306479/16 | | 7196A | | 50 mL | 50 mL | | 0.190 Absorbance | | 0.25 mL |
| CCB 240-306479/17 | | 7196A | | 50 mL | 50 mL | | 0 Absorbance | | |
| 240-88967-A-3 | LL3mw-244-120617-GW | 7196A | T | 50 mL | 50 mL | 0.002 Absorbance | 0.003 Absorbance | | |
| 240-88967-A-2 | LL12mw-247-120617-GW | 7196A | T | 50 mL | 50 mL | 0.129 Absorbance | 0.129 Absorbance | | |
| 240-88967-A-1 | BKGmw-008-120617-GW | 7196A | T | 50 mL | 50 mL | 0.009 Absorbance | 0.009 Absorbance | | |
| CCV 240-306479/21 | | 7196A | | 50 mL | 50 mL | | 0.191 Absorbance | | 0.25 mL |
| CCB 240-306479/22 | | 7196A | | 50 mL | 50 mL | | 0 Absorbance | | |

| Batch Notes | |
|---|---|
| Acid Used for pH Adjustment ID | 3294428 |
| Spectrophotometer Cell Path Length | 1 cm |
| Color Reagent ID | 3376470 |
| Pipette ID | E8 |

| 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.

# Shipping and Receiving Documents

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

0.8/0.5

# Chain of Custody Record

Cr(VI) chain

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 6618 89 | 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 - Erie Burning Grounds | 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 (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air) | Field Filtered Sample (Yes or No) | Perform MS/MSD (Yes or No) | SM4500-CN-I - Free Cyanide | 9012B - Total Cyanide | Cr hex. chrom. | Total Number of containers | Special Instructions/Note: |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Preservation Code: | | | | B | B | N | | |
| BKGmw-008-120617-gw | 12.6.17 | 1025 | G | W | N | N | | | X | 1 | 24 hour short hold |
| LL12mw-247-120617-gw | ↓ | 0948 | G | W | N | N | | | X | 1 | |
| LL3mw-244-120617-gw | ↓ | 1110 | G | W | N | N | | | X | 1 | |

240-88967 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: |
|---|---|---|---|

| Relinquished by | Date/Time | Company | Received by | Date/Time | Company |
|---|---|---|---|---|---|
| Liz Busby | 1730 12/6/17 | Cardno | R | 12/6/17 1530 | TA-KC |
| Relinquished by: | Date/Time: 12/6/17 1620 | Company TA-KC | Received by: | Date/Time: 12-6-17 1620 | Company 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:



12/07/2017

**TestAmerica Canton Sample Receipt Form/Narrative** **Login # : 289467**
**Canton Facility**

Client CARDNO Site Name —
Cooler Received on 12-6-17 Opened on 12-6-17
FedEx: 1st Grd Exp UPS FAS Clipper Client Drop Off TestAmerica Courier Other

Cooler unpacked by: RP

**Receipt After-hours**: Drop-off Date/Time Storage Location

TestAmerica Cooler # Foam Box Client Cooler Box Other
Packing material used: Bubble Wrap Foam Plastic Bag None Other
COOLANT: Wet Ice Blue Ice Dry Ice Water None

1. Cooler temperature upon receipt ☐ See Multiple Cooler Form
IR GUN# IR-8 (CF **-0.3** °C) Observed Cooler Temp. 0.6 °C Corrected Cooler Temp. 0.5 °C
IR GUN #36 (CF **+0.3**°C) Observed Cooler Temp. ____ °C Corrected Cooler Temp. ____ °C
~~IR GUN # 627 (CF **-1.3**°C) Observed Cooler Temp. ____ °C Corrected Cooler Temp. ____ °C~~

| | | |
|---|---|---|
| 2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity — | Yes | No |
| -Were the seals on the outside of the cooler(s) signed & dated? | Yes | No NA |
| -Were tamper/custody seals on the bottle(s) or bottle kits (LLHg/MeHg)? | Yes | No |
| -Were tamper/custody seals intact and uncompromised? | Yes | No NA |
| 3. Shippers' packing slip attached to the cooler(s)? | Yes | No |
| 4. Did custody papers accompany the sample(s)? | Yes | No |
| 5. Were the custody papers relinquished & signed in the appropriate place? | Yes | No |
| 6. Was/were the person(s) who collected the samples clearly identified on the COC? | Yes | No |
| 7. Did all bottles arrive in good condition (Unbroken)? | Yes | No |
| 8. Could all bottle labels be reconciled with the COC? | Yes | No |
| 9. Were correct bottle(s) used for the test(s) indicated? | Yes | No |
| 10. Sufficient quantity received to perform indicated analyses? | Yes | No |
| 11. Are these work share samples? | Yes | No |
| If yes, Questions 12-16 have been checked at the originating laboratory. | | |
| 12. Were all preserved sample(s) at the correct pH upon receipt? | Yes | No NA pH Strip Lot# **HC730269** |
| 13. Were VOAs on the COC? | Yes | No |
| 14. Were air bubbles >6 mm in any VOA vials? ● ⬅ Larger than this. | Yes | No NA |
| 15. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot #____ | Yes | No |
| 16. Was a LL Hg or Me Hg trip blank present? ____ | Yes | No |

**Tests that are not checked for pH by Receiving:**
**VOAs**
**Oil and Grease**
**TOC**

Contacted PM ____ Date ____ by ____ via Verbal Voice Mail Other

Concerning ____

**16. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES**

Samples processed by:

**17. SAMPLE CONDITION**

Sample(s) ____ were received after the recommended holding time had expired.
Sample(s) ____ were received in a broken container.
Sample(s) ____ were received with bubble >6 mm in diameter. (Notify PM)

**18. SAMPLE PRESERVATION**

Sample(s) ____ were further preserved in the laboratory.
Time preserved: ____ Preservative(s) added/Lot number(s): ____

# Login Sample Receipt Checklist

Client: Cardno TEC, Inc

Job Number: 240-88967-1

**Login Number: 88967**
**List Number: 1**
**Creator: Martin, Elizabeth**

**List Source: TestAmerica Canton**

| 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. | N/A | |
| Sample custody seals, if present, are intact. | N/A | |
| 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. | True | Preservation labels on samples match COC |
| 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 | |