



Cokenergy, LLC

3210 Watling Street
Mail Code 2-991
East Chicago, Indiana 46312

January 16, 2020

Chief, Environmental Enforcement Section
Environment and Natural Resources Division
U.S. Department of Justice
Box 7611, Ben Franklin Station
Washington, DC 20044-7611
Re: DOJ No. 90-5-2-1-08555/1

Air Enforcement Division Director
U.S. Environmental Protection Agency
Office of Civil Enforcement
Air Enforcement Division
U.S. Environmental Protection Agency
1200 Pennsylvania Ave, NW Mail Code: 2242A
Washington, DC 20460

Compliance Tracker
Air Enforcement and Compliance Assurance Branch
U.S. Environmental Protection Agency – Region 5
77 West Jackson Blvd. AE-18J
Chicago, IL 60604-3590

Susan Tennenbaum
U.S. Environmental Protection Agency
Region 5
C-14J
77 West Jackson Blvd
Chicago, IL 60640

Including an electronic copy to:
R5airenforcement@epa.gov

Including an electronic copy to:
tennenbaum.susan@epa.gov

Phil Perry
Indiana Department of Environmental Management
Chief, Air Compliance and Enforcement Branch
100 North Senate Avenue
MC-61-53, IGCN 1003
Indianapolis, IN 46204-2251

Elizabeth A. Zlatos
Indiana Department of Environmental Management
Office of Legal Counsel
100 North Senate Avenue
MC-60-01, IGCN 1307
Indianapolis, IN 46204-2251

Including an electronic copy to:
bzlatos@idem.in.gov

Subject: Consent Decree, United States, et al. v. Indiana Harbor Coke Company, et al.
Cokenergy, LLC (Part 70 Permit No. T089-41033-00383)
Lead and VOC Stack Test Results Report – Cokenergy Stack 201

To Whom It May Concern:

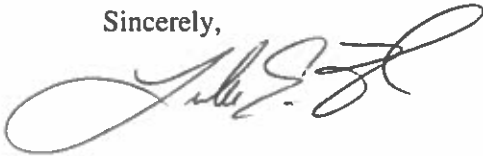
In accordance with the Enhanced Monitoring Requirements, Paragraph 22a. and 22b. of the consent decree (18-cv-35), Cokenergy, LLC has completed stack testing on the Main Stack (Stack 201) for lead and volatile organic compounds (VOC). The testing was completed over the period of December 4, 2019 through December 6, 2019 by AECOM Technical Services, Inc.

The VOC testing was completed on December 4, 2019 and the average of the three (3) test runs was 1.47 pound per hour. The lead testing was completed on December 5 and 6, 2019 and averaged 0.014 pound per hour.

If you have any questions regarding this report, please contact me at (219) 397-4626 or email at lford@primaryenergy.com.

I certify under penalty of law that this information was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my directions and my inquiry of the person(s) who manage the system, or the person(s) directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely,



Luke E. Ford
Director EH&S
Primary Energy

cc: East Chicago Public Library
2401 E. Columbus Drive
East Chicago, Indiana 46312

East Chicago Public Library
1008 W. Chicago Avenue
East Chicago, Indiana 46312

Attachments

File: X://675

**INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR MANAGEMENT
COMPLIANCE DATA SECTION
PART 70 OPERATING PERMIT
CERTIFICATION**

Source Name: Cokenergy LLC

Source Address: 3210 Watling Street, MC 2-991, East Chicago, Indiana 46312-1610

Part 70 Permit No.: T089-41033-00383

This certification shall be included when submitting monitoring, testing reports/results or other documents as required by this permit.

Please check what document is being certified:

- ☐ Annual Compliance Certification Letter
- ☐ Test Result (specify) _____
- ☒ Report (specify) Lead and VOC Stack Test Report Consent Decree (18-cv-35)
- ☐ Notification (specify) _____
- ☐ Affidavit (specify) _____
- ☐ Other (specify) _____

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

Signature: 

Printed Name: Seth Acheson

Title/Position: General Manager Cokenergy, LLC

Phone: (219) 397-4521

Date: January 16, 2020

Stack 201 Test Report for Consent Decree

**Test Dates:
December 4-6, 2019**

**Prepared for:
Cokenergy LLC
East Chicago, Indiana**

January 2020

COMPLIANCE TEST REPORT FOR CONSENT DECREE
STACK 201

TEST DATES:
December 4-6, 2019

Prepared for:

Cokenergy LLC
3210 Watling Street, MC 2-991
East Chicago, IN 46321

Prepared by:

AECOM
701 Scarboro Road
Oak Ridge, Tennessee 37830

January 2020

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ACRONYMS

AECOM	AECOM Technical Services, Inc.
CD	Consent Decree
CO ₂	Carbon Dioxide
Cokenergy	Cokenergy LLC
ETS	Emission Tracking System
FIA	Flame Ionization Analyzer
HNO ₃	Nitric Acid
IDEM	Indiana Department of Environmental Management
IHCC	Indiana Harbor Coke Company
O ₂	Oxygen
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

TEST CERTIFICATION SHEET

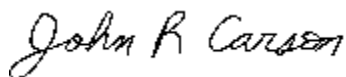
Emission Test Report for Stack 201 at Cokenergy LLC

Project Manager

I was the project manager for the testing and preparation of this report and certify that the data, information, and results in this report are accurate and true as described by the methods and procedures cited herein.

Data collected under the supervision of others is included in this report and is presumed to have been gathered in accordance with recognized standards.

AECOM



John R. Carson, PE

Principal Engineer

1.0 INTRODUCTION/OVERVIEW

AECOM Technical Services Inc. (AECOM) performed stack tests at Cokenergy LLC (Cokenergy) in East Chicago, Indiana, on December 4-6, 2019. The purpose of the tests was to measure emissions of lead and volatile organic compounds (VOC) from the main stack (Stack 201). A test protocol describing these tests was submitted to IDEM on October 8, 2019.

Cokenergy LLC, SunCoke Energy, Inc. and Indiana Harbor Coke Company entered into a Consent Decree (18-cv-35) (CD) with the United States and the State of Indiana to resolve alleged Clean Air Act violations. This CD became effective on October 25, 2018. Paragraph 22 of the CD requires stack testing of the Main Stack for lead and VOCs. The CD requires two (2) stack tests for lead and one (1) stack test for VOC within 5 years of the effective date. These tests satisfy the first of two lead stack tests and the VOC testing requirement.

Cokenergy's Director of Environment, Health, and Safety, Luke Ford, coordinated the testing. Indiana Department of Environmental Management's (IDEM) Steve Friend observed the VOC tests on December 4, 2019. The AECOM test team included John Carson, Bill Thomas, Willie Lea, and Shayne Jacobs.

The remaining sections of the report discuss the process, the test results, and the sampling methodology. The appendices contain production and Emission Tracking System (ETS) data, instrument and field data, analytical data, and calibration information.

2.0 PROCESS DESCRIPTION

Cokenergy recovers waste heat from the adjacent IHCC non-recovery metallurgical coke manufacturing facility. Non-recovery coke ovens, in contrast with byproduct coke ovens, combust all the coal volatiles within the oven and the heat from combustion is recovered to generate steam. Although some low pressure steam may be used locally, most of the steam is sent to a steam turbine to generate electricity. Cokenergy operates a flue gas desulfurization system, which incorporates a lime spray dryer and baghouse that removes PM and sulfur dioxide from the coke oven flue gases.

3.0 TEST RESULTS

This report summarizes the test results in this section and provides information on how the tests were performed in Section 4.0. The appendices contain production and ETS data, instrument and field data, analytical data, and calibration information.

The VOC emissions from Stack 201 were measured by three 1 hour test runs on December 4, 2019. Table 1 lists the results of the testing. The testing was performed using a flame ionization analyzer (FIA) with a methane “cutter” that operated in two modes. In the first mode, all hydrocarbons in the gas stream were measured. In the second mode, only methane was measured. The purpose of this design is to separate methane from non-methane hydrocarbons. Non-methane hydrocarbons were not detected, and the VOC emissions were calculated using the measured methane values.

Note that one bypass vent stack at the adjacent IHCC was open during the tests as some of the ovens below that stack were being rebuilt. The ETS reported a small amount of flue gas venting through the bypass vent stack (2.94%) during the tests. The measured VOC value was adjusted upward by this amount.

The Cokenergy Title V operating permit (T089-36965-00383) issued by IDEM does not have a VOC emission limit. However, the adjacent IHCC coke ovens (which are the source of the flue gases emitted from Stack 201) has a VOC limit in their IDEM-issued operating permit (T089-36982-00382). The measured VOC emission rate was within the IHCC limit.

The lead emissions from Stack 201 were measured by three 1.5 hour test runs on December 5-6, 2019. The test results are summarized in Table 2. A temporary plant shut down occurred during Test Run No. 3. The sampling trains were immediately stopped at that time. Testing resumed after the plant was running again at the target steam load.

As during the VOC testing, one bypass vent stack at the adjacent IHCC was open during the tests as ovens below that stack were being rebuilt. The ETS reported the same small amount

of flue gas venting through the bypass vent stack (2.94%) during the tests. The measured lead value was adjusted upward by this amount.

The Cokenergy Title V operating permit does not have a lead emission limit. However, the IHCC permit has a lead emission limit. The measured lead emission rate was within the IHCC limit.

Table 1. Stack 201 VOC Test Results

Parameters				
Run No.	1	2	3	Average
Date	12/4/2019	12/4/2019	12/4/2019	
Run times	10:30 - 11:30	12:10 - 13:10	13:35 - 14:35	
Sample time (minutes)	60	60	60	60
Steam Production (KPPH)	752	733	717	734
Moisture Content (% Vol.)	12.5	11.8	12.1	12.1
O2 (%)	13.0	13.0	13.1	13.0
CO2 (%)	5.2	5.2	5.2	5.20
Stack Gas Temperature (°F)	263	255	256	258
Gas Flow Rate (ACFM)	1,330,107	1,331,127	1,321,535	1,327,590
Gas Flow Rate (SCFM)	935,904	946,860	939,612	940,792
Methane Concentration (ppm - wet basis)	1.11	0.31	1.02	0.81
Non-methane concentration (ppm - wet basis)	ND	ND	ND	ND
VOC emission rate (lb/hour as carbon)*	1.94	0.55	1.79	1.43
Bypass Venting (from ETS report)	2.94%	2.94%	2.94%	
Total VOC emission rate adjusted for bypass venting (lb/hour)	2.00	0.57	1.85	1.47
Indiana Harbor (IHCC) VOC emission limit (lb/hour)				2.28

* Based on methane value

Table 2. Stack 201 Lead Test Results

Parameters				
Run No.	1	2	3	Average
Date	12/5/2019	12/5/2019	12/6/2019	
Run times	14:15-16:09	16:54-18:45	8:16-9:06; 14:50-15:58	
Sample time (minutes)	96	96	96	96
Steam production (KPPH)	712	752	765	743
Volume sampled (dscf)	53.13	52.62	54.13	53.29
Moisture Content (% Vol.)	11.9	12.7	12.3	12.3
Percent Isokinetic	100.8	101.2	101.4	101.1
O2 (%)	13.1	13.0	13.0	13.0
CO2 (%)	5.3	5.3	5.3	5.3
Stack Gas Temperature (°F)	272	272	270	271
Stack Velocity (ft/sec.)	84.4	84.2	85.1	84.6
Gas Flow Rate (ACFM)	1,289,154	1,285,495	1,300,006	1,291,552
Gas Flow Rate (SCFM)	906,895	903,600	923,530	911,342
Gas Flow Rate (DSCFM)	799,329	788,472	809,898	799,233
Lead concentration (ug/m3)	6.78	2.52	4.45	4.58
Lead emission rate (lb/hour)	0.020	0.0074	0.013	0.014
Bypass Venting (from ETS Report)	2.94%	2.94%	2.94%	
Total lead emission rate adjusted for bypass venting (lb/hour)	0.021	0.0077	0.014	0.014
Indiana Harbor (IHCC) Lead emission limit (lb/hour)				0.19

4.0 SAMPLING METHODOLOGY

The test methods are shown in Table 3. Each test was based on United States Environmental Protection Agency (USEPA) reference methods or alternative methods approved by USEPA.

Table 3. Test Methods

Pollutant	Test Method Reference	Comment
Traverse point layout	USEPA Method 1	
Gas flow rate	USEPA Method 2	
Gas molecular weight	USEPA Method 3A	Measured O ₂ and CO ₂
Moisture	USEPA Method 4	
Volatile Organic Compounds	USEPA Method 25A	
Lead	USEPA Method 12	

This section contains a brief description of the sampling and analytical procedures for each method that was employed during the testing.

4.1 Sampling Point Determination – USEPA Method 1

The number and location of velocity traverse points was determined according to the procedures outlined in USEPA Method 1. The sample location was inspected to ensure USEPA Method 1 criteria were met. All points were at least 1.0 inch from the stack wall, per Method 1. Stack 201 required a 12 point traverse.

4.2 Flue Gas Velocity and Volumetric Flow Rate – USEPA Method 2

The flue gas velocity and volumetric flow rate were determined according to the procedures outlined in USEPA Method 2. Velocity measurements were made using S-type Pitot tubes that had been calibrated according to USEPA Method 2 criteria. Differential pressures were measured with a fluid inclined manometer. Flue gas temperatures were measured with Type K thermocouples equipped with digital readouts.

Three velocity traverse runs were performed during each 1-hour VOC test run. The volumetric flow rate for each test run was determined by averaging the 3 individual velocity traverse runs.

4.3 Flue Gas Composition – USEPA Method 3A

Flue gas analysis for oxygen (O₂) and carbon dioxide (CO₂) concentrations to determine the flue gas dry molecular weight was performed in accordance with USEPA Method 3A utilizing continuous emissions monitors for each gas. The concentrations of O₂ and CO₂ were reported in percent levels.

4.4 Flue Gas Moisture Content – USEPA Method 4

The flue gas moisture content was determined according to the sampling and analytical procedures outlined in USEPA Method 4. The impingers in the Method 12 train were connected in series and placed in an ice bath to ensure condensation of the moisture in the flue gas stream. Any moisture that was not condensed in the impingers was adsorbed by silica gel; therefore, all moisture was collected and weighed.

4.5 VOC - USEPA Method 25A

The concentration of VOC was determined using a FIA. The sample was extracted from the stack using an in-stack filter connected to a heated probe and heated Teflon sample line. The FIA block was also heated. The FIA was also equipped with a “Methane Only” feature that allowed determination of both the methane and non-methane VOC concentrations. The sample gas was analyzed on a wet basis (i.e., not conditioned before being analyzed).

The analyzer was calibrated with zero gas and three levels of methane in air. A calibration error test was performed prior to the tests as specified in Method 25A to verify that the FIA response was linear. Zero and calibration drift measurements were performed after each test run.

4.6 Lead - USEPA Method 12

The lead sampling was performed using an USEPA Method 12 sampling train. The sample train included a Teflon-lined stainless steel nozzle connected to a glass probe liner. The outlet of the probe was connected to a heated, glass filter holder containing a quartz fiber filter. The outlet of the filter holder was connected to a series of ball-joint impingers. The first impinger was a modified Smith-Greenburg containing 100 mL of a 0.1N Nitric Acid (HNO_3) solution. The second impinger was a Smith-Greenburg also containing 100 mL of a 0.1N HNO_3 solution. The third impinger was an empty modified Smith-Greenburg. The fourth impinger contained approximately 200 grams of indicating silica gel.

At the conclusion of each Method 12 test run, the sample train was recovered by washing the nozzle/probe assembly three times with 0.1N HNO_3 , removing the filter to a Petri dish, and washing the front half of the filter holder with 0.1N HNO_3 . The impinger train was then disassembled and each impinger weighed to determine the moisture gained during the sample run. The liquid contents of impingers one and two were transferred into a sample container. Impingers 1, 2, and 3 were rinsed with 0.1N HNO_3 .

The sample filters, the 0.1N HNO_3 impinger and rinse solutions, a blank filter, and a reagent blank of the 0.1N HNO_3 solution were sent to the laboratory. The filter and liquid samples were processed as described in Method 12. The extracts from each test run (and the blanks) were composited for analysis by inductively coupled plasma mass spectrometry.

Appendix A
PRODUCTION AND ETS DATA

Cokenergy Stack 201
VOC Emissions Testing
Process Data
4-Dec-19

	Run 1	Run 2	Run 3	Average
Start Date	12/4/2019	12/4/2019	12/4/2019	
End Date	12/4/2019	12/4/2019	12/4/2019	
Start Time	10:30	12:10	13:35	
End Time	11:30	13:10	14:35	
Boiler FW Flow (KPPH)				
A1	42.03	41.02	40.14	41.06
A2	46.80	45.75	44.80	45.78
A3	47.86	46.67	46.01	46.85
A4	47.36	46.01	45.11	46.16
B1	0.00	0.00	0.00	0.00
B2	62.84	59.40	56.13	59.46
B3	61.07	58.37	55.32	58.25
B4	60.13	58.35	55.56	58.01
C1	40.07	40.71	40.53	40.44
C2	47.67	46.98	46.55	47.07
C3	47.02	46.35	45.55	46.30
C4	41.67	40.73	39.95	40.78
D1	43.91	43.74	44.41	44.02
D2	56.46	54.84	54.36	55.22
D3	57.19	56.03	55.32	56.18
D4	51.26	49.43	49.17	49.95
Steam From Boilers (KPPH)	751.92	733.30	716.63	733.95
Baghouse 1 DP in. WC	10.34	10.25	9.88	10.15
Baghouse 2 DP in. WC	10.15	10.08	9.73	9.99
Stack O2, %	13.13	13.27	13.40	13.27
Stack SO2, ppm	182.16	175.79	181.23	179.73
Stack Opacity, %	2.00	1.99	2.01	2.00

**Cokenergy Stack 201
Lead Emissions Testing
Process Data
December 5 & 6, 2019**

	Run 1	Run 2	Run 3*	Average
Start Date	12/5/2019	12/5/2019	12/6/2019	
End Date	12/5/2019	12/5/2019	12/6/2019	
Start Time	14:15	16:54	8:16	
End Time	16:09	18:45	15:58	
Boiler FW Flow (KPPH)				
A1	44.92	40.43	47.18	44.17
A2	47.99	43.99	50.75	47.58
A3	47.71	51.22	48.45	49.13
A4	45.90	55.71	51.28	50.96
B1	0.00	0.00	0.00	0.00
B2	55.14	51.65	58.24	55.01
B3	58.29	54.96	60.94	58.06
B4	55.18	52.39	59.08	55.55
C1	36.65	51.84	44.00	44.16
C2	45.17	62.79	48.29	52.09
C3	46.54	60.44	48.16	51.71
C4	41.15	48.33	41.79	43.76
D1	40.23	37.82	46.46	41.50
D2	48.54	45.65	54.57	49.59
D3	49.52	46.96	58.15	51.54
D4	50.90	47.77	49.66	49.44
Steam From Boilers (KPPH)	712.39	751.50	765.20	743.03
Baghouse 1 DP in. WC	9.99	9.87	10.15	10.00
Baghouse 2 DP in. WC	9.91	9.80	10.03	9.91
Stack O2, %	13.45	12.99	13.15	13.20
Stack SO2, ppm	166.59	196.31	181.49	181.46
Stack Opacity, %	2.03	1.94	2.21	2.06

*There was a plant trip during run 3. The testing was suspended at 9:02 AM and resumed at 14:50.

1/13/20 4:08 PM

Permit Compliance Summary 20191204

Constants Dated
20191108

Update Date

SO₂

3-Hour Block	Average Coal Charged (tons/hour)	Plant-Wide Venting %	Vented SO ₂ Rate lbs/hr	Main Stack SO ₂ Concentration PPM	Main Stack Flow DSCFM	Main Stack SO ₂ Rate lbs/hr	Total Plant-Wide SO ₂ Rate lbs/hr
0 - 3:00	206.94	2.94%	84.3	200.33	687,425	1372	1457
3 - 6:00	206.94	2.94%	84.3	199.67	699,418	1392	1476
6 - 9:00	206.94	2.94%	84.3	179.17	717,448	1281	1365
9 - 12:00	206.94	2.94%	84.3	181.00	694,767	1253	1337
12 - 15:00	206.94	2.94%	84.3	177.33	649,509	1148	1232
15 - 18:00	206.94	2.94%	84.3	184.92	705,758	1301	1385
18 - 21:00	206.94	2.94%	84.3	185.83	681,716	1262	1347
21 - 24:00	206.94	2.94%	84.3	181.58	680,989	1232	1317
24-Hour AVG	206.94	2.94%	84.3	186.23	689,629	1280	1364
Method	Two Day Avg			Running Avg	Manual		

Venting Summary 12 / 04 / 2019

	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
ovens under stack	17	17	16	17	17	16	17	17	17	17	16	17	17	16	17	17
off line ovens	0	0	0	0	9	0	0	0	0	0	0	0	1	0	0	1
on line ovens	17	17	16	17	8	16	17	17	17	17	16	17	16	16	17	16
oven correction to venting	100.0%	100.0%	100.0%	100.0%	47.1%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	94.1%	100.0%	100.0%	94.1%

268	96.0%
11	
257	

[illegible][illegible]

1/13/20 4:08 PM

Permit Compliance Summary

20191205

Constants Dated
20191108

Update Date

SO₂

3-Hour Block	Average Coal Charged (tons/hour)	Plant-Wide Venting %	Vented SO ₂ Rate lbs/hr	Main Stack SO ₂ Concentration PPM	Main Stack Flow DSCFM	Main Stack SO ₂ Rate lbs/hr	Total Plant-Wide SO ₂ Rate lbs/hr
0 - 3:00	211.93	2.94%	86.3	181.42	689,270	1246	1332
3 - 6:00	211.93	2.94%	86.3	183.00	690,809	1260	1346
6 - 9:00	211.93	2.94%	86.3	165.58	707,497	1167	1254
9 - 12:00	211.93	2.94%	86.3	169.25	691,723	1167	1253
12 - 15:00	211.93	2.94%	86.3	160.50	686,998	1030	1117
15 - 18:00	211.93	2.94%	86.3	185.42	677,892	1253	1339
18 - 21:00	211.93	2.94%	86.3	195.75	677,952	1322	1409
21 - 24:00	211.93	2.94%	86.3	194.25	710,665	1376	1462
24-Hour AVG	211.93	2.94%	86.3	178.15	691,601	1228	1314
Method	Two Day Avg			Running Avg	Manual		

Venting Summary 12 / 05 / 2019

	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
ovens under slack	17	17	16	17	17	16	17	17	17	17	16	17	17	16	17	17
off line ovens	0	0	0	0	9	0	0	0	0	0	0	0	1	0	0	1
on line ovens	17	17	16	17	8	16	17	17	17	17	16	17	16	16	17	1
oven correction to venting	100.0%	100.0%	100.0%	100.0%	47.1%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	94.1%	100.0%	100.0%	94.1%

268	96.0%
11	
257	

96.0%[illegible][illegible]2.94%

1/13/20 4:08 PM

Permit Compliance Summary

20191206

SO₂ Constants Dated 20191206 Update Date

3-Hour Block	Average Coal Charged (tons/hour)	Plant-Wide Venting %	Vented SO ₂ Rate lbs/hr	Main Stack SO ₂ Concentration PPM	Main Stack Flow DSCFM	Main Stack SO ₂ Rate lbs/hr	Total Plant-Wide SO ₂ Rate lbs/hr
0 - 3:00	198.33	2.94%	80.4	190.56	677,866	1287	1368
3 - 6:00	198.33	2.94%	80.4	202.83	682,813	1380	1461
6 - 9:00	198.33	3.10%	84.7	182.83	693,563	1264	1348
9 - 12:00	198.33	46.45%	1270.2	164.25	443,156	725	1996
12 - 15:00	198.33	6.33%	173.2	166.08	670,247	1109	1283
15 - 18:00	198.33	2.94%	80.4	181.42	686,604	1241	1322
18 - 21:00	198.33	2.94%	80.4	173.25	679,646	1173	1254
21 - 24:00	198.33	2.94%	80.4	170.92	706,278	1203	1283
24-Hour AVG	198.33	8.82%	241.3	179.02	655,022	1173	1414
Method	Two Day Avg			Running Avg	Manual		

Venting Summary 12/06/2019

	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
ovens under stack	17	17	16	17	17	16	17	17	17	17	16	17	17	16	17	17
off line ovens	0	0	0	0	9	0	0	0	0	0	0	0	1	0	0	1
on line ovens	17	17	16	17	8	16	17	17	17	17	16	17	16	16	17	16
oven correction to venting	100.0%	100.0%	100.0%	100.0%	47.1%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	94.1%	100.0%	100.0%	94.1%

268
11
257
96.0%

	Corrected venting percentage															
	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
3-Hour Block																
0 - 3:00	0.00%	0.00%	0.00%	0.00%	47.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
3 - 6:00	0.00%	0.00%	0.00%	0.00%	47.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
6 - 9:00	0.00%	0.00%	0.00%	0.00%	47.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.80%	0.00%	0.02%	0.30%
9 - 12:00	46.27%	46.50%	38.02%	40.39%	47.06%	49.08%	33.76%	29.57%	40.30%	51.53%	18.40%	58.40%	58.14%	41.90%	61.22%	48.64%
12 - 15:00	0.00%	0.00%	0.00%	0.00%	47.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
15 - 18:00	0.00%	0.00%	0.00%	0.00%	47.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
18 - 21:00	0.00%	0.00%	0.00%	0.00%	47.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
21 - 24:00	0.00%	0.00%	0.00%	0.00%	47.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
24-Hour AVG	5.78%	5.81%	4.75%	5.05%	47.06%	6.14%	4.22%	3.70%	5.04%	6.44%	2.30%	18.51%	7.37%	5.24%	7.65%	6.12%

Plant Wide Average
2.9%
2.9%
3.1%
46.5%
6.3%
2.9%
2.9%
8.82%

Appendix B
STACK CALCULATIONS AND FIELD DATA

Plant Name	Cokenergy
Sampling Location	Main Stack
Date	4-Dec-19
CEM Operator	Bill Thomas
Project Number	60616835

Note: Times shown are EST

Run No.	Start Time	Stop Time	Start - Stop Time	Reference Method Obs. Value						
				O ₂	CO ₂	THC	NMHC	CH ₄	Moisture	Flow Rate
1	1130	1230	1130 - 1230	12.7	5.1	0.48	-0.61	1.11	0.1248	935904
2	1310	1410	1310 - 1410	12.8	5.1	-0.05	-0.37	0.31	0.1181	946860
3	1435	1535	1435 - 1535	13.0	5.1	0.62	-0.39	1.02	0.1213	939612
4										
5										
6										
7										
8										
9										
10										
11										
12										

CEM Data Correction Data Sheet

Plant Name	Cokenergy
Sampling Location	Main Stack
Date	4-Dec-19
CEM Operator	Bill Thomas
Project Number	60616835
Pollutant	O ₂

Run No.	Start Time	Stop Time	Obs. Conc. (% or ppm)	Calibration Data			Calibration Corrected Data (% or ppm)
				Cma	Co	Cm	
1	1130	1230	12.7	10.1	-0.1	9.8	13.0
2	1310	1410	12.8	10.1	-0.1	9.9	13.0
3	1435	1535	13.0	10.1	-0.1	10.0	13.1
4					-0.1	10.0	
5					-0.1	10.0	
6					-0.1	10.0	
7					-0.1	10.0	
8					-0.1	10.0	
9					-0.1	10.0	
10					-0.1	10.0	
11							
12							
							13.1

Calibration Error Correction

$$C_{gas} = (C_{obs} - C_o) * (C_{ma} / (C_m - C_o))$$

CEM Data Correction Data Sheet

Plant Name	Cokenergy
Sampling Location	Main Stack
Date	4-Dec-19
CEM Operator	Bill Thomas
Project Number	60616835
Pollutant	CO ₂

Run No.	Start Time	Stop Time	Obs. Conc. (% or ppm)	Calibration Data			Calibration Corrected Data (% or ppm)
				Cma	Co	Cm	
1	1130	1230	5.10	10.0	0.1	9.7	5.20
2	1310	1410	5.1	10.0	0.1	9.7	5.2
3	1435	1535	5.1	10.0	0.1	9.7	5.2
4					0.1	9.7	
5					0.1	9.7	
6					0.1	9.7	
7					0.1	9.7	
8					0.1	9.7	
9					0.1	9.7	
10					0.1	9.7	
11							
12							
							5.2

Calibration Error Correction

$$C_{gas} = (C_{obs} - C_o) * (C_{ma} / (C_m - C_o))$$

Reference Method Results
Source: Main Stack Cokenergy
Date: 12/4/19

	O2, %	CO2, %	THC, ppm	NMHC, ppm	CH4, ppm
12/4/2019 11:31	12.6	5.1	1.01	-0.24	1.25
12/4/2019 11:32	12.6	5.1	0.92	0.19	0.74
12/4/2019 11:33	12.6	5.2	0.87	-0.03	0.91
12/4/2019 11:34	12.6	5.1	0.82	0.02	0.81
12/4/2019 11:35	12.6	5.1	1.02	-0.10	1.13
12/4/2019 11:36	12.6	5.1	1.00	-1.53	3.01
12/4/2019 11:37	12.6	5.1	0.80	-1.91	2.90
12/4/2019 11:38	12.7	5.1	0.61	-1.57	2.19
12/4/2019 11:39	12.6	5.1	0.59	-0.93	1.52
12/4/2019 11:40	12.6	5.1	0.57	-0.65	1.22
12/4/2019 11:41	12.6	5.2	0.54	-0.81	1.35
12/4/2019 11:42	12.6	5.2	0.57	-0.64	1.21
12/4/2019 11:43	12.6	5.2	0.54	-0.54	1.08
12/4/2019 11:44	12.6	5.2	0.50	-0.86	1.36
12/4/2019 11:45	12.6	5.2	0.46	-1.01	1.47
12/4/2019 11:46	12.7	5.1	0.66	-0.73	1.39
12/4/2019 11:47	12.6	5.2	0.77	-1.35	2.11
12/4/2019 11:48	12.6	5.2	1.25	-0.30	1.56
12/4/2019 11:49	12.6	5.2	0.87	-0.63	1.50
12/4/2019 11:50	12.6	5.2	0.52	-0.82	1.34
12/4/2019 11:51	12.6	5.2	2.54	0.87	1.68
12/4/2019 11:52	12.6	5.2	1.78	-0.90	2.68
12/4/2019 11:53	12.7	5.2	0.47	-1.01	1.48
12/4/2019 11:54	12.7	5.2	0.39	-0.68	1.06
12/4/2019 11:55	13.1	5.2	0.33	-0.25	0.58
12/4/2019 11:56	13.0	5.1	0.28	-0.62	0.90
12/4/2019 11:57	12.9	5.2	0.36	-0.37	0.72
12/4/2019 11:58	12.8	5.2	0.64	-0.43	1.07
12/4/2019 11:59	12.8	5.2	0.32	-0.29	0.60
12/4/2019 12:00	12.8	5.2	0.29	-0.64	0.92
12/4/2019 12:01	12.7	5.1	0.29	-0.51	0.80
12/4/2019 12:02	12.8	5.2	0.74	-1.16	2.10
12/4/2019 12:03	12.8	5.1	0.48	-1.11	1.66
12/4/2019 12:04	12.8	5.2	0.23	-0.60	0.83
12/4/2019 12:05	12.8	5.2	0.22	-0.31	0.53
12/4/2019 12:06	12.7	5.2	0.20	-0.36	0.56
12/4/2019 12:07	12.8	5.2	0.23	-0.18	0.41
12/4/2019 12:08	13.1	5.2	0.26	-0.40	0.67
12/4/2019 12:09	12.8	5.1	0.25	-0.34	0.59
12/4/2019 12:10	12.7	5.2	0.20	-0.25	0.45
12/4/2019 12:11	12.7	5.1	0.17	-0.77	0.93
12/4/2019 12:12	12.7	5.1	0.14	-1.02	1.15
12/4/2019 12:13	12.7	5.1	0.15	-1.17	1.32
12/4/2019 12:14	12.7	5.1	0.13	-0.98	1.10
12/4/2019 12:15	12.7	5.1	0.25	-0.67	0.91
12/4/2019 12:16	12.7	5.2	0.65	-0.06	0.70
12/4/2019 12:17	12.7	5.1	0.14	-0.52	0.66
12/4/2019 12:18	12.7	5.1	0.12	-0.44	0.56
12/4/2019 12:19	12.7	5.1	0.12	-0.37	0.49
12/4/2019 12:20	12.7	5.1	0.13	-0.17	0.30
12/4/2019 12:21	12.7	5.1	0.12	-0.31	0.43
12/4/2019 12:22	12.8	5.1	0.13	-0.64	0.77
12/4/2019 12:23	12.8	5.1	0.14	-0.70	0.84
12/4/2019 12:24	12.8	5.1	0.16	-0.75	0.91
12/4/2019 12:25	12.9	5.1	0.12	-0.57	0.69
12/4/2019 12:26	13.5	5.1	0.10	-1.00	1.11
12/4/2019 12:27	13.2	5.1	0.10	-0.67	0.77
12/4/2019 12:28	13.0	5.1	0.14	-0.54	0.68
12/4/2019 12:29	13.0	5.1	0.28	-0.97	1.25
12/4/2019 12:30	13.0	5.2	0.12	-0.35	0.46

Run Average = 12.7 5.1 0.48 -0.61 1.11

Reference Method Results
Source: Main Stack Cokenergy
Date: 12/4/19

	O2, %	CO2, %	THC, ppm	NMHC, ppm	CH4, ppm
12/4/2019 13:11	12.9	5.1	-0.05	-0.59	0.54
12/4/2019 13:12	13.0	5.1	-0.02	-0.35	0.33
12/4/2019 13:13	12.9	5.1	-0.01	-0.14	0.13
12/4/2019 13:14	12.9	5.1	-0.04	-0.02	-0.02
12/4/2019 13:15	12.9	5.1	-0.05	-0.12	0.06
12/4/2019 13:16	12.8	5.1	-0.04	-0.32	0.28
12/4/2019 13:17	12.8	5.1	-0.05	-0.59	0.54
12/4/2019 13:18	12.8	5.2	-0.06	-0.55	0.49
12/4/2019 13:19	12.8	5.2	-0.07	-0.89	0.82
12/4/2019 13:20	12.7	5.2	-0.07	-0.69	0.62
12/4/2019 13:21	12.8	5.2	-0.08	-0.45	0.37
12/4/2019 13:22	12.8	5.1	-0.03	-0.31	0.28
12/4/2019 13:23	12.8	5.2	-0.03	-0.18	0.15
12/4/2019 13:24	12.8	5.2	-0.01	-0.37	0.37
12/4/2019 13:25	12.8	5.2	-0.04	-0.15	0.11
12/4/2019 13:26	12.8	5.1	-0.06	-0.20	0.14
12/4/2019 13:27	12.8	5.1	-0.09	-0.29	0.21
12/4/2019 13:28	12.8	5.1	-0.10	-0.43	0.33
12/4/2019 13:29	12.8	5.1	-0.13	-0.62	0.49
12/4/2019 13:30	12.8	5.1	-0.14	-0.50	0.36
12/4/2019 13:31	12.8	5.1	-0.14	-0.67	0.52
12/4/2019 13:32	12.8	5.1	-0.12	-0.75	0.63
12/4/2019 13:33	12.8	5.1	-0.11	-0.76	0.65
12/4/2019 13:34	12.8	5.1	-0.14	-0.48	0.33
12/4/2019 13:35	12.8	5.1	0.07	-0.26	0.32
12/4/2019 13:36	12.8	5.1	0.19	-0.43	0.61
12/4/2019 13:37	12.8	5.1	-0.01	-0.56	0.55
12/4/2019 13:38	12.8	5.1	-0.10	-0.19	0.09
12/4/2019 13:39	12.9	5.2	-0.11	-0.41	0.29
12/4/2019 13:40	12.9	5.1	-0.09	-0.57	0.48
12/4/2019 13:41	12.9	5.1	-0.10	-0.38	0.28
12/4/2019 13:42	12.8	5.1	-0.10	-0.26	0.16
12/4/2019 13:43	12.9	5.1	-0.11	-0.47	0.36
12/4/2019 13:44	12.9	5.1	-0.10	-0.43	0.33
12/4/2019 13:45	12.8	5.1	-0.12	-0.45	0.33
12/4/2019 13:46	12.9	5.1	-0.15	-0.43	0.28
12/4/2019 13:47	12.8	5.1	-0.17	-0.59	0.42
12/4/2019 13:48	12.9	5.1	0.35	0.22	0.13
12/4/2019 13:49	12.8	5.1	0.09	-0.31	0.40
12/4/2019 13:50	12.9	5.1	-0.18	-0.34	0.16
12/4/2019 13:51	12.8	5.1	0.13	-0.13	0.27
12/4/2019 13:52	12.9	5.1	0.79	-0.14	0.94
12/4/2019 13:53	12.9	5.1	-0.16	-0.19	0.03
12/4/2019 13:54	12.9	5.1	-0.16	-0.17	0.01
12/4/2019 13:55	12.8	5.1	-0.17	-0.11	-0.05
12/4/2019 13:56	12.9	5.1	-0.22	-0.36	0.15
12/4/2019 13:57	12.8	5.1	-0.12	0.00	-0.12
12/4/2019 13:58	12.9	5.1	0.16	0.04	0.12
12/4/2019 13:59	12.8	5.1	-0.16	-0.30	0.14
12/4/2019 14:00	12.8	5.1	-0.14	-0.21	0.08
12/4/2019 14:01	12.8	5.1	-0.14	-0.24	0.11
12/4/2019 14:02	12.9	5.1	0.28	-0.57	0.85
12/4/2019 14:03	12.9	5.1	0.06	-0.69	0.74
12/4/2019 14:04	12.9	5.1	-0.16	-0.19	0.03
12/4/2019 14:05	12.9	5.1	-0.14	-0.11	-0.03
12/4/2019 14:06	12.9	5.1	-0.16	-0.09	-0.08
12/4/2019 14:07	12.9	5.1	-0.17	-0.23	0.07
12/4/2019 14:08	12.9	5.1	-0.18	-0.86	0.67
12/4/2019 14:09	12.9	5.1	-0.17	-0.50	0.33
12/4/2019 14:10	12.9	5.1	-0.16	-0.86	0.70

Run Average = 12.8 5.1 -0.05 -0.37 0.31

Reference Method Results
Source: Main Stack Cokenergy
Date: 12/4/19

	O2, %	CO2, %	THC, ppm	NMHC, ppm	CH4, ppm
12/4/2019 14:36	12.9	5.1	0.70	-0.07	0.77
12/4/2019 14:37	13.0	5.0	1.19	0.32	0.87
12/4/2019 14:38	12.9	5.1	0.80	-0.75	1.55
12/4/2019 14:39	12.9	5.1	0.72	-0.22	0.93
12/4/2019 14:40	12.9	5.0	0.70	-0.32	1.02
12/4/2019 14:41	12.9	5.0	0.66	-0.24	0.90
12/4/2019 14:42	12.9	5.0	0.62	-0.29	0.92
12/4/2019 14:43	13.0	5.0	0.61	-0.24	0.86
12/4/2019 14:44	12.9	5.1	1.04	-0.04	1.09
12/4/2019 14:45	12.9	5.1	0.99	-0.03	1.03
12/4/2019 14:46	13.0	5.1	1.37	0.31	1.07
12/4/2019 14:47	13.0	5.1	0.65	-0.60	1.25
12/4/2019 14:48	13.0	5.1	0.63	-0.38	1.01
12/4/2019 14:49	13.0	5.1	0.62	-0.34	0.97
12/4/2019 14:50	13.0	5.1	0.61	-0.03	0.63
12/4/2019 14:51	13.0	5.0	0.59	-0.13	0.72
12/4/2019 14:52	13.0	5.1	0.62	-0.28	0.90
12/4/2019 14:53	13.0	5.0	0.61	-0.11	0.71
12/4/2019 14:54	13.0	5.0	0.57	-0.62	1.19
12/4/2019 14:55	13.0	5.0	0.58	-0.71	1.29
12/4/2019 14:56	13.0	5.0	0.60	-0.40	1.00
12/4/2019 14:57	13.0	5.0	0.57	-0.44	1.01
12/4/2019 14:58	13.0	5.0	0.75	-0.64	1.38
12/4/2019 14:59	13.0	5.0	0.64	-0.44	1.07
12/4/2019 15:00	13.0	5.0	0.56	-0.24	0.80
12/4/2019 15:01	13.0	5.0	0.56	-0.07	0.64
12/4/2019 15:02	13.0	5.0	0.56	-0.02	0.58
12/4/2019 15:03	13.0	5.0	0.57	-0.17	0.74
12/4/2019 15:04	13.0	5.0	0.60	-0.37	0.97
12/4/2019 15:05	13.0	5.0	0.61	-0.70	1.31
12/4/2019 15:06	13.0	5.0	0.58	-0.62	1.20
12/4/2019 15:07	13.0	5.0	0.57	-0.76	1.33
12/4/2019 15:08	13.0	5.0	0.57	-0.41	0.98
12/4/2019 15:09	13.0	5.1	0.63	-0.78	1.41
12/4/2019 15:10	13.0	5.1	0.61	-0.33	0.94
12/4/2019 15:11	13.0	5.0	0.62	-0.41	1.02
12/4/2019 15:12	13.0	5.0	0.60	-0.44	1.03
12/4/2019 15:13	13.0	5.0	0.59	-0.69	1.28
12/4/2019 15:14	13.0	5.0	0.55	-0.61	1.16
12/4/2019 15:15	13.0	5.0	0.52	-0.77	1.29
12/4/2019 15:16	13.0	5.0	0.56	-0.28	0.83
12/4/2019 15:17	13.0	5.1	0.56	-0.65	1.20
12/4/2019 15:18	13.0	5.1	0.56	-0.41	0.97
12/4/2019 15:19	13.0	5.1	0.56	-0.34	0.90
12/4/2019 15:20	13.0	5.1	0.57	-0.63	1.20
12/4/2019 15:21	13.0	5.1	0.54	-0.69	1.23
12/4/2019 15:22	13.0	5.1	0.52	-0.32	0.85
12/4/2019 15:23	13.0	5.1	0.51	-0.57	1.07
12/4/2019 15:24	13.0	5.1	0.58	-0.29	0.87
12/4/2019 15:25	13.0	5.1	0.54	-0.29	0.83
12/4/2019 15:26	13.0	5.1	0.48	-0.13	0.61
12/4/2019 15:27	13.0	5.1	0.53	-0.51	1.04
12/4/2019 15:28	13.0	5.1	0.54	-0.74	1.28
12/4/2019 15:29	13.0	5.1	0.51	-0.45	0.96
12/4/2019 15:30	13.0	5.1	0.51	-0.33	0.84
12/4/2019 15:31	13.0	5.1	0.48	-0.31	0.79
12/4/2019 15:32	13.1	5.1	0.47	-0.75	1.23
12/4/2019 15:33	13.0	5.1	0.48	-0.50	0.98
12/4/2019 15:34	13.1	5.1	0.47	-0.77	1.24
12/4/2019 15:35	13.0	5.1	0.66	-0.65	1.31

Run Average = 13.0 5.1 0.62 -0.39 1.02

CEM CALIBRATION DATA

Sampling Location

Date	Main Stack
Run Number	4-Dec-19
Start Time	1
Stop Time	1130
	1230

Plant Name

Plant Rep.	Cokenergy
Team Leader	Luke Ford
CEM Operator	John Carson
Project Number	Bill Thomas
	60616835

Analyzer Number	O2	Calibration Span
	CO2	20.99
	CO	20.67
	THC	15
	NOx	
	SO2	

Calibration Gas Specification (% of Span)	CALIBRATION ERROR CHECK				SYSTEM CAL CHECK					Calibration Correction Factors
	Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	Pre Run 1		Post Run 1		Drift (% of Span)	
					System Response	Syst. Bias (% of Span)	System Response	Syst. Bias (% of Span)		
O2 Zero	<20	0 UHP Nitrogen	0	0.0%	-0.1	-0.5%	-0.1	-0.5%	0.0%	-Co=0.1
O2 Mid	40-60	CC273267	9.8	-1.3%	9.8	0.0%	9.8	0.0%	0.0%	Cm=9.8
O2 High	100	CC126166	20.9	-0.4%						
CO2 Zero	<20	0 UHP Nitrogen	0.1	0.5%	0.1	0.0%	0.1	0.0%	0.0%	Co=0.1
CO2 Mid	40-60	CC273267	9.8	-0.9%	9.7	-0.5%	9.7	-0.5%	0.0%	Cm=9.7
CO2 High	100	CC126166	20.7	0.1%						
THC Zero	0	0 CEMS Zero Gas	0.11		-0.08		-0.23		-1.0%	
THC Low	25-35	SA11032	5.35	0.4%						
THC Mid	45-55	CC182395	8.68	1.4%	8.99		8.71		-1.9%	
THC High	80-90	15 CC232179	14.74							

$$\text{Calibration Error} = \left(\frac{\text{Analyzer Response} - \text{Calibration Value}}{\text{Analyzer Span}} \right) \times 100; \text{allowable error} = \pm 2\%, \pm 5\% \text{ for THC}$$

$$\text{System Bias} = \left(\frac{\text{System Response} - \text{Analyzer Response}}{\text{Analyzer Span}} \right) \times 100; \text{allowable error} = \pm 5\%$$

$$\text{Drift} = \left(\frac{\text{Post Test System Response} - \text{Pretest System Response}}{\text{Analyzer Span}} \right) \times 100; \text{allowable error} = \pm 3\%$$

$$\text{Co} = \frac{\text{Pretest System Zero Response} + \text{Post Test System Zero Response}}{2}$$

$$\text{Cm} = \frac{\text{Pretest System Upscale Response} + \text{Post Test System Upscale Response}}{2}$$

NR = Not required by EPA Method.

CEM CALIBRATION DATA

Sampling Location	Main Stack
Date	4-Dec-19
Run Number	3
Start Time	1435
Stop Time	1535

Plant Name	Cokenergy
Plant Rep.	Luke Ford
Team Leader	John Carson
CEM Operator	Bill Thomas
Project Number	60616835

Analyzer Number	O2
Calibration Span	20.99
	CO2
	20.67
	CO
	THC
	15
	NOx
	SO2

CALIBRATION ERROR CHECK				SYSTEM CAL CHECK				
Calibration Gas	Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	Pre Run 3		Post Run 3	
(% of Span)					System Response	Syst. Bias (% of Span)	System Response	Syst. Bias (% of Span)
O2 Zero	<20	0 UHP Nitrogen	0	0.0%	-0.1	-0.5%	-0.1	-0.5%
O2 Mid	40-60	CC273267	9.8	-1.3%	10	1.0%	9.9	0.5%
O2 High	100	CC126166	20.9	-0.4%				
CO2 Zero	<20	0 UHP Nitrogen	0.1	0.5%	0.1	0.0%	0.1	0.0%
CO2 Mid	40-60	CC273267	9.8	-0.9%	9.6	-1.0%	9.7	-0.5%
CO2 High	100	CC126166	20.7	0.1%				
THC Zero	0	0 CEMS Zero Gas	0.11		-0.37		-0.12	1.7%
THC Low	25-35	SA11032	5.35	0.4%				
THC Mid	45-55	CC182395	8.68	1.4%	9		9.06	0.4%
THC High	80-90	15 CC232179	14.74					

Calibration Error = $\left(\frac{\text{Analyzer Response} - \text{Calibration Value}}{\text{Analyzer Span}} \right) \times 100$; allowable error = $\pm 2\%$, $\pm 5\%$ for THC

System Bias = $\left(\frac{\text{System Response} - \text{Analyzer Response}}{\text{Analyzer Span}} \right) \times 100$; allowable error = $\pm 5\%$

Drift = $\left(\frac{\text{Post Test System Response} - \text{Pretest System Response}}{\text{Analyzer Span}} \right) \times 100$; allowable error = $\pm 3\%$

Co = $\frac{\text{Pretest System Zero Response} + \text{Post Test System Zero Response}}{2}$

Cm = $\frac{\text{Pretest System Upscale Response} + \text{Post Test System Upscale Response}}{2}$

NR = Not required by EPA Method.

Reference Method Direct Calibration Results

Source: Main Stack Cokenergy

Date: 12/4/19 NOTE: DAS time is EST; plant time is CST

	O2, %	CO2, %	THC, ppm
12/4/2019 9:49	-0.1	0.2	1.81
12/4/2019 9:50	0.0	0.1	1.85
12/4/2019 9:51	0.0	0.1	4.70
12/4/2019 9:52	-0.1	0.1	2.12
12/4/2019 9:53	17.9	13.8	1.72
12/4/2019 9:54	21.0	20.5	1.89
12/4/2019 9:55	20.9	20.8	2.00
12/4/2019 9:56	20.9	20.8	1.86
12/4/2019 9:57	20.9	20.7	2.18
12/4/2019 9:58	12.4	14.5	1.85
12/4/2019 9:59	9.8	9.8	1.48
12/4/2019 10:00	9.8	9.8	1.33

12/4/2019 10:36	4.8	9.8	0.72
12/4/2019 10:37	4.1	9.7	1.02
12/4/2019 10:38	-0.1	0.5	1.80
12/4/2019 10:39	-0.1	0.2	2.31
12/4/2019 10:40	-0.1	0.2	4.19
12/4/2019 10:41	-0.1	0.1	8.29
12/4/2019 10:42	-0.1	0.1	6.46
12/4/2019 10:43	-0.1	0.1	1.36
12/4/2019 10:44	-0.1	0.1	0.20
12/4/2019 10:45	-0.1	0.1	0.29
12/4/2019 10:46	-0.2	0.1	0.11
12/4/2019 10:47	2.7	0.1	5.03
12/4/2019 10:48	20.4	0.1	22.00
12/4/2019 10:49	20.5	0.1	18.15
12/4/2019 10:50	20.6	0.1	14.79
12/4/2019 10:51	20.6	0.1	14.82
12/4/2019 10:52	20.6	0.1	14.74
12/4/2019 10:53	20.2	0.3	11.40
12/4/2019 10:54	20.6	0.1	7.94
12/4/2019 10:55	20.7	0.1	8.25
12/4/2019 10:56	20.6	0.1	8.47
12/4/2019 10:57	20.7	0.1	8.68
12/4/2019 10:58	18.8	1.2	8.93
12/4/2019 10:59	20.7	0.1	4.94
12/4/2019 11:00	20.7	0.1	3.39
12/4/2019 11:01	20.7	0.1	3.54
12/4/2019 11:02	20.7	0.0	3.87
12/4/2019 11:03	20.7	0.1	4.34
12/4/2019 11:04	20.7	0.1	4.76
12/4/2019 11:05	20.7	0.0	5.01
12/4/2019 11:06	20.7	0.0	5.17
12/4/2019 11:07	20.7	0.1	5.27
12/4/2019 11:08	20.7	0.0	5.35

Reference Method Bias Check Results

Source: Main Stack Cokenergy

Date: 12/4/19

	O2, %	CO2, %	THC, ppm
12/4/2019 10:19	11.3	5.3	1.89
12/4/2019 10:20	0.1	1.8	0.88
12/4/2019 10:21	-0.1	0.2	2.30
12/4/2019 10:22	-0.1	0.2	-0.06
12/4/2019 10:23	-0.1	0.1	-0.21
12/4/2019 10:24	-0.1	0.1	-0.08
12/4/2019 10:25	-0.1	0.1	0.07
12/4/2019 10:26	-0.1	0.1	0.27
12/4/2019 10:27	4.2	2.7	0.46
12/4/2019 10:28	9.8	9.6	0.73
12/4/2019 10:29	9.8	9.7	0.97
12/4/2019 10:30	9.8	9.7	1.13
12/4/2019 11:11	16.0	2.2	6.33
12/4/2019 11:12	3.9	1.4	1.33
12/4/2019 11:13	-0.1	0.1	-0.71
12/4/2019 11:14	-0.1	0.1	-0.43
12/4/2019 11:15	-0.1	0.0	-0.06
12/4/2019 11:16	-0.1	0.0	-0.08
12/4/2019 11:17	3.6	0.8	1.59
12/4/2019 11:18	14.8	3.0	7.69
12/4/2019 11:19	20.6	0.1	9.99
12/4/2019 11:20	20.6	0.0	9.25
12/4/2019 11:21	20.7	0.0	9.04
12/4/2019 11:22	20.7	0.0	8.99

Reference Method Bias Check Results

Source: Main Stack Cokenergy

Date: 12/4/19

	SO2, ppm	O2, %	CO2, %	THC ppm
12/4/2019 12:35	89.0	7.1	2.8	-0.04
12/4/2019 12:36	7.5	-0.1	0.1	-0.25
12/4/2019 12:37	3.8	-0.1	0.1	-0.23
12/4/2019 12:38	2.9	0.7	0.2	-0.23
12/4/2019 12:39	4.2	9.7	8.4	-0.24
12/4/2019 12:40	1.4	9.8	9.6	-0.38
12/4/2019 12:41	1.0	9.8	9.7	-0.37
12/4/2019 12:42	0.6	9.8	9.7	-0.37
12/4/2019 12:50	167.5	4.9	9.8	-0.76
12/4/2019 12:51	112.4	14.2	5.8	0.86
12/4/2019 12:52	9.7	20.7	0.2	8.29
12/4/2019 12:53	4.0	20.7	0.2	8.42
12/4/2019 12:54	2.2	20.7	0.2	8.70
12/4/2019 12:55	1.6	20.7	0.1	8.70
12/4/2019 12:56	1.1	20.7	0.1	8.71

Reference Method Bias Check Results

Source: Main Stack Cokenergy

Date: 12/4/19

	SO2, ppm	O2, %	CO2, %	THC ppm
12/4/2019 14:12	168.6	12.9	5.1	-0.16
12/4/2019 14:13	104.6	15.0	5.1	-0.31
12/4/2019 14:14	18.9	17.4	5.1	-1.04
12/4/2019 14:15	18.1	17.2	4.8	-0.98
12/4/2019 14:16	12.5	0.3	0.3	-0.45
12/4/2019 14:17	3.0	-0.1	0.1	-0.39
12/4/2019 14:18	1.7	-0.1	0.1	-0.37
12/4/2019 14:19	1.1	0.3	0.1	-0.18
12/4/2019 14:20	20.5	8.9	6.1	0.17
12/4/2019 14:21	1.6	9.9	9.6	0.34
12/4/2019 14:22	0.8	10.0	9.6	0.33
12/4/2019 14:27	163.7	4.9	9.7	-0.18
12/4/2019 14:28	166.0	5.1	9.8	-0.16
12/4/2019 14:29	75.9	17.6	3.8	1.99
12/4/2019 14:30	7.0	20.8	0.2	8.93
12/4/2019 14:31	3.1	20.8	0.2	9.00

Reference Method Bias Check Results

Source: Main Stack Cokenergy

Date: 12/4/19

	SO2, ppm	O2, %	CO2, %	THC ppm
12/4/2019 15:59	182.7	13.5	5.2	0.79
12/4/2019 16:00	26.8	1.0	0.9	0.92
12/4/2019 16:01	5.3	-0.1	0.1	-0.24
12/4/2019 16:02	2.6	-0.1	0.1	-0.12
12/4/2019 16:03	5.0	0.7	0.2	-0.06
12/4/2019 16:04	6.9	9.4	7.8	0.21
12/4/2019 16:05	1.1	9.9	9.7	0.23
12/4/2019 16:06	0.6	9.9	9.7	0.24
12/4/2019 16:07	0.4	9.9	9.7	0.26
12/4/2019 16:14	166.2	4.9	9.9	-0.06
12/4/2019 16:15	166.8	4.9	9.9	-0.16
12/4/2019 16:16	114.0	13.9	6.3	2.29
12/4/2019 16:17	9.3	20.7	0.3	8.11
12/4/2019 16:18	3.4	20.8	0.2	9.00
12/4/2019 16:19	1.9	20.8	0.2	9.09
12/4/2019 16:20	1.2	20.8	0.2	9.06

Velocity Traverse Data

Plant Name: Cokenergy

Sampling Location: Main Stack

Project Number: 60616835

Note: Time shown is CST

Run #	1			2			3		
Date	4-Dec-19			4-Dec-19			4-Dec-19		
Time	1032-1041			1055-1107			1118-1129		
Location	Main Stack			Main Stack			Main Stack		
Pitot Tube Coefficient	0.84			0.84			0.84		
Stack Diameter, ft	18			18			18		
Stack Length, ft				0			0		
Stack Area, sq. ft.	254.5			254.5			254.5		
Barometric Pressure, in. Hg	28.902			28.902			28.902		
Static Pressure, in. H ₂ O	-1.20			-1.2			-1.2		
Stack Gas O ₂ , %	12.93%			13.13%			13.24%		
Stack Gas CO ₂ , %	5.20%			5.30%			5.20%		
Stack Gas N ₂ , %	81.87%			81.56%			81.56%		
Dry Gas Molecular Weight	29.349153			29.373937			29.361371		
Moisture Content, %	12.48%			12.48%			12.48%		
Wet Gas Molecular Weight	27.93			27.95			27.94		
Stack Gas Flow, acfm	1340700			1341712			1307909		
Stack Gas Flow, scfm	937476			942938			927299		
Traverse Point	Stack Temp.	Velocity Pressure	Sq. Root of Vel. Press.	Stack Temp.	Velocity Pressure	Sq. Root of Vel. Press.	Stack Temp.	Velocity Pressure	Sq. Root of Vel. Press.
1	274	1.5	1.22	261	1.5	1.22	260	1.6	1.26
2	274	1.6	1.26	261	1.8	1.34	261	1.5	1.22
3	273	1.3	1.14	263	1.3	1.14	262	1	1.00
4	263	2.1	1.45	262	2	1.41	261	1.8	1.34
5	267	2	1.41	264	1.9	1.38	265	1.9	1.38
6	268	1.9	1.38	267	1.7	1.30	266	1.6	1.26
7	265	2	1.41	264	1.8	1.34	257	1.7	1.30
8	267	1.8	1.34	265	2	1.41	260	1.9	1.38
9	268	1.5	1.22	266	1.7	1.30	263	1.8	1.34
10	262	1.6	1.26	263	1.4	1.18	243	1.7	1.30
11	264	1.5	1.22	265	1.6	1.26	244	1.5	1.22
12	266	1.2	1.10	266	1.4	1.18	249	1.3	1.14
Average	268		1.29	264		1.29	258		1.26

Velocity Traverse Data

Plant Name: Cokenergy
 Sampling Location: Main Stack
 Project Number: 60616835

Note: Time shown is CST

Run #	4			5			6		
Date	4-Dec-19			4-Dec-19			4-Dec-19		
Time	1214-1222			1234-1242			1254-1304		
Location	Main Stack			Main Stack			Main Stack		
Pitot Tube Coefficient	0.84			0.84			0.84		
Stack Diameter, ft	18			18			18		
Stack Length, ft	0			0			0		
Stack Area, sq. ft.	254.5			254.5			254.5		
Barometric Pressure, in. Hg	28.902			28.902			28.902		
Static Pressure, in. H ₂ O	-1.2			-1.2			-1.2		
Stack Gas O ₂ , %	13.00%			13.00%			13.10%		
Stack Gas CO ₂ , %	5.23%			5.23%			5.23%		
Stack Gas N ₂ , %	81.77%			81.77%			81.67%		
Dry Gas Molecular Weight	29.3564			29.3564			29.360432		
Moisture Content, %	11.81%			11.81%			11.81%		
Wet Gas Molecular Weight	28.02			28.02			28.02		
Stack Gas Flow, acfm	1322708			1328935			1341737		
Stack Gas Flow, scfm	937682			945943			956953		
Traverse Point	Stack Temp.	Velocity Pressure	Sq. Root of Vel. Press.	Stack Temp.	Velocity Pressure	Sq. Root of Vel. Press.	Stack Temp.	Velocity Pressure	Sq. Root of Vel. Press.
1	255	1.6	1.26	247	1.7	1.30	250	1.7	1.30
2	256	1.7	1.30	250	1.6	1.26	251	1.6	1.26
3	258	1.3	1.14	251	1.4	1.18	252	1.1	1.05
4	253	1.8	1.34	252	1.8	1.34	253	2.1	1.45
5	258	1.9	1.38	256	2.1	1.45	255	2.1	1.45
6	261	1.7	1.30	258	1.6	1.26	258	1.6	1.26
7	261	1.8	1.34	258	1.8	1.34	252	1.8	1.34
8	262	1.6	1.26	260	1.9	1.38	254	2	1.41
9	264	1.7	1.30	262	1.6	1.26	257	1.9	1.38
10	252	1.5	1.22	250	1.5	1.22	251	1.5	1.22
11	254	1.6	1.26	256	1.7	1.30	252	1.7	1.30
12	258	1.5	1.22	257	1.3	1.14	255	1.4	1.18
Average	258		1.28	255		1.29	253		1.30

Velocity Traverse Data

Plant Name: Cokenergy

Sampling Location: Main Stack

Project Number: 60616835

Note: Time shown is CST

Run #	7			8			9		
Date	4-Dec-19			4-Dec-19			4-Dec-19		
Time	1338-1346			1400-1410			1418-1427		
Location	Main Stack			Main Stack			Main Stack		
Pitot Tube Coefficient	0.84			0.84			0.84		
Stack Diameter, ft	18			18			18		
Stack Length, ft	0			0			0		
Stack Area, sq. ft.	254.5			254.5			254.5		
Barometric Pressure, in. Hg	28.902			28.902			28.902		
Static Pressure, in. H ₂ O	-1.2			-1.2			-1.2		
Stack Gas O ₂ , %	13.14%			13.14%			13.14%		
Stack Gas CO ₂ , %	5.12%			5.12%			5.23%		
Stack Gas N ₂ , %	81.74%			81.74%			81.63%		
Dry Gas Molecular Weight	29.345111			29.345111			29.361836		
Moisture Content, %	12.13%			12.13%			12.13%		
Wet Gas Molecular Weight	27.97			27.97			27.98		
Stack Gas Flow, acfm	1314621			1322663			1327321		
Stack Gas Flow, scfm	937175			939944			941718		
Traverse Point	Stack Temp.	Velocity Pressure	Sq. Root of Vel. Press.	Stack Temp.	Velocity Pressure	Sq. Root of Vel. Press.	Stack Temp.	Velocity Pressure	Sq. Root of Vel. Press.
1	250	1.7	1.30	252	1.7	1.30	252	1.6	1.26
2	251	1.7	1.30	252	1.5	1.22	253	1.7	1.30
3	253	1.2	1.10	253	1.2	1.10	254	1.2	1.10
4	251	2	1.41	259	2	1.41	257	2	1.41
5	254	2.1	1.45	261	2	1.41	260	2.2	1.48
6	257	1.7	1.30	262	1.7	1.30	261	1.5	1.22
7	252	1.5	1.22	253	1.8	1.34	259	1.7	1.30
8	258	1.6	1.26	255	2.1	1.45	262	1.8	1.34
9	259	1.7	1.30	258	1.5	1.22	263	1.7	1.30
10	250	1.5	1.22	254	1.4	1.18	253	1.4	1.18
11	253	1.6	1.26	255	1.5	1.22	254	1.6	1.26
12	256	1.3	1.14	257	1.4	1.18	257	1.5	1.22
Average	254		1.27	256		1.28	257		1.28

Plant Name: Cokenergy
Sampling Location: Main Stack
Project Number: 60616835
Note: Time shown is CST

Cokenergy
Main Stack
60616835

Note: Time shown is CST

Run #	1			2			3			4		
Date	4-Dec-19			4-Dec-19			4-Dec-19			4-Dec-19		
Time	1030-1130			1212-1312			1337-1437					
Location	Main Stack			Main Stack			Main Stack			Main Stack		
	Initial Wt.	Final Wt.	Wt. Gain	Initial Wt.	Final Wt.	Wt. Gain	Initial Wt.	Final Wt.	Wt. Gain	Initial Wt.	Final Wt.	Wt. Gain
Impinger #1	688.7	769.1	80.4	685.6	760.2	74.6	769.1	845.1	76	728.5		
Impinger #2	676.2	676.3	0.1	669.2	668.1	-1.1	676.3	677.5	1.2	707.7		
Impinger #3	611.8	611.8	0	605.3	605.4	0.1	611.8	612.6	0.8	603.6		
Impinger #4	848.2	853.8	5.6	801.5	808.7	7.2	853.8	859	5.2	959.4		
Condensed Water, g		86.1			80.8			83.2			0	
DGMCF		0.976			0.976			0.976			0.976	
Barometric Pressure (" Hg)		28.902			28.90			28.90			28.90	
Average DGM Temp (°F)		57			63			65				
Average Delta H (in wc)		0.75			0.75			0.75				
Meter Volume (acf)		29.542			29.859			29.926				
Corrected Volume of Gas sampled (acf)		28.833			29.142			29.208			0.000	
Volume at Meter (dscf)		28.499			28.474			28.429			0.000	
Flue Gas Moisture (%)		12.48%			11.81%			12.13%			#DIV/0!	



Test No.: 7-1

Location: Main Stack

Personnel: WJL/57

Start Test : 10:32

End Test : 10:41

Stack Dimensions : Circular; 216" diameter

Barometric Pressure, Pbar : 28.90 in. Hg

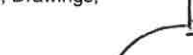
Static Pressure: -1.2 in. H₂O



Pitot Positive Leak Check : > 3 in. H₂O

Pitot Negative Leak Check : > 3 in. H₂O

Notes, Drawings;



A hand-drawn diagram of a circle with four points labeled A, B, C, and D. Point A is on the left, B is at the top, C is on the right, and D is at the bottom. An arrow points from the text 'CMS Probe' to point A.

Pitot Tube Type : S Type

I.D. No. : HST 8

Pitot Coefficient, C_p : 0.84

Manometer Type : Oil

I.D. No. : URS-001

Thermometer Type : Type K

I.D. No. : UKS-001



VELOCITY TRAVERSE DATA SHEET

Project Name: Annual SO2 RATA Test

Test No.: 1-3

Project No.: 60616835

Location: Main Stack

Date: 12/4/19

Personnel: WL/SJ

Traverse Point	Velocity Pressure	Stack Temperature	
A-1	1.6	260	
A-2	1.5	261	
A-3	1.0	262	
B-1	1.8	261	
B-2	1.9	265	
B-3	1.6	266	
C-1	1.7	257	
C-2	1.9	260	
C-3	1.8	263	
D-1	1.7	243	
D-2	1.5	244	
D-3	1.3	249	
Average			

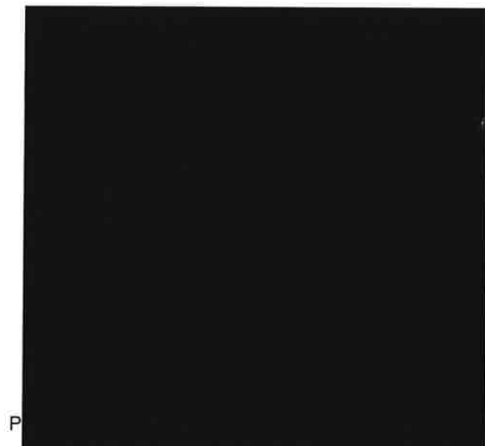
Start Test : 11:18

End Test : 11:29

Stack Dimensions : Circular; 216" diameter

Barometric Pressure, Pbar : 28.90 in. Hg

Static Pressure : -1.2 in. H₂O



Pitot Positive Leak Check : ✓ > 3 in. H₂O

Pitot Negative Leak Check : ✓ > 3 in. H₂O

Notes, Drawings:

Pitot Tube Type : S Type

I.D. No. : HST8

Pitot Coefficient, Cp : 0.84

Manometer Type : Oil

I.D. No. : URS-001

Thermometer Type : Type K

I.D. No. : URS-001



EPA M4 DATA SHEET

Project Name: Annual SO2 RATA TestTest No.: M-1Stack Dimensions: Circular; 216"Project No.: 60616835Location: Main StackBarometric Pressure: 28.90 in. HgDate: 12/13/19
4Personnel: WL/SJStatic Pressure: -1.2 in. H₂OAverage ΔH: 0.75

VELOCITY TRAVERSE		
TRAVERSE POINT	VELOCITY PRESSURE (ΔP)	STACK TEMP.
Average		

IMPINGER WEIGHTS			
Impinger	Initial Wt.	Final Wt.	Total
1	688.7	769.1	804
2	676.2	676.3	0.1
3	611.8	611.8	0.0
4	848.7	853.8	516.15
Total			85.6

PITOT LEAK CHECK (> 3")	
TRAIN LEAK CHECK (ft ³ @ in. Hg.)	
INITIAL	0.005 @ 10
FINAL	0.005 @ 10

MOISTURE TRAIN					
SAMPLING TIME		DRY GAS METER	DGM TEMP.	LAST IMPINGER TEMP.	TRAIN VACUUM
Clock	Sample				
10:30	0	453.768	52	46	1.5
	5	456.18	56	43	1.5
	10	458.62	57	42	1.5
	15	461.09	57	41	1.5
	20	463.54	57	44	1.5
	25	466.00	58	46	1.5
	30	468.45	59	47	1.5
	40	473.41	60	46	1.5
	50	478.36	60	47	1.5
11:30	60	483.310	61	47	1.5

Control Console I.D.: URS-001ΔH@: 1.923 γ: 0.976Pitot Tube Type: SI.D. No.: 14578 Coefficient: 0.84Manometer Type: Oil Incl.I.D. No.: URS-001Thermometer Type: KI.D. No.: URS-001

NOTES: _____



Test No.: _____

Location: Main Stack

Personnel: WLSJ

Start Test: 12:34

End Test: 12:42

Barometric Pressure, Pbar: 28.90 in. Hg

Static Pressure: -1.2 in. H₂O

Pitot Positive Leak Check : ☒ > 3 in. H₂O

Pitot Negative Leak Check : > 3 in. H₂O

Pitot Tube Type : S Type

I.D. No. : 19518

Manometer Type : Oil

I.D. No. : URS-001

Thermometer Type : Type K

I.D. No. : UKS-009



VELOCITY TRAVERSE DATA SHEET

Project Name: Annual SO2 RATA Test

Test No.: 6

Project No.: 60616835

Location: Main Stack

Date: 12/4/14

Personnel: W4/SJ

Traverse Point	Velocity Pressure	Stack Temperature	
A-1	1.7	250	
A-2	1.6	251	
A-3	1.1	252	
B-1	2.1	253	
B-2	2.1	255	
B-3	1.6	258	
C-1	1.8	252	
C-2	2.0	254	
C-3	1.9	257	
D-1	1.5	251	
D-2	1.7	252	
D-3	1.4	255	
Average			

Start Test: 12:54

End Test: 13:04

Stack Dimensions: Circular; 216" diameter

Barometric Pressure, Pbar: 28.90 in. Hg

Static Pressure: -1.2 in. H₂O



Pitot Positive Leak Check: ✓ > 3 in. H₂O

Pitot Negative Leak Check: ✓ > 3 in. H₂O

Notes, Drawings;

Pitot Tube Type: S Type

I.D. No.: H1578

Pitot Coefficient, Cp: 0.84

Manometer Type: Oil

I.D. No.: URS-001

Thermometer Type: Type K

I.D. No.: URS-001



EPA M4 DATA SHEET

Project Name: Annual SO2 RATA Test

Test No.: M-2

Stack Dimensions: Circular; 216"

Project No.: 60616835

Location: Main Stack

Barometric Pressure: 28.90 in. Hg

Date: 12/4/19

Personnel: WL/SJ

Static Pressure: -1.8 in. H₂O

Average ΔH: 0.75

VELOCITY TRAVERSE

TRAVERSE POINT	VELOCITY PRESSURE (ΔP)	STACK TEMP.
Average		

IMPINGER WEIGHTS

Impinger	Initial Wt.	Final Wt.	Total
1	685.6	760.2	74.6
2	669.2	668.1	-1.1
3	605.3	605.4	0.1
4	801.5	808.7	7.2
Total			80.8

PITOT LEAK CHECK (> 3")

TRAIN LEAK CHECK (ft ³ @ in. Hg.)	
INITIAL	0.005 @ 10
FINAL	0.005 @ 10

MOISTURE TRAIN

SAMPLING TIME		DRY GAS METER	DGM TEMP.	LAST IMPINGER TEMP.	TRAIN VACUUM
Clock	Sample				
12:12	0	484.164	61	47	1.5
	5	486.59	61	47	1.5
	10	489.17	62	46	1.5
	15	491.56	63	49	1.5
	20	494.03	63	51	1.5
	25	496.54	64	53	1.5
	30	499.02	65	53	1.5
	40	504.03	65	55	1.5
	50	509.02	66	57	1.5
13:12	60	514.023	66	56	1.5

ΔH

0.75

Control Console I.D.: URS-001 ΔH@:

1.923

Y: 0.976

Pitot Tube Type: S

I.D. No.: Coefficient: 0.84

Manometer Type: Oil Incl.

I.D. No.: URS-001

Thermometer Type: K

I.D. No.: URS-001

NOTES:



VELOCITY TRAVERSE DATA SHEET

Project Name: Annual SO2 RATA Test

Test No.: 7

Project No.: 60616835

Location: Main Stack

Date: 12/4/19

Personnel: WL/SJ

Traverse Point	Velocity Pressure	Stack Temperature	
A-1	1.7	250	
A-2	1.7	251	
A-3	1.2	253	
B-1	2.0	251	
B-2	2.1	254	
B-3	1.7	257	
C-1	1.5	252	
C-2	1.6	258	
C-3	1.7	259	
D-1	1.5	250	
D-2	1.6	253	
D-3	1.3	256	
Average			

Start Test: 13:38

End Test: 13:46

Stack Dimensions: Circular; 216" diameter

Barometric Pressure, Pbar: 28.90 in. Hg

Static Pressure: -1.2 in. H₂O



Pitot Positive Leak Check: ✓ > 3 in. H₂O

Pitot Negative Leak Check: ✓ > 3 in. H₂O

Notes, Drawings:

Pitot Tube Type: S Type

I.D. No.: 14518

Pitot Coefficient, Cp: 0.84

Manometer Type: Oil

I.D. No.: URS-001

Thermometer Type: Type K

I.D. No.: URS-001



Test No.: 2

Location: Main Stack

Personnel: MDI

Start Test : 14:00

End Test : 19/10

Barometric Pressure, Pbar 28.90 in. Hg

Static Pressure: 7.2 in. H₂O

Pitot Positive Leak Check : ☒ > 3 in. H₂O

Pitot Negative Leak Check : > 3 in. H₂O

Pitot Tube Type : S Type

I.D. No. : HDT8

I.D. No. : UR-001

I.D. No. : CR-001

Thermometer Type : Type K



EPA M4 DATA SHEET

Project Name: Annual SO2 RATA TestTest No.: M3Stack Dimensions: Circular; 216"Project No.: 60616835Location: Main StackBarometric Pressure: 28.90 in. HgDate: 12/4/19Personnel: WL/SJStatic Pressure: -1.2 in. H₂OAverage ΔH: 0.75

VELOCITY TRAVERSE		
TRAVERSE POINT	VELOCITY PRESSURE (ΔP)	STACK TEMP.
Average		

IMPINGER WEIGHTS			
Impinger	Initial Wt.	Final Wt.	Total
1	769.1	845.1	
2	676.3	677.5	
3	611.8	612.6	
4	853.8	859.0	
Total			

PITOT LEAK CHECK (> 3")	
TRAIN LEAK CHECK (ft ³ @ in. Hg.)	
INITIAL	0.00 @ 10
FINAL	0.005 @ 10

MOISTURE TRAIN					
SAMPLING TIME		DRY GAS METER	DGM TEMP.	LAST IMPINGER TEMP.	TRAIN VACUUM
Clock	Sample				
13:37	0	514.195	63	53	1.5
	5	516.61	63	50	1.5
	10	519.11	63	49	1.5
	15	521.61	64	50	1.5
	20	524.09	64	51	1.5
	25	526.58	65	53	1.5
	30	529.08	66	55	1.5
	40	534.10	67	53	1.5
	50	539.11	67	55	1.5
14:37	60	544.121	68	56	1.5

ΔH
0.75
↓

Control Console I.D.: URS-001 ΔH@: 1.923 Y: 0.976
Pitot Tube Type: S I.D. No.: HST8 Coefficient: 0.84
Manometer Type: Oil Incl. I.D. No.: URS-001
Thermometer Type: K I.D. No.: URS-001

NOTES: _____

Calculation Summary

Project Name Cokenergy Compliance Tests
Project Number 60616835
Facility East Chicago, IN

Sample Type	M12	M12	M12	Averages
Source	Main Stack	Main Stack	Main Stack	
Condition	Std	Std	Std	
Run	1	2	3	
Date	12/5/2019	12/5/2019	12/6/2019	
Time Start	14:15	16:54	08:16	
Time Stop	16:09	18:45	15:58	
Sampling Times	14:15-16:09	16:54-18:45	08:16-15:58	
Duct Diameter (ft) <i>(equivalent if square duct)</i>	18.00	18.00	18.00	
Pitot Tube Correction Factor	0.84	0.84	0.84	
Nozzle Diameter (inches)	0.179	0.179	0.179	
DGMCF (Y_d)	0.969	0.976	0.976	
Orifice Factor ("wc) (ΔH_o)	1.893	1.893	1.893	
Console Identification	URS-002	URS-002	URS-002	
Standard Temperature (°F)	68	68	68	
Barometric Pressure Measured ("Hg)	30.07	30.07	30.30	
Stack Elevation (ft) <i>(relative to Barometer)</i>	818	818	818	
Barometric Pressure ("Hg) (P_b)	29.25	29.25	29.48	
Average Stack Temperature (°F)	271.6	272.2	270.2	271.3
Average DGM Temp (°F)	67.8	67.2	43.6	
Average Delta H ("wc) (ΔH_{avg})	1.04	1.02	1.04	
Condensed Water (g)	151.4	162.7	160.8	
Test Duration (minutes) (Θ)	96	96.0	96.0	96
Static Pressure ("wc)	-1.20	-1.20	-1.20	
Carbon Monoxide (CO) Content (%)	0	0	0	
Carbon Dioxide (CO ₂) Content (%)	5.30	5.30	5.30	
Oxygen (O ₂) Content (%)	13.10	13.00	13.00	
Hydrogen (H ₂) Content (%)	0.0	0.0	0.0	
Methane (CH ₄) Content (%)	0.0	0.0	0.0	
Nitrogen (N ₂) Content (%)	81.60	81.70	81.70	
Meter Volume (dcf) (V_m)	55.916	54.920	53.538	
Average square root of ΔP ($(\Delta P)_{avg}$)	1.243	1.236	1.258	
Absolute Stack Pressure ("Hg)	29.16	29.16	29.39	
Absolute Stack Temperature (°R)	731.6	732.2	730.2	731.3
Flue Gas Moisture (%)	11.86	12.74	12.30	12.30
Moisture at saturation	N/A	N/A	N/A	
Moisture used in Calculation	11.86	12.74	12.30	12.30
Gas Molecular Weight (Wet) (g/g-mole)	28.02	27.92	27.97	
Corrected Vol of Gas Sample (dcf) ($V_{m(actual)}$)	54.183	53.602	52.253	
Volume at Meter (dscf)	53.132	52.623	54.125	
Average Gas Velocity (ft/sec)	84.43	84.19	85.15	84.59
Avg Flow Rate (acfh)	77,349,255	77,129,717	78,000,351	77,493,108
Avg Flow Rate (acfm)	1,289,154	1,285,495	1,300,006	1,291,552
Avg Flow Rate (scfh)	54,413,699	54,216,029	55,411,780	54,680,503
Avg Flow Rate (scfm)	906,895	903,600	923,530	911,342
Avg Flow Rate (dscfh)	47,959,713	47,308,349	48,593,898	47,953,987
Avg Flow Rate (dscfm)	799,329	788,472	809,898	799,233
Isokinetic Sampling Rate (%)	100.82	101.23	101.37	

Console Calibration Check

Console Identification	URS-002	URS-002	URS-002
Average square root of ΔH ($(\Delta H)_{avg}$)	1.02	1.01	1.02
Gas Molecular Weight (Dry) (M_d) (g/g-mole)	29.4	29.4	29.4
Dry Gas Meter Calibration Check Value (Y_{DA})	0.955	0.965	0.973
Deviation Y_{DA} to Y_d (%)	-1.427	-1.108	-0.324

Calculation Summary

Data Entry Area

Sample Type	M12	Pitot Tube Correction Factor	0.84	Entered By (initials)	WCT
Source	Main Stack	Console ID	URS-002	Checked by (initials)	
Condition	Std	DGMCF	0.969	Corrected by (initials)	
Run	1	ΔH_{pit}	1.893		
Date	5-Dec-19	Nozzle Diameter (in)	0.1790	% CO	
Duct Diameter (ft)	18.00	Std Temp (°F)	68	% CO ₂	5.3
Duct Depth (ft)		Bar Press ("Hg, meas)	30.07	% O ₂	13.1
Duct Width (ft)		Meter Elev (ft) (rel to Brmtr)	818	% H ₂	
		Static Press ("H ₂ O)	-1.2	% CH ₄	

Times		DGM Volumes (as read)		Impinger Catch (g)		
		start		Initial	Final	
start	14:15	start	694.674			
stop	16:09	stop	750.590	1	703.5	808.8
						105.3
start		start		2	714.5	745.7
						31.2
stop		stop		3	591.4	595.7
						4.3
start		start		4	824.1	834.7
						10.6
stop		stop		5		
start		start		6		
stop		stop		7		
start		start		8		
stop		stop		9		
start		start		10		
stop		stop				
start		start				
stop		stop				
start		start				
stop		stop				
start		start				
stop		stop				
start		start				
stop		stop				
Duration	96	Total	55.916	Total Wt Gain 151.4		

	ΔP ("H ₂ O)	ΔH ("H ₂ O)	Stack Temp (°F)	DGM Temp (°F)	$\sqrt{\Delta P}$	$\sqrt{\Delta H}$
Averages	1.55	1.04	272	67.8	1.2427	1.0167

Individual Readings	1.50	1.02	272	57	1.22474487	1.00995
	1.50	1.02	272	58	1.22474487	1.00995
	1.50	1.02	272	60	1.22474487	1.00995
	1.50	1.02	272	60	1.22474487	1.00995
	1.30	0.89	272	62	1.14017543	0.943398
	1.30	0.89	272	63	1.14017543	0.943398
	1.80	1.20	272	65	1.34164079	1.095445
	1.80	1.20	272	66	1.34164079	1.095445
	1.70	1.10	272	67	1.30384048	1.048809
	1.70	1.10	272	68	1.30384048	1.048809
	1.50	1.02	272	70	1.22474487	1.00995
	1.50	1.02	272	70	1.22474487	1.00995
	1.70	1.10	272	71	1.30384048	1.048809
	1.70	1.10	271	71	1.30384048	1.048809
	1.80	1.20	272	72	1.34164079	1.095445
	1.80	1.20	271	72	1.34164079	1.095445
	1.70	1.10	271	72	1.30384048	1.048809
	1.70	1.10	271	72	1.30384048	1.048809
	1.20	0.82	271	72	1.09544512	0.905539
	1.20	0.82	271	72	1.09544512	0.905539
	1.50	1.02	271	72	1.22474487	1.00995
	1.50	1.02	271	72	1.22474487	1.00995
	1.40	0.95	271	72	1.18321596	0.974679
	1.40	0.95	271	71	1.18321596	0.974679

Calculation Summary

Data Entry Area

Sample Type	M12	Pitot Tube Correction Factor	0.84	Entered By (initials)	WCT
Source	Main Stack	Console ID	URS-002	Checked by (initials)	
Condition	Std	DGMCF	0.976	Corrected by (initials)	
Run	2	ΔH_{g}	1.893		
Date	5-Dec-19	Nozzle Diameter (in)	0.1790	% CO	
Duct Diameter (ft)	18.00	Std Temp (°F)	68	% CO ₂	5.3
Duct Depth (ft)		Bar Press ("Hg, meas)	30.07	% O ₂	13
Duct Width (ft)		Meter Elev (ft) (rel to Brmtr)	818	% H ₂	
		Static Press ("H ₂ O)	-1.2	% CH ₄	

Times		DGM Volumes (as read)		Impinger Catch (g)		
				Initial	Final	
start	16:54	start	751.419			
stop	18:45	stop	806.339	1	706.1	118.8
start		start		2	684.5	26.9
stop		stop		3	579.0	4.6
start		start		4	808.7	12.4
stop		stop		5		
start		start		6		
stop		stop		7		
start		start		8		
stop		stop		9		
start		start		10		
stop		stop				
start		start				
stop		stop				
start		start				
stop		stop				
start		start				
stop		stop				
start		start				
stop		stop				
				Total Wt Gain 162.7		
Duration	98	Total	54.920			

	ΔP ("H ₂ O)	ΔH ("H ₂ O)	Stack Temp (°F)	DGM Temp (°F)	$v\Delta P$	$v\Delta H$
Averages	1.53	1.02	272	67.2	1.2364	1.0096

Individual Readings	1.40	0.95	272	66	1.18321596	0.97468
	1.40	0.95	272	67	1.18321596	0.97468
	1.40	0.95	272	67	1.18321596	0.97468
	1.40	0.95	272	67	1.18321596	0.97468
	1.30	0.89	272	67	1.14017543	0.9434
	1.30	0.89	272	68	1.14017543	0.9434
	1.70	1.10	272	67	1.30384048	1.04881
	1.70	1.10	272	68	1.30384048	1.04881
	1.80	1.20	272	68	1.34164079	1.09545
	1.80	1.20	272	68	1.34164079	1.09545
	1.60	1.00	272	68	1.26491106	1
	1.60	1.00	272	68	1.26491106	1
	1.70	1.10	273	68	1.30384048	1.04881
	1.70	1.10	272	68	1.30384048	1.04881
	1.80	1.20	273	68	1.34164079	1.09545
	1.80	1.20	273	68	1.34164079	1.09545
	1.40	0.95	273	68	1.18321596	0.97468
	1.40	0.95	273	68	1.18321596	0.97468
	1.40	0.95	270	66	1.18321596	0.97468
	1.40	0.95	272	66	1.18321596	0.97468
1.50	1.02	272	66	1.22474487	1.00995	
1.50	1.02	272	66	1.22474487	1.00995	
1.40	0.95	272	65	1.18321596	0.97468	
1.40	0.95	273	66	1.18321596	0.97468	

Calculation Summary

Data Entry Area

Sample Type	M12	Pitot Tube Correction Factor	0.84	Entered By (initials)	WCT
Source	Main Stack	Console ID	URS-002	Checked by (initials)	
Condition	Std	DGMCF	0.976	Corrected by (initials)	
Run	3	ΔH_e	1.893		
Date	6-Dec-19	Nozzle Diameter (in)	0.1790	% CO	
Duct Diameter (ft)	18.00	Std Temp (°F)	68	% CO ₂	5.3
Duct Depth (ft)		Bar Press ("Hg. meas)	30.3	% O ₂	13
Duct Width (ft)		Meter Elev (ft) (rel to Brmtr)	818	% H ₂	
		Static Press ("H ₂ O)	-1.2	% CH ₄	

Times		DGM Volumes (as read)		Impinger Catch (g)		
start	08:16	start	806.524		Initial	Final
stop	15:58	stop	860.062	1	702.8	801.8
start		start		2	722.5	764.8
stop		stop		3	599.8	606.8
start		start		4	834.7	847.2
stop		stop		5		
start		start		6		
stop		stop		7		
start		start		8		
stop		stop		9		
start		start		10		
stop		stop				
start		start				
stop		stop				
start		start				
stop		stop				
start		start				
stop		stop				
start		start				
stop		stop				
start		start				
stop		stop				
Duration	9h 38m	Total	53.538		Total Wt Gain	160.8

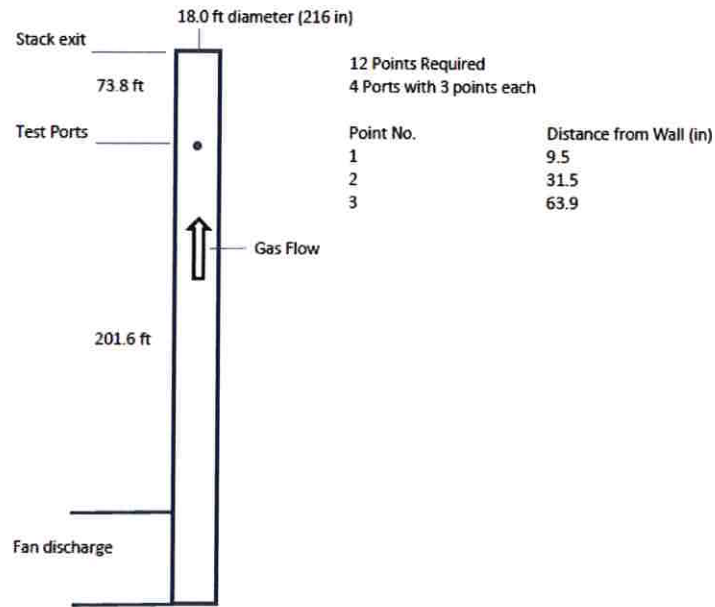
	ΔP ("H ₂ O)	ΔH ("H ₂ O)	Stack Temp (°F)	DGM Temp (°F)	$\nabla \Delta P$	$\nabla \Delta H$
Averages	1.59	1.04	270	43.6	1.2581	1.0190

Individual Readings	1.60	1.00	272	38	1.26491106	1
	1.60	1.00	272	38	1.26491106	1
	1.60	1.00	272	39	1.26491106	1
	1.60	1.00	272	40	1.26491106	1
	1.30	0.89	272	40	1.14017543	0.943398
	1.30	0.89	272	41	1.14017543	0.943398
	1.80	1.20	271	41	1.34164079	1.095445
	1.80	1.20	271	42	1.34164079	1.095445
	2.00	1.30	271	43	1.41421356	1.140175
	2.00	1.30	268	43	1.41421356	1.140175
	1.40	0.90	274	43	1.18321596	0.948683
	1.40	0.90	272	44	1.18321596	0.948683
	1.50	1.02	268	44	1.22474487	1.00995
	1.50	1.02	270	44	1.22474487	1.00995
	1.40	0.90	269	45	1.18321596	0.948683
	1.40	0.90	269	45	1.18321596	0.948683
	1.20	0.82	269	45	1.09544512	0.905539
	1.20	0.82	268	45	1.09544512	0.905539
	1.80	1.20	268	43	1.34164079	1.095445
	1.80	1.20	269	45	1.34164079	1.095445
1.90	1.30	269	47	1.37840488	1.140175	
1.90	1.30	269	49	1.37840488	1.140175	
1.60	1.00	269	50	1.26491106	1	
1.60	1.00	268	52	1.26491106	1	

Lead Results

Parameter	Run 1	Run 2	Run 3
Sample volume (dscf)	53.13	52.62	54.13
Sample volume (dscm)	1.505	1.490	1.533
Composite lead in sample (ug)	10.20	3.75	6.82
Lead Conc. (ug/ft3)	0.192	0.071	0.126
Lead Conc. (ug/m3)	6.8	2.5	4.4

Main Stack Test Port Locations
Cokenergy LLC
(No scale)



Schematic of Main Stack

Sample Type	Lead by Method 12	Date	12-5-19	Barometer ID	WC	Page	1	of	1
Project Name	Cokerenergy Compliance Test	Cond		Run	1	Bar. Press. ("Hg)	30.07	Train Leak Rate (cfm @ "Hg)	
Project Number	60616835	Console ID	URS-002	Stat. Press. ("H ₂ O)	-1.2	Initial	0.01	@	10
Facility	Cokerenergy	DGMCF	0.476 0.969	Probe ID	6-003	Final	0.005	@	10
Source	Main Stack	ΔH _{CF}	1.923	K _f		PTCF	0.84	Pitot Tube Leak Check ("H ₂ O @ "H ₂ O)	
Operator	Shayne Jacobs	Filter No.	1.893	Meter Elevation (ft) (relative to Barometer)	810	Initial (-)	0	@	5.5
Duct Dimension(s)	18' circular diameter	Nozzle Dia (in)	0.179	Initial (+)		0	@	4.7	
Nozzle Calibration	● 0.179 ● 0.179 ● 0.179		Caliper Used			Final (-)	✓	@	5
				Calibration Exp Date		Final (+)	✓	@	5

Post-Test Stack TC Check	Reference Thermometer ID	Ref Thermometer Exp Date	Thermometer and TC agree within 2°F	Y/N	Post-Test: Are Pitots Damaged?	Y/N
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Point	Clock Time	DGM Reading (ft³)	ΔP (in. H ₂ O)	ΔH (in. H ₂ O)	Temperature (°F)					Vacuum (in. Hg)
					Stack	Probe Target	Filter Target	Imp Exit Target <68	DGM Outlet	
A 1	14:15	694.674	1.5	1.02	272	255	254	52	57	2
A 1	14:19	692.07	1.5	1.02	272	252	253	46	58	2
A 2	14:23	699.46	1.5	1.02	272	247	252	45	60	2
A 2	14:27	701.85	1.5	1.02	272	251	253	45	60	2
A 3	14:31	704.25	1.3	0.89	272	252	253	46	62	2
A 3	14:35	706.41	1.3	0.89	272	249	256	46	63	2
B 1	14:39	708.540	1.8							
B 1	14:46	708.540	1.8	1.2	272	235	252	43	65	2
B 2	14:50	710.07	1.8	1.2	272	240	252	43	66	2
B 2	14:54	713.30	1.7	1.1	272	249	253	43	67	2
B 3	14:58	715.72	1.7	1.1	272	247	253	43	68	2
B 3	15:02	718.12	1.5	1.02	272	250	255	44	70	2
B 3	15:06	720.49	1.5	1.02	272	249	256	44	70	2
	15:10	722.850								
C 1	15:16	722.850	1.7	1.1	272	250	249	42	71	2
C 1	15:20	725.25	1.7	1.1	271	249	247	41	71	2
C 2	15:24	727.66	1.8	1.2	272	250	250	41	72	2
C 2	15:28	730.11	1.8	1.2	271	250		41	72	2
C 3	15:32	732.56	1.7	1.1	271	254	227	42	72	2
C 3	15:36	734.47	1.7	1.1	271	253	242	42	72	2
	15:40	737.368								
D 1	15:45	737.368	1.2	0.82	271	254	260	42	72	2
D 1	15:49	739.43	1.2	0.82	271	249	258	43	72	2
D 2	15:53	741.48	1.5	1.02	271	246	254	43	72	2
D 2	15:57	743.77	1.5	1.02	271	246	254	44	72	2
D 3	16:01	746.10	1.4	0.95	271	249	256	44	72	2
D 3	16:05	748.56	1.4	0.95	271	248	256	44	71	2
	16:09	750.590								

Notes: K factor: .685

Project Name		Cokenergy Compliance Test	
Project Number		60616835	
Date		12/4/19	
Source		Main Stack	

Method 12 Sample Recovery

Condition No.	
Run No.	1
Balance ID	i5500
Recovered by	je

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Initial Wt (g)	Final Wt (g)
1	0.1N HNO3	100	Mod GS	703.5	808.8
2	0.1N HNO3	100	GS	714.5	745.7
3	Empty	--	Mod GS	591.4	595.7
4	Silica Gel	300	Mod GS	826.7	834.7
5			SC	824.1	834.1
6			p		
7					

Sample Log

Sample ID Number	Container Size	Description

Sample Recovery Notes

Disassemble sample train, wipe off excess water and weigh each impinger.
Record the final weights in the Moisture Determination section of this data

Note condition of the silica gel impinger. ____%

broke original silica gel
impinger

Sample Type	Lead by Method 12		Date	12/5/19	Barometer ID	Wc	Page	1	of	1
Project Name	Cokenergy Compliance Test		Cond		Run	2	Bar. Press. ("Hg)	30.07		
Project Number	60616835		Console ID	URS-002			Stat. Press. ("H ₂ O)	-1.2		
Facility	Cokenergy		DGMCF	0.969			Probe ID	6-003		
Source	Main Stack		ΔH@	1.893	K _i	1.685	PTCF	0.84		
Operator	Shayne Jacobs		Filter No.				Meter Elevation (ft) (relative to Barometer)	818		
Duct Dimension(s)	18" circular diameter		Nozzle Dia (in)							
Nozzle Calibration			Caliper Used							
			ID							
			Calibration Exp Date							
Initial (-)								✓ @ 5		
Initial (+)								✓ @ 5		
Final (-)								✓ @ 5		
Final (+)								✓ @ 5		

Post-Test Stack TC Check	Reference Thermometer ID	Ref Thermometer Exp Date	Thermometer and TC agree within 2°F	Y/N	Post-Test: Are Pitots Damaged?	Y/N
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Point	Clock Time	DGM Reading (ft ³)	ΔP (in. H ₂ O)	ΔH (in. H ₂ O)	Temperature (°F)					DGM Outlet	Vacuum (in. Hg)
					Stack	Probe Target	Filter Target	Imp Exit Target <68			
A1	16:54	751.419	1.4	0.95	272	254	255	46	66	1.5	
A1	16:58	753.77	1.4	0.95	272	254	257	45	67	1.5	
A2	17:02	755.97	1.4	0.95	272	252	259	44	67	1.5	
A2	17:06	758.17	1.4	0.95	272	252	259	45	67	1.5	
A3	17:10	760.35	1.3	0.89	272	254	258	45	67	1.5	
A3	17:14	762.50	1.3	0.89	272	252	259	46	68	1.5	
	17:18	764.638									
B1	17:23	764.638	1.7	1.1	272	248	258	44	67	2	
B1	17:27	766.97	1.7	1.1	272	251	258	44	68	2	
B2	17:31	769.30	1.8	1.2	272	252	259	43	68	2	
B2	17:35	771.66	1.8	1.2	272	250	257	43	68	2	
B3	17:39	774.12	1.6	1.0	272	228	252	43	68	2	
B3	17:43	776.48	1.6	1.0	272	227	254	43	68	2	
	17:47	778.795									
C1	17:53	778.795	1.7	1.1	273	241	256	41	68	2	
C1	17:57	781.13	1.7	1.1	272	247	256	41	68	2	
C2	18:01	783.46	1.8	1.2	273	250	247	41	68	2	
C2	18:05	785.86	1.8	1.2	273	250	251	41	68	2	
C3	18:09	788.32	1.4	0.95	273	253	259	41	68	2	
C3	18:13	790.66	1.4	0.95	273	250	252	41	68	2	
	18:17	792.875									
D1	18:21	792.875	1.4	0.95	270	251	259	42	66	2	
D1	18:25	795.08	1.4	0.95	272	250	257	42	66	2	
D2	18:29	797.26	1.5	1.02	272	248	257	43	66	2	
D2	18:33	799.57	1.5	1.02	272	248	257	44	66	2	
D3	18:37	801.91	1.4	0.95	272	250	261	44	65	2	
D3	18:41	804.11	1.4	0.95	273	250	258	44	66	2	
	18:45	806.339									

Notes:	SDS-12: General Isokinetic Sampling Issued: August 2019 Document reviewed biennially
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Project Name		Cokenergy Compliance Test	
Project Number		60616835	
Date		12/5/19	
Source		Main Stack	

Method 12 Sample Recovery

Condition No.	
Run No.	2
Balance ID	i5500
Recovered by	JC

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Initial Wt (g)	Final Wt (g)
1	0.1N HNO3	100	Mod GS	726.1	824.9
2	0.1N HNO3	100	GS	684.5	711.4
3	Empty	--	Mod GS	579.0	583.6
4	Silica Gel	300	Mod GS	808.7	821.1
5			stop JC	824.4	
6					
7					

Sample Log

Sample ID Number	Container Size	Description

Sample Recovery Notes

Disassemble sample train, wipe off excess water and weigh each impinger.
Record the final weights in the Moisture Determination section of this data

Note condition of the silica gel impinger. ____%

Sample Type	Lead by Method 12	Date	12-6-19	Barometer ID	weather channel	Page	1	of	1
Project Name	Cokenergy Compliance Test	Cond		Run	3	Bar. Press. ("Hg)	30.30	Train Leak Rate (cfm @ "Hg)	
Project Number	60616835	Console ID	URS-002	Stat. Press. ("H ₂ O)	-1.2	Initial	0.005	@	10
Facility	Cokenergy	DGMCF	0.969	Probe ID	6-003	Final	0.005	@	10
Source	Main Stack	ΔH@	1.893	K _r	.685	PTCF	0.84	Pitot Tube Leak Check ("H ₂ O@ "H ₂ O)	
Operator	Shayne Jacobs	Filter No.		Meter Elevation (ft) (relative to Barometer)	818	Initial (-)	✓	@	5
Duct Dimension(s)	18" circular diameter	Nozzle Dia (in)	0.179			Initial (+)	✓	@	5
Nozzle Calibration			Caliper Used	ID		Final (-)	✓	@	5
				Calibration Exp Date		Final (+)	✓	@	5

Post-Test Stack TC Check	Reference Thermometer ID	Ref Thermometer Exp Date	Thermometer and TC agree within 2°F	Y/N	Post-Test: Are Pitots Damaged?	Y/N
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Point	Clock Time	DGM Reading (ft ³)	ΔP (in. H ₂ O)	ΔH (in. H ₂ O)	Temperature (°F)					DGM Outlet	Vacuum (in. Hg)
					Stack	Probe Target	Filter Target	Imp Exit Target <68			
D1	8:16	806.524	1.6	1.0	272	252	253	36		38	2
D1	8:20	808.72	1.6	1.0	272	246	252	38		38	2
D2	8:24	810.91	1.6	1.0	272	249	228	40		39	2
D2	8:28	813.10	1.6	1.0	272	247	236	40		40	2
D3	8:32	815.28	1.3	0.89	272	249	233	40		40	2
D3	8:36	817.37	1.3	0.89	272	252	229	40		41	2
	8:40	819.435	+55								
A1	8:46	819.435	1.8	1.2	271	240	255	42		41	2
A1	8:50	821.80	1.8	1.2	271	248	253	46		42	2
C2	8:54	824.15	2.0	1.3	271	246	253	50		43	2
C2	8:58	826.58	2.0	1.3	268	237	251	53		43	2
C3	9:02	829.035	1.4	0.9	274	225	257	45		43	2
C3	9:06	831.27	1.4	0.9	272	225	252	45		44	2
	9:10	833.327									
A1	14:50	833.327	1.5	1.02	268	225	248	42		44	2
A1	14:54	835.54	1.5	1.02	270	226	252	41		44	2
A2	14:58	837.76	1.4	0.9	269	227	248	41		45	2
A2	15:02	839.85	1.4	0.9	269	229	249	41		45	2
A3	15:06	841.93	1.2	0.82	269	228	244	42		45	2
A3	15:10	843.94	1.2	0.82	268	230	251	42		45	2
	15:14	845.925									
B1	15:34	845.925	1.8	1.2	268	252	260	37		43	2
B1	15:38	848.27	1.8	1.2	269	254	261	41		45	2
B2	15:42	850.61	1.9	1.3	269	250	260	46		47	2
B2	15:46	853.05	1.9	1.3	269	251	260	49		49	2
B3	15:50	855.55	1.6	1.0	269	246	259	54		50	2
B3	15:54	857.83	1.6	1.0	268	247	259	56		52	2
	15:58	860.062									

Notes: Pause 9:02, 39:40
14:36, 14:40, 14:44

Project Name		Cokenergy Compliance Test	
Project Number		60616835	
Date		12/6/19	
Source		Main Stack	

Method 12 Sample Recovery

Condition No.	
Run No.	3
Balance ID	15500
Recovered by	JC

Moisture Determination

JC

Imp No.	Contents	Volume (mL)	Configuration	Initial Wt (g)	Final Wt (g)
1	0.1N HNO3	100	Mod GS	702.8	824.9
2	0.1N HNO3	100	GS	722.5	771.4
3	Empty	--	Mod GS	599.8	583.6
4	Silica Gel	300	Mod GS	834.7	821.1
5					
6					
7					

Sample Recovery Notes

Disassemble sample train, wipe off excess water and weigh each impinger.
Record the final weights in the Moisture Determination section of this data

Note condition of the silica gel impinger. ____%

801.8
764.8
604.8
847.2

Sample Log

Sample ID Number	Container Size	Description

RDS-06: General Sample Recovery
Issued: May 2018
Document reviewed biennially

Field Balance Calibration Check

Project Name	Cokenergy RATA & Compliance Tests
Project Number	60616835
Balance ID	5500
Calibration Weight ID	Troemner 92946

Date	Actual Mass (g)	Balance Reading (g)	Difference ^a (g)	Initials
12/3/19	500g	500.4	0.4	JC
12/4/19		500.0	0.0	JC
12/5/19		500.1	0.1	JC
12/6/19		500.1	0.1	JC

^a The acceptance criteria for difference is ± 0.5 grams.

CDS-08D: Field Balance Calibration
 Per: EM SOP-010
 Issued: October 2019
 Document reviewed biennially

Plant Name	Cokenergy
Sampling Location	Main Stack
Date	5-Dec-19
CEM Operator	Bill Thomas
Project Number	60616835

Note: Times shown are EST

Run No.	Start Time	Stop Time	Start - Stop Time	Reference Method Obs. Value						
				O ₂	CO ₂	THC	NMHC	CH4	Moisture	Flow Rate
1	1354	1548	1354 - 1548	12.9	5.3					
2	1649	1837	1649 - 1837	12.9	5.3					
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										

Reference Method Results

Source: Main Stack Cokenergy

Date: 12/5/19 NOTE: DAS time is E:

O2, % CO2, %

12/5/2019 13:54	12.8	5.3
12/5/2019 13:55	12.7	5.4
12/5/2019 13:56	12.7	5.4
12/5/2019 13:57	12.8	5.3
12/5/2019 13:58	12.8	5.4
12/5/2019 13:59	12.9	5.4
12/5/2019 14:00	13.4	5.4
12/5/2019 14:01	12.9	5.4
12/5/2019 14:02	13.0	5.4
12/5/2019 14:03	12.9	5.4
12/5/2019 14:04	12.8	5.4
12/5/2019 14:05	12.8	5.4
12/5/2019 14:06	12.9	5.4
12/5/2019 14:07	12.8	5.4
12/5/2019 14:08	12.8	5.4
12/5/2019 14:09	12.9	5.4
12/5/2019 14:10	12.9	5.4
12/5/2019 14:11	13.0	5.4
12/5/2019 14:12	13.0	5.4
12/5/2019 14:13	13.0	5.4
12/5/2019 14:14	13.0	5.4
12/5/2019 14:15	13.0	5.3
12/5/2019 14:16	13.0	5.3
12/5/2019 14:17	12.9	5.3
12/5/2019 14:18	12.8	5.3
12/5/2019 14:19	12.8	5.4
12/5/2019 14:20	12.8	5.3
12/5/2019 14:21	12.8	5.3
12/5/2019 14:22	12.8	5.3
12/5/2019 14:23	12.8	5.4
12/5/2019 14:24	12.8	5.3
12/5/2019 14:25	12.8	5.3
12/5/2019 14:26	12.8	5.4
12/5/2019 14:27	12.8	5.3
12/5/2019 14:28	12.8	5.3
12/5/2019 14:29	12.8	5.3
12/5/2019 14:30	12.8	5.3
12/5/2019 14:31	12.8	5.3
12/5/2019 14:32	12.8	5.3
12/5/2019 14:33	12.8	5.3
12/5/2019 14:34	12.8	5.3
12/5/2019 14:35	12.8	5.3
12/5/2019 14:36	12.8	5.3
12/5/2019 14:37	12.8	5.3
12/5/2019 14:38	12.8	5.3
12/5/2019 14:39	12.8	5.3
12/5/2019 14:40	12.8	5.3
12/5/2019 14:41	12.8	5.3
12/5/2019 14:42	12.8	5.3
12/5/2019 14:43	12.8	5.3
12/5/2019 14:44	12.8	5.3

Reference Method Results

Source: Main Stack Cokenergy

Date: 12/5/19 NOTE: DAS time is EST

O2, % CO2, %

12/5/2019 14:45	12.9	5.3
12/5/2019 14:46	12.8	5.3
12/5/2019 14:47	12.9	5.3
12/5/2019 14:48	12.9	5.3
12/5/2019 14:49	12.9	5.3
12/5/2019 14:50	12.9	5.3
12/5/2019 14:51	12.8	5.3
12/5/2019 14:52	12.8	5.3
12/5/2019 14:53	12.9	5.3
12/5/2019 14:54	12.9	5.3
12/5/2019 14:55	12.9	5.3
12/5/2019 14:56	12.9	5.3
12/5/2019 14:57	12.9	5.3
12/5/2019 14:58	12.9	5.3
12/5/2019 14:59	12.9	5.3
12/5/2019 15:00	12.9	5.3
12/5/2019 15:01	12.9	5.3
12/5/2019 15:02	13.1	5.3
12/5/2019 15:03	13.0	5.3
12/5/2019 15:04	13.1	5.3
12/5/2019 15:05	13.0	5.3
12/5/2019 15:06	12.9	5.3
12/5/2019 15:07	12.9	5.3
12/5/2019 15:08	12.9	5.3
12/5/2019 15:09	12.9	5.3
12/5/2019 15:10	12.9	5.3
12/5/2019 15:11	12.9	5.3
12/5/2019 15:12	12.9	5.3
12/5/2019 15:13	12.9	5.3
12/5/2019 15:14	12.9	5.3
12/5/2019 15:15	12.9	5.3
12/5/2019 15:16	12.9	5.3
12/5/2019 15:17	12.9	5.3
12/5/2019 15:18	12.9	5.3
12/5/2019 15:19	12.9	5.3
12/5/2019 15:20	13.2	5.2
12/5/2019 15:21	12.9	5.2
12/5/2019 15:22	13.0	5.2
12/5/2019 15:23	13.0	5.2
12/5/2019 15:24	13.0	5.2
12/5/2019 15:25	12.9	5.2
12/5/2019 15:26	12.9	5.2
12/5/2019 15:27	13.0	5.2
12/5/2019 15:28	13.0	5.2
12/5/2019 15:29	13.0	5.2
12/5/2019 15:30	13.0	5.2
12/5/2019 15:31	13.0	5.2
12/5/2019 15:32	13.0	5.2
12/5/2019 15:33	13.0	5.2
12/5/2019 15:34	13.0	5.2
12/5/2019 15:35	13.0	5.2

Reference Method Results

Source: Main Stack Cokenergy

Date: 12/5/19 NOTE: DAS time is EST

O2, % CO2, %

12/5/2019 15:36	13.0	5.2
12/5/2019 15:37	13.0	5.2
12/5/2019 15:38	13.0	5.2
12/5/2019 15:39	13.3	5.2
12/5/2019 15:40	13.0	5.2
12/5/2019 15:41	13.0	5.2
12/5/2019 15:42	13.0	5.2
12/5/2019 15:43	13.0	5.2
12/5/2019 15:44	13.0	5.2
12/5/2019 15:45	13.0	5.2
12/5/2019 15:46	13.0	5.2
12/5/2019 15:47	13.0	5.2
12/5/2019 15:48	13.0	5.2

Average = 12.9 5.3

Reference Method Results

Source: Main Stack Cokenergy

Date: 12/5/19 NOTE: DAS time is E:

O2, % CO2, %

12/5/2019 16:49	13.3	5.1
12/5/2019 16:50	13.3	5.1
12/5/2019 16:51	13.3	5.1
12/5/2019 16:52	13.3	5.1
12/5/2019 16:53	13.3	5.1
12/5/2019 16:54	13.3	5.1
12/5/2019 16:55	13.4	5.1
12/5/2019 16:56	13.5	5.2
12/5/2019 16:57	14.0	5.2
12/5/2019 16:58	13.5	5.2
12/5/2019 16:59	13.4	5.1
12/5/2019 17:00	13.2	5.1
12/5/2019 17:01	13.2	5.2
12/5/2019 17:02	13.2	5.1
12/5/2019 17:03	13.2	5.1
12/5/2019 17:04	13.2	5.1
12/5/2019 17:05	13.2	5.2
12/5/2019 17:06	13.2	5.2
12/5/2019 17:07	13.2	5.2
12/5/2019 17:08	13.1	5.2
12/5/2019 17:09	13.1	5.2
12/5/2019 17:10	13.1	5.2
12/5/2019 17:11	13.1	5.2
12/5/2019 17:12	13.1	5.2
12/5/2019 17:13	13.1	5.2
12/5/2019 17:14	13.1	5.2
12/5/2019 17:15	13.1	5.2
12/5/2019 17:16	13.1	5.2
12/5/2019 17:17	13.1	5.2
12/5/2019 17:18	13.1	5.2
12/5/2019 17:19	13.1	5.2
12/5/2019 17:20	13.0	5.2
12/5/2019 17:21	13.0	5.2
12/5/2019 17:22	13.1	5.2
12/5/2019 17:23	13.1	5.2
12/5/2019 17:24	13.1	5.2
12/5/2019 17:25	13.0	5.2
12/5/2019 17:26	13.0	5.2
12/5/2019 17:27	13.0	5.2
12/5/2019 17:28	13.0	5.2
12/5/2019 17:29	13.0	5.2
12/5/2019 17:30	13.0	5.2
12/5/2019 17:31	13.0	5.2
12/5/2019 17:32	13.0	5.2
12/5/2019 17:33	13.1	5.2
12/5/2019 17:34	13.1	5.2
12/5/2019 17:35	13.0	5.2
12/5/2019 17:36	13.0	5.2
12/5/2019 17:37	13.2	5.2
12/5/2019 17:38	13.0	5.2
12/5/2019 17:39	13.0	5.2

Reference Method Results

Source: Main Stack Cokerenergy

Date: 12/5/19 NOTE: DAS time is E:

O2, % CO2, %

12/5/2019 17:40	12.8	5.3
12/5/2019 17:41	12.8	5.3
12/5/2019 17:42	12.8	5.4
12/5/2019 17:43	12.8	5.4
12/5/2019 17:44	12.8	5.4
12/5/2019 17:45	12.8	5.3
12/5/2019 17:46	12.8	5.4
12/5/2019 17:47	12.8	5.4
12/5/2019 17:48	12.8	5.4
12/5/2019 17:49	12.8	5.4
12/5/2019 17:50	12.8	5.4
12/5/2019 17:51	12.7	5.4
12/5/2019 17:52	12.8	5.4
12/5/2019 17:53	12.8	5.4
12/5/2019 17:54	12.8	5.4
12/5/2019 17:55	12.8	5.3
12/5/2019 17:56	12.8	5.3
12/5/2019 17:57	12.8	5.3
12/5/2019 17:58	12.8	5.3
12/5/2019 17:59	12.8	5.3
12/5/2019 18:00	12.8	5.4
12/5/2019 18:01	12.8	5.3
12/5/2019 18:02	12.7	5.4
12/5/2019 18:03	12.7	5.4
12/5/2019 18:04	12.8	5.4
12/5/2019 18:05	12.8	5.4
12/5/2019 18:06	12.8	5.4
12/5/2019 18:07	12.8	5.4
12/5/2019 18:08	12.8	5.4
12/5/2019 18:09	12.7	5.4
12/5/2019 18:10	12.7	5.4
12/5/2019 18:11	12.8	5.4
12/5/2019 18:12	12.8	5.4
12/5/2019 18:13	12.8	5.4
12/5/2019 18:14	12.8	5.4
12/5/2019 18:15	12.8	5.4
12/5/2019 18:16	12.8	5.4
12/5/2019 18:17	12.7	5.4
12/5/2019 18:18	12.7	5.4
12/5/2019 18:19	12.7	5.4
12/5/2019 18:20	12.7	5.4
12/5/2019 18:21	12.7	5.4
12/5/2019 18:22	12.7	5.4
12/5/2019 18:23	12.7	5.4
12/5/2019 18:24	12.7	5.4
12/5/2019 18:25	12.8	5.4
12/5/2019 18:26	12.8	5.4
12/5/2019 18:27	12.7	5.4
12/5/2019 18:28	12.7	5.4
12/5/2019 18:29	12.7	5.4
12/5/2019 18:30	12.7	5.4

Reference Method Results

Source: Main Stack Cokenergy

Date: 12/5/19 NOTE: DAS time is E:

O2, % CO2, %

12/5/2019 18:31	12.7	5.4
12/5/2019 18:32	12.7	5.4
12/5/2019 18:33	12.9	5.4
12/5/2019 18:34	13.2	5.5
12/5/2019 18:35	12.6	5.5
12/5/2019 18:36	12.6	5.5
12/5/2019 18:37	12.5	5.5
Average =	12.9	5.3

CEM Data Correction Data Sheet

Plant Name	Cokenergy
Sampling Location	Main Stack
Date	5-Dec-19
CEM Operator	Bill Thomas
Project Number	60616835
Pollutant	O ₂

Run No.	Start Time	Stop Time	Obs. Conc. (% or ppm)	Calibration Data			Calibration Corrected Data (% or ppm)
				Cma	Co	Cm	
1	1354	1548	12.9	10.1	-0.1	10.0	13.1
2	1649	1837	12.9	10.1	0.0	10.0	13.0
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
							13.0

Calibration Error Correction

$$C_{gas} = (C_{obs} - C_o) * (C_{ma} / (C_m - C_o))$$

CEM Data Correction Data Sheet

Plant Name	Cokenergy
Sampling Location	Main Stack
Date	5-Dec-19
CEM Operator	Bill Thomas
Project Number	60616835
Pollutant	CO ₂

Run No.	Start Time	Stop Time	Obs. Conc. (% or ppm)	Calibration Data			Calibration Corrected Data (% or ppm)
				Cma	Co	Cm	
1	1354	1548	5.30	10.0	0.2	9.9	5.3
2	1649	1837	5.3	10.0	0.2	9.8	5.3
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
							5.3

Calibration Error Correction

$$C_{gas} = (C_{obs} - C_o) * (C_{ma} / (C_m - C_o))$$

Reference Method Direct Calibration Results

Source: Main Stack Cokenergy

Date: 12/5/19 NOTE: DAS time is EST; plant time is CST

O2, % CO2, %

12/5/2019 9:45	21.5	0.4
12/5/2019 9:46	18.8	0.5
12/5/2019 9:47	0.1	0.2
12/5/2019 9:48	-0.1	-0.2
12/5/2019 9:49	-0.1	41.1
12/5/2019 9:50	-0.1	-0.5
12/5/2019 9:51	-0.1	-0.1
12/5/2019 9:52	-0.1	0.1
12/5/2019 9:53	2.8	0.1
12/5/2019 9:54	21.1	14.5
12/5/2019 9:55	21.1	20.6
12/5/2019 9:56	21.0	20.8
12/5/2019 9:57	21.0	20.8
12/5/2019 9:58	16.4	20.2
12/5/2019 9:59	10.8	10.3
12/5/2019 10:00	10.5	10.0
12/5/2019 10:01	10.2	10.0

Reference Method Bias Check Results

Source: Main Stack Cokenergy

Date: 12/5/19

NOTE: DAS time is EST; plant time is CST

O2, % CO2, %

12/5/2019 10:09	12.4	5.6
12/5/2019 10:10	2.8	4.5
12/5/2019 10:11	0.0	0.3
12/5/2019 10:12	-0.1	0.3
12/5/2019 10:13	-0.1	0.2
12/5/2019 10:14	-0.1	0.2
12/5/2019 10:15	1.5	0.2
12/5/2019 10:16	9.8	7.8
12/5/2019 10:17	9.9	9.8
12/5/2019 10:18	9.9	9.9

Reference Method Bias Check Results

Source: Main Stack Cokenergy

Date: 12/5/19 NOTE: DAS time is EST; plant time is CST
O2, % CO2, %

12/5/2019 16:00	13.1	5.2
12/5/2019 16:01	8.9	5.1
12/5/2019 16:02	0.0	0.4
12/5/2019 16:03	0.0	0.2
12/5/2019 16:04	0.0	0.2
12/5/2019 16:05	4.0	0.8
12/5/2019 16:06	10.0	9.0
12/5/2019 16:07	10.0	9.8
12/5/2019 16:08	10.0	9.8

Reference Method Bias Check Results

Source: Main Stack Cokenergy

Date: 12/5/19 NOTE: DAS time is EST; plant time is CST

O₂, % CO₂, %

12/5/2019 18:58	12.6	5.5
12/5/2019 18:59	8.9	5.4
12/5/2019 19:00	0.0	0.4
12/5/2019 19:01	0.0	0.2
12/5/2019 19:02	0.0	0.2
12/5/2019 19:03	4.0	0.8
12/5/2019 19:04	10.0	9.0
12/5/2019 19:05	10.0	9.8
12/5/2019 19:06	10.0	9.8

CEM CALIBRATION DATA

Analyzer Number	Calibration Span
O2	20.99
CO2	20.67
CO	
THC	
NOx	
SO2	

Cokerenergy
Luke Ford
John Carlson
Bill Thomas
60616835

Plant Name
Plant Rep.
Team Leader
CEM Operator
Project Number

Main Stack
5-Dec-19
1
1354
1548

Sampling Location
Date
Run Number
Start Time
Stop Time

CALIBRATION ERROR CHECK			SYSTEM CAL CHECK						
Calibration Gas Specification (% of Span)	Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	Pre Run 1		Post Run 1		Calibration Correction Factors
					System Response	Syst. Bias (% of Span)	System Response	Syst. Bias (% of Span)	
O2 Zero	<20	0 UHP Nitrogen	-0.1	-0.5%	-0.1	0.0%	0	0.5%	-Co=0.1
O2 Mid	40-60	10.08 CC273267	10.2	0.6%	9.9	-1.4%	10	-1.0%	Cm=10.0
O2 High	100	20.99 CC126166	21	0.0%					
CO2 Zero	<20	0 UHP Nitrogen	0.1	0.5%	0.2	0.5%	0.2	0.5%	Co=0.2
CO2 Mid	40-60	9.983 CC273267	10	0.1%	9.9	-0.5%	9.8	-1.0%	Cm=9.9
CO2 High	100	20.67 CC126166	20.8	0.6%					

$$\text{Calibration Error} = \left(\frac{\text{Analyzer Response} - \text{Calibration Value}}{\text{Analyzer Span}} \right) \times 100; \text{allowable error} = \pm 2\%, \pm 5\% \text{ for THC}$$

$$\text{System Bias} = \left(\frac{\text{System Response} - \text{Analyzer Response}}{\text{Analyzer Span}} \right) \times 100; \text{allowable error} = \pm 5\%$$

$$\text{Drift} = \left(\frac{\text{Post Test System Response} - \text{Pretest System Response}}{\text{Analyzer Span}} \right) \times 100; \text{allowable error} = \pm 3\%$$

$$\text{Co} = \frac{\text{Pretest System Zero Response} + \text{Post Test System Zero Response}}{2}$$

$$\text{Cm} = \frac{\text{Pretest System Upscale Response} + \text{Post Test System Upscale Response}}{2}$$

NR = Not required by EPA Method.

CEM CALIBRATION DATA

Analyzer Number	Calibration Span
O2	20.99
CO2	20.67
CO	
THC	
NOx	
SO2	

Cokenergy
Luke Ford
John Carson
Bill Thomas
60616835

Plant Name
Plant Rep.
Team Leader
CEM Operator
Project Number

Main Stack
5-Dec-19
2
1649
1837

Sampling Location
Date
Run Number
Start Time
Stop Time

CALIBRATION ERROR CHECK					SYSTEM CAL CHECK				
Calibration Gas Specification (% of Span)	Calibration Value (% or ppm)	Cylinder Number (1)	Analyzer Calibration Response	Difference (% of Span)	Pre Run 2		Post Run 2		Calibration Correction Factors
					System Response	Syst. Bias (% of Span)	System Response	Syst. Bias (% of Span)	
O2 Zero	<20	0 UHP Nitrogen	-0.1	-0.5%	0	0.5%	0	0.5%	Co=0.0
O2 Mid	40-60	10.08 CC273267	10.2	0.6%	10	-1.0%	10	-1.0%	Cm=10.0
O2 High	100	20.99 CC126166	21	0.0%					
CO2 Zero	<20	0 UHP Nitrogen	0.1	0.5%	0.2	0.5%	0.2	0.5%	Co=0.2
CO2 Mid	40-60	9.983 CC273267	10	0.1%	9.8	-1.0%	9.8	-1.0%	Cm=9.8
CO2 High	100	20.67 CC126166	20.8	0.6%					

Calibration Error = $\left(\frac{\text{Analyzer Response} - \text{Calibration Value}}{\text{Analyzer Span}} \right) \times 100$; allowable error = $\pm 2\%$, $\pm 5\%$ for THC

System Bias = $\left(\frac{\text{System Response} - \text{Analyzer Response}}{\text{Analyzer Span}} \right) \times 100$; allowable error = $\pm 5\%$

Drift = $\left(\frac{\text{Post Test System Response} - \text{Pretest System Response}}{\text{Analyzer Span}} \right) \times 100$; allowable error = $\pm 3\%$

Co = $\frac{\text{Pretest System Zero Response} + \text{Post Test System Zero Response}}{2}$

Cm = $\frac{\text{Pretest System Upscale Response} + \text{Post Test System Upscale Response}}{2}$

NR = Not required by EPA Method.

Appendix C
ANALYTICAL REPORT

ANALYTICAL REPORT

Job Number: 140-17625-1

Job Description: Cokenergy - M12

For:

AECOM

105 Mitchell Road, Suite 200

Oak Ridge, TN 37830

Attention: John Carson



Approved for release.
Courtney M Adkins
Project Manager II
12/26/2019 7:16 AM

Courtney M Adkins, Project Manager II
5815 Middlebrook Pike, Knoxville, TN, 37921
(865)291-3000
courtney.adkins@testamericainc.com
12/26/2019

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

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Definitions/Glossary

Client: AECOM
Project/Site: Cokenergy - M12

Job ID: 140-17625-1

Qualifiers

Metals

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)

Method Summary

Client: AECOM
Project/Site: Cokenergy - M12

Job ID: 140-17625-1

Method	Method Description	Protocol	Laboratory
5/12/6010B	Lead (ICP)	40CFRPart60	TAL KNX
5/12 Prep	Preparation, Stationary Source	40CFRPart60	TAL KNX

Protocol References:

40CFRPart60 = 40 CFR Part 60

Laboratory References:

TAL KNX = Eurofins TestAmerica, Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

Sample Summary

Client: AECOM
Project/Site: Cokenergy - M12

Job ID: 140-17625-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
140-17625-1	M12-COMBINED-1	Air	12/05/19 00:00	12/13/19 10:15	
140-17625-2	M12-COMBINED-2	Air	12/05/19 00:00	12/13/19 10:15	
140-17625-3	M12-COMBINED-3	Air	12/06/19 00:00	12/13/19 10:15	
140-17625-4	M12-COMBINED-BLANK	Air	12/06/19 00:00	12/13/19 10:15	
140-17625-5	A-6940 M12 MEDIA CHECK FILTER	Air	12/05/19 00:00	12/13/19 10:15	

Job Narrative

140-17625-1

Sample Receipt

The samples were received on December 13, 2019 at 10:15 AM in good condition and properly preserved. The temperature of the cooler at receipt was 17.5° C.

Metals

Method 12 Train Preparation and Analysis

These stack gas samples were prepared and analyzed using Eurofins TestAmerica Knoxville standard operating procedure KNOX-MT-0016 which is based on Method 12, "Determination of Inorganic Lead Emissions from Stationary Sources". SW-846 Method 6010B as incorporated in Eurofins TestAmerica Knoxville standard operating procedure KNOX-MT-0007 was used to perform the final instrument analysis.

Acid digestion was performed on the front half particulate filter, the nitric acid probe rinse and the nitric acid impinger solution as a combined sample using HNO₃ and H₂O₂. This digestate was adjusted to final volume and analyzed for lead by ICP.

Lead results were calculated using the following equation:

$$\text{Pb, } \mu\text{g/sample} = (\text{Raw Sample Concentration, } \mu\text{g/L}) \times (\text{Bench DF}) \times (\text{Final Volume ICP Digestate, L})$$

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

QC Association Summary

Client: AECOM
Project/Site: Cokenergy - M12

Job ID: 140-17625-1

Metals

Prep Batch: 36159

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17625-1	M12-COMBINED-1	Total/NA	Air	5/12 Prep	
140-17625-2	M12-COMBINED-2	Total/NA	Air	5/12 Prep	
140-17625-3	M12-COMBINED-3	Total/NA	Air	5/12 Prep	
140-17625-4	M12-COMBINED-BLANK	Total/NA	Air	5/12 Prep	
140-17625-5	A-6940 M12 MEDIA CHECK FILTER	Total/NA	Air	5/12 Prep	
MB 140-36159/6-A	Method Blank	Total/NA	Air	5/12 Prep	
LCS 140-36159/7-A	Lab Control Sample	Total/NA	Air	5/12 Prep	
LCSD 140-36159/8-A	Lab Control Sample Dup	Total/NA	Air	5/12 Prep	

Analysis Batch: 36264

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-17625-1	M12-COMBINED-1	Total/NA	Air	5/12/6010B	36159
140-17625-2	M12-COMBINED-2	Total/NA	Air	5/12/6010B	36159
140-17625-3	M12-COMBINED-3	Total/NA	Air	5/12/6010B	36159
140-17625-4	M12-COMBINED-BLANK	Total/NA	Air	5/12/6010B	36159
140-17625-5	A-6940 M12 MEDIA CHECK FILTER	Total/NA	Air	5/12/6010B	36159
MB 140-36159/6-A	Method Blank	Total/NA	Air	5/12/6010B	36159
LCS 140-36159/7-A	Lab Control Sample	Total/NA	Air	5/12/6010B	36159
LCSD 140-36159/8-A	Lab Control Sample Dup	Total/NA	Air	5/12/6010B	36159

Client Sample Results

Client: AECOM
Project/Site: Cokenergy - M12

Job ID: 140-17625-1

Client Sample ID: M12-COMBINED-1

Lab Sample ID: 140-17625-1

Date Collected: 12/05/19 00:00

Matrix: Air

Date Received: 12/13/19 10:15

Sample Container: Petri/Filter

Method: 5/12/6010B - Lead (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Pb	10.2		1.00	0.350	ug/Sample		12/18/19 08:00	12/20/19 10:46	1

Client Sample ID: M12-COMBINED-2

Lab Sample ID: 140-17625-2

Date Collected: 12/05/19 00:00

Matrix: Air

Date Received: 12/13/19 10:15

Sample Container: Petri/Filter

Method: 5/12/6010B - Lead (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Pb	3.75		1.00	0.350	ug/Sample		12/18/19 08:00	12/20/19 10:51	1

Client Sample ID: M12-COMBINED-3

Lab Sample ID: 140-17625-3

Date Collected: 12/06/19 00:00

Matrix: Air

Date Received: 12/13/19 10:15

Sample Container: Petri/Filter

Method: 5/12/6010B - Lead (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Pb	6.82		1.00	0.350	ug/Sample		12/18/19 08:00	12/20/19 11:06	1

Client Sample ID: M12-COMBINED-BLANK

Lab Sample ID: 140-17625-4

Date Collected: 12/06/19 00:00

Matrix: Air

Date Received: 12/13/19 10:15

Sample Container: Petri/Filter

Method: 5/12/6010B - Lead (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Pb	ND		1.00	0.350	ug/Sample		12/18/19 08:00	12/20/19 11:11	1

Client Sample ID: A-6940 M12 MEDIA CHECK FILTER

Lab Sample ID: 140-17625-5

Date Collected: 12/05/19 00:00

Matrix: Air

Date Received: 12/13/19 10:15

Sample Container: Petri/Filter

Method: 5/12/6010B - Lead (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Pb	ND		1.00	0.350	ug/Sample		12/18/19 08:00	12/20/19 11:31	1

Default Detection Limits

Client: AECOM
Project/Site: Cokenergy - M12

Job ID: 140-17625-1

Method: 5/12/6010B - Lead (ICP)

Prep: 5/12 Prep

Analyte	RL	MDL	Units
Pb	1.00	0.350	ug/Sample

QC Sample Results

Client: AECOM
Project/Site: Cokenergy - M12

Job ID: 140-17625-1

Method: 5/12/6010B - Lead (ICP)

Lab Sample ID: MB 140-36159/6-A
Matrix: Air
Analysis Batch: 36264

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 36159

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Pb	ND		1.00	0.350	ug/Sample		12/18/19 08:00	12/20/19 10:31	1

Lab Sample ID: LCS 140-36159/7-A
Matrix: Air
Analysis Batch: 36264

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 36159

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Pb	10.0	9.734		ug/Sample		97	80 - 120

Lab Sample ID: LCSD 140-36159/8-A
Matrix: Air
Analysis Batch: 36264

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 36159

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Pb	10.0	10.05		ug/Sample		100	80 - 120	3	20

Lab Chronicle

Client: AECOM
Project/Site: Cokenergy - M12

Job ID: 140-17625-1

Client Sample ID: M12-COMBINED-1

Date Collected: 12/05/19 00:00

Date Received: 12/13/19 10:15

Lab Sample ID: 140-17625-1

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5/12 Prep			1 Sample	100 mL	36159	12/18/19 08:00	KNC	TAL KNX
Total/NA	Analysis	5/12/6010B		1			36264	12/20/19 10:46	KNC	TAL KNX
Instrument ID: DUO										

Client Sample ID: M12-COMBINED-2

Date Collected: 12/05/19 00:00

Date Received: 12/13/19 10:15

Lab Sample ID: 140-17625-2

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5/12 Prep			1 Sample	100 mL	36159	12/18/19 08:00	KNC	TAL KNX
Total/NA	Analysis	5/12/6010B		1			36264	12/20/19 10:51	KNC	TAL KNX
Instrument ID: DUO										

Client Sample ID: M12-COMBINED-3

Date Collected: 12/06/19 00:00

Date Received: 12/13/19 10:15

Lab Sample ID: 140-17625-3

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5/12 Prep			1 Sample	100 mL	36159	12/18/19 08:00	KNC	TAL KNX
Total/NA	Analysis	5/12/6010B		1			36264	12/20/19 11:06	KNC	TAL KNX
Instrument ID: DUO										

Client Sample ID: M12-COMBINED-BLANK

Date Collected: 12/06/19 00:00

Date Received: 12/13/19 10:15

Lab Sample ID: 140-17625-4

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5/12 Prep			1 Sample	100 mL	36159	12/18/19 08:00	KNC	TAL KNX
Total/NA	Analysis	5/12/6010B		1			36264	12/20/19 11:11	KNC	TAL KNX
Instrument ID: DUO										

Client Sample ID: A-6940 M12 MEDIA CHECK FILTER

Date Collected: 12/05/19 00:00

Date Received: 12/13/19 10:15

Lab Sample ID: 140-17625-5

Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5/12 Prep			1 Sample	100 mL	36159	12/18/19 08:00	KNC	TAL KNX
Total/NA	Analysis	5/12/6010B		1			36264	12/20/19 11:31	KNC	TAL KNX
Instrument ID: DUO										

Lab Chronicle

Client: AECOM
Project/Site: Cokenergy - M12

Job ID: 140-17625-1

Client Sample ID: Method Blank

Lab Sample ID: MB 140-36159/6-A

Date Collected: N/A

Matrix: Air

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5/12 Prep			1 Sample	100 mL	36159	12/18/19 08:00	KNC	TAL KNX
Total/NA	Analysis	5/12/6010B		1			36264	12/20/19 10:31	KNC	TAL KNX
Instrument ID: DUO										

Client Sample ID: Lab Control Sample

Lab Sample ID: LCS 140-36159/7-A

Date Collected: N/A

Matrix: Air

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5/12 Prep			1 Sample	100 mL	36159	12/18/19 08:00	KNC	TAL KNX
Total/NA	Analysis	5/12/6010B		1			36264	12/20/19 10:36	KNC	TAL KNX
Instrument ID: DUO										

Client Sample ID: Lab Control Sample Dup

Lab Sample ID: LCSD 140-36159/8-A

Date Collected: N/A

Matrix: Air

Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5/12 Prep			1 Sample	100 mL	36159	12/18/19 08:00	KNC	TAL KNX
Total/NA	Analysis	5/12/6010B		1			36264	12/20/19 10:41	KNC	TAL KNX
Instrument ID: DUO										

Laboratory References:

TAL KNX = Eurofins TestAmerica, Knoxville, 5815 Middlebrook Pike, Knoxville, TN 37921, TEL (865)291-3000

Accreditation/Certification Summary

Client: AECOM
Project/Site: Cokenergy - M12

Job ID: 140-17625-1

Laboratory: Eurofins TestAmerica, Knoxville

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

Authority	Program	Identification Number	Expiration Date
	AFCEE	N/A	
ANAB	Dept. of Defense ELAP	L2311	02-14-22
ANAB	Dept. of Energy	L2311.01	02-14-22
ANAB	ISO/IEC 17025	L2311	02-13-22
Arkansas DEQ	State	2423	06-16-20
California	State	2423	06-30-20
Colorado	State	TN00009	02-29-20
Connecticut	State	PH-0223	09-30-21
Florida	NELAP	E87177	06-30-20
Georgia (DW)	State	906	04-13-20
Hawaii	State	NA	04-13-20
Kansas	NELAP	E-10349	11-01-20
Kentucky (DW)	State	90101	12-31-19
Louisiana	NELAP	83979	06-30-20
Louisiana (DW)	State	LA019	12-31-19
Maryland	State	277	03-31-20
Michigan	State	9933	04-13-20
Nevada	State	TN00009	07-31-20
New Hampshire	NELAP	299919	01-17-20
New Jersey	NELAP	TN001	06-30-20
New York	NELAP	10781	03-31-20
North Carolina (DW)	State	21705	07-31-20
North Carolina (WW/SW)	State	64	12-31-19
North Carolina (WW/SW)	State Program	64	12-31-20
Ohio VAP	State	CL0059	08-28-20
Oklahoma	State	9415	09-01-20
Oregon	NELAP	TNI0189	01-01-20
Pennsylvania	NELAP	68-00576	12-31-19
Tennessee	State	02014	04-13-20
Texas	NELAP	T104704380-18-12	08-31-20
US Fish & Wildlife	US Federal Programs	058448	07-31-20
USDA	US Federal Programs	P330-19-00236	08-20-22
Utah	NELAP	TN00009	07-31-20
Virginia	NELAP	460176	09-15-20
Washington	State	C593	01-19-20
West Virginia (DW)	State	9955C	12-31-19
West Virginia DEP	State	345	04-30-20
Wisconsin	State	998044300	08-31-20

METALS

COVER PAGE
METALS

Lab Name: Eurofins TestAmerica, Knoxville Job Number: 140-17625-1

SDG No.: _____

Project: Cokenergy - M12

Client Sample ID	Lab Sample ID
M12-COMBINED-1	140-17625-1
M12-COMBINED-2	140-17625-2
M12-COMBINED-3	140-17625-3
M12-COMBINED-BLANK	140-17625-4
A-6940 M12 MEDIA CHECK FILTER	140-17625-5

Comments:

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: M12-COMBINED-1

Lab Sample ID: 140-17625-1

Lab Name: Eurofins TestAmerica, Knoxville

Job No.: 140-17625-1

SDG ID.:

Matrix: Air

Date Sampled: 12/05/2019 00:00

Reporting Basis: WET

Date Received: 12/13/2019 10:15

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7439-92-1	Pb	10.2	1.00	0.350	ug/Samp le			1	5/12/601 0B

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: M12-COMBINED-2

Lab Sample ID: 140-17625-2

Lab Name: Eurofins TestAmerica, Knoxville

Job No.: 140-17625-1

SDG ID.:

Matrix: Air

Date Sampled: 12/05/2019 00:00

Reporting Basis: WET

Date Received: 12/13/2019 10:15

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7439-92-1	Pb	3.75	1.00	0.350	ug/Samp le			1	5/12/601 0B

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: M12-COMBINED-3

Lab Sample ID: 140-17625-3

Lab Name: Eurofins TestAmerica, Knoxville

Job No.: 140-17625-1

SDG ID.:

Matrix: Air

Date Sampled: 12/06/2019 00:00

Reporting Basis: WET

Date Received: 12/13/2019 10:15

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7439-92-1	Pb	6.82	1.00	0.350	ug/Samp le			1	5/12/601 0B

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: M12-COMBINED-BLANK

Lab Sample ID: 140-17625-4

Lab Name: Eurofins TestAmerica, Knoxville

Job No.: 140-17625-1

SDG ID.:

Matrix: Air

Date Sampled: 12/06/2019 00:00

Reporting Basis: WET

Date Received: 12/13/2019 10:15

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7439-92-1	Pb	ND	1.00	0.350	ug/Samp le			1	5/12/601 0B

1A-IN
INORGANIC ANALYSIS DATA SHEET
METALS

Client Sample ID: A-6940 M12 MEDIA CHECK FILTER

Lab Sample ID: 140-17625-5

Lab Name: Eurofins TestAmerica, Knoxville

Job No.: 140-17625-1

SDG ID.:

Matrix: Air

Date Sampled: 12/05/2019 00:00

Reporting Basis: WET

Date Received: 12/13/2019 10:15

CAS No.	Analyte	Result	RL	MDL	Units	C	Q	DIL	Method
7439-92-1	Pb	ND	1.00	0.350	ug/Samp le			1	5/12/601 0B

2A-IN
CALIBRATION VERIFICATIONS
METALS

Lab Name: Eurofins TestAmerica, Knoxville Job No.: 140-17625-1

SDG No.: _____

ICV Source: 90XXICVS_00118 Concentration Units: ug/L

CCV Source: 90CVCCVP_00488

Analyte	ICV 140-36264/4 12/20/2019 09:55				CCV 140-36264/9 12/20/2019 10:21				CCV 140-36264/21 12/20/2019 11:21			
	Found	C	True	%R	Found	C	True	%R	Found	C	True	%R
Pb	249.3		250	100	496.2		500	99	500.3		500	100

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.
Italicized analytes were not requested for this sequence.

2A-IN
CALIBRATION VERIFICATIONS
METALS

Lab Name: Eurofins TestAmerica, Knoxville Job No.: 140-17625-1

SDG No.: _____

ICV Source: 90XXICVS_00118 Concentration Units: ug/L

CCV Source: 90CVCCVP_00488

Analyte	CCV 140-36264/25 12/20/2019 11:41											
	Found	C	True	%R	Found	C	True	%R	Found	C	True	%R
Pb	503.1		500	101								

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.
Italicized analytes were not requested for this sequence.

2A-IN
CALIBRATION VERIFICATIONS
METALS

Lab Name: Eurofins TestAmerica, Knoxville Job No.: 140-17625-1

SDG No.: _____

ICV Source: 90XXICVS_00118 Concentration Units: ug/L

CCV Source: 90XXCCVLP_00456

Analyte	CCVL 140-36264/3 12/20/2019 09:50				ICV 140-36264/4 12/20/2019 09:55							
	Found	C	True	%R	Found	C	True	%R	Found	C	True	%R
Pb	254.2		250	102	249.3		250	100				

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.
Italicized analytes were not requested for this sequence.

2B-IN
CRQL CHECK STANDARD
METALS

Lab Name: Eurofins TestAmerica, Knoxville Job No.: 140-17625-1

SDG No.: _____

Method: 5/12/6010B Instrument ID: DUO

Lab Sample ID: CRI 140-36264/8 Concentration Units: ug/L

CRQL Check Standard Source: 90XXCRDL100P_00502

Analyte	CRQL Check Standard				
	True	Found	Qualifiers	%R(1)	Limits
Pb	10.0	10.64		106	50-150

Lab Sample ID: CRI 140-36264/24 Concentration Units: ug/L

CRQL Check Standard Source: 90XXCRDL100P_00502

Analyte	CRQL Check Standard				
	True	Found	Qualifiers	%R(1)	Limits
Pb	10.0	9.580	J	96	50-150

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

3-IN
INSTRUMENT BLANKS
METALS

Lab Name: Eurofins TestAmerica, Knoxville Job No.: 140-17625-1

SDG No.: _____

Concentration Units: ug/L

Analyte	RL	ICB 140-36264/5 12/20/2019 10:00		CCB 140-36264/10 12/20/2019 10:26		CCB 140-36264/22 12/20/2019 11:26		CCB 140-36264/26 12/20/2019 11:46	
		Found	C	Found	C	Found	C	Found	C
Pb	10.0	ND		ND		ND		ND	

Italicized analytes were not requested for this sequence.

3-IN
METHOD BLANK
METALS

Lab Name: Eurofins TestAmerica, Knoxville Job No.: 140-17625-1

SDG No.: _____

Concentration Units: ug/Sample Lab Sample ID: MB 140-36159/6-A

Instrument Code: DUO Batch No.: 36264

CAS No.	Analyte	Concentration	C	Q	Method
7439-92-1	Pb	ND			5_12_6010B

4A-IN
INTERFERENCE CHECK STANDARD
METALS

Lab Name: Eurofins TestAmerica, Knoxville Job No.: 140-17625-1
 SDG No.: _____
 Lab Sample ID: ICSA 140-36264/6 Instrument ID: DUO
 Lab File ID: F122019.asc ICS Source: 90XXICSAP_00030
 Concentration Units: ug/L

Analyte	True Solution A	Found Solution A	Percent Recovery
Pb		3.70	
Ag		-0.170	
Al	500000	520820	104
As		-0.320	
B		32.4	
Ba		1.12	
Be		-0.520	
Ca	500000	477070	95
Cd		-0.120	
Co		-0.610	
Cr		5.50	
Cu		-0.190	
Fe	200000	195360	98
K		54.4	
Li		9.40	
Mg	500000	514210	103
Mn		0.530	
Mo		-1.74	
Na		225	
Ni		0.750	
P		3.72	
Sb		-1.34	
Si		3.40	
Sn		-0.0400	
Sr		-8.01	
Ti		13.5	
Tl		-0.310	
V		1.93	
Zn		-2.18	

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

4A-IN
INTERFERENCE CHECK STANDARD
METALS

Lab Name: Eurofins TestAmerica, Knoxville Job No.: 140-17625-1
 SDG No.: _____
 Lab Sample ID: ICSAB 140-36264/7 Instrument ID: DUO
 Lab File ID: F122019.asc ICS Source: 90XXICSABP_00038
 Concentration Units: ug/L

Analyte	True Solution AB	Found Solution AB	Percent Recovery
Pb	50.0	49.9	100
<i>Ag</i>	200	206	103
<i>Al</i>	250000	257420	103
<i>As</i>	100	102	102
<i>B</i>	1000	1030	103
<i>Ba</i>	500	504	101
<i>Be</i>	500	533	107
<i>Ca</i>	250000	245570	98
<i>Cd</i>	1000	971	97
<i>Co</i>	500	486	97
<i>Cr</i>	500	503	101
<i>Cu</i>	500	513	103
<i>Fe</i>	100000	101190	101
<i>K</i>	10000	10958	110
<i>Li</i>	1000	1029	103
<i>Mg</i>	250000	255500	102
<i>Mn</i>	500	505	101
<i>Mo</i>	1000	989	99
<i>Na</i>	10000	10667	107
<i>Ni</i>	1000	979	98
<i>P</i>	1000	985	99
<i>Sb</i>	600	639	107
<i>Se</i>	50.0	56.6	113
<i>Si</i>	1000	1060	106
<i>Sn</i>	1000	979	98
<i>Sr</i>	1000	1014	101
<i>Ti</i>	1000	1013	101
<i>Tl</i>	100	98.4	98
<i>V</i>	500	498	100
<i>Zn</i>	1000	995	100

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

5B-IN
POST DIGESTION SPIKE SAMPLE RECOVERY
METALS

Client ID: M12-COMBINED-2 PDS

Lab ID: 140-17625-2 PDS

Lab Name: Eurofins TestAmerica, Knoxville

Job No.: 140-17625-1

SDG No.: _____

Matrix: Air

Concentration Units: ug/Sample

Analyte	SSR C	Sample Result (SR) C	Spike Added (SA)	%R	Control Limit %R	Q	Method
Pb	13.73	3.75	10.0	100	75-125		5/12/6010B

SSR = Spiked Sample Result

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

5B-IN
POST DIGESTION SPIKE DUPLICATE SAMPLE RECOVERY
METALS

Client ID: M12-COMBINED-2 PDSD

Lab ID: 140-17625-2 PDSD

Lab Name: Eurofins TestAmerica, Knoxville

Job No.: 140-17625-1

SDG No.: _____

Matrix: Air

Concentration Units: ug/Sample

Analyte	(SDR) C	Spike Added (SA)	%R	Control Limit %R	RPD	RPD Limit	Q	Method
Pb	13.75	10.0	100	75-125	0.1			5/12/6010B

SDR = Sample Duplicate Result

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

7A-IN
LAB CONTROL SAMPLE
METALS

Lab ID: LCS 140-36159/7-A

Lab Name: Eurofins TestAmerica, Knoxville

Job No.: 140-17625-1

Sample Matrix: Air

LCS Source: 90SPKNX10P_00005

Analyte	Air (ug/Sample)							
	True	Found	C	%R	Limits		Q	Method
Pb	10.0	9.734		97	80	120		5/12/6010B

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

FORM VIIA - IN

7D-IN
LAB CONTROL SAMPLE DUPLICATE
METALS

Lab ID: LCSD 140-36159/8-A

Lab Name: Eurofins TestAmerica, Knoxville

Job No.: 140-17625-1

Sample Matrix: Air

LCS Source: 90SPKNX10P_00005

Analyte	(SDR) C		Spike Added	%R	Control Limit %R	RPD	RPD Limit	Q	Method
Pb	10.05		10.0	100	80-120	3	20		5/12/6010B

SDR = Spike Duplicate Results

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

FORM VIID - IN

8-IN
ICP-AES AND ICP-MS SERIAL DILUTIONS
METALS

Lab ID: 140-17625-2

SDG No: _____

Lab Name: Eurofins TestAmerica, Knoxville

Job No: 140-17625-1

Matrix: Air

Concentration Units: ug/Sample

Analyte	Initial Sample		Serial		% Difference	Q	Method
	Result (I)	C	Result (S)	C			
Pb	3.75		3.315	J	NC		5/12/6010B

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

FORM VIII-IN

9-IN
CALIBRATION BLANK DETECTION LIMITS
METALS

Lab Name: Eurofins TestAmerica, Knoxville Job Number: 140-17625-1
SDG Number: _____
Matrix: Air Instrument ID: DUO
Method: 5/12/6010B XMDL Date: 01/01/2015 10:57

Analyte	Wavelength/ Mass	XRL (ug/L)	XMDL (ug/L)
Pb		10	2.6

9-IN
DETECTION LIMITS
METALS

Lab Name: Eurofins TestAmerica, Knoxville Job Number: 140-17625-1
SDG Number: _____
Matrix: Air Instrument ID: DUO
Method: 5/12/6010B MDL Date: 02/24/2015 11:04
Prep Method: 5/12 Prep

Analyte	Wavelength/ Mass	RL (ug/Sample)	MDL (ug/Sample)
Pb		1	0.35

10-IN
ICP-AES INTERELEMENT CORRECTION FACTORS
METALS

Lab Name: Eurofins TestAmerica, Knoxville Job Number: 140-17625-1

SDG No.: _____

ICP-AES Instrument ID: DUO Date: 08/29/2019

Analyte	Wave Length	Al	As	B	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	K	Li	Mg
Aluminum	308.215														
Antimony	206.833									0.017807					
Arsenic	189.042									-0.002727		-0.000043			
Beryllium	313.042														
Boron	249.678								0			-0.000333			
Cadmium	226.502											0.000067			
Chromium	267.716														
Cobalt	228.616														
Copper	324.754											-0.000086			
Lead	220.353	-0.000027							-0.00327		-0.000405	0.000026			
Manganese	257.610											0			0
Nickel	231.604											-0.000046			
Selenium	196.090											-0.000115			
Silicon	250.690								0.008400						
Silver	328.068														
Sodium	589.592														
Strontium	421.552						0.000035								
Thallium	190.856								0.005658	0.000290					
Titanium	334.941														
Tungsten	207.911														
Vanadium	292.402									-0.001250		0			
Zinc	213.856										0.000870	0.000091			

10-IN
ICP-AES INTERELEMENT CORRECTION FACTORS
METALS

Lab Name: Eurofins TestAmerica, Knoxville Job Number: 140-17625-1

SDG No.: _____

ICP-AES Instrument ID: DUO Date: 08/29/2019

Analyte	Wave Length	Mn	Mo	Na	Ni	P	Pb	Sb	Se	Si	Sn	Sr	Ti	Tl	V
Aluminum	308.215		0.028807												0.014428
Antimony	206.833										-0.002441				-0.002068
Arsenic	189.042		0.000681							-0.000027					
Beryllium	313.042														0
Boron	249.678														
Cadmium	226.502				-0.000085										
Chromium	267.716														
Cobalt	228.616		-0.001379							0			0.001588		
Copper	324.754														
Lead	220.353		-0.001950		0.000124					0.000126			-0.000605		
Manganese	257.610														
Nickel	231.604		0.000998							-0.000016				0.000230	
Selenium	196.090	0.000866								0.000018					
Silicon	250.690														
Silver	328.068														-0.001768
Sodium	589.592														
Strontium	421.552														
Thallium	190.856									-0.000010			-0.000621		0.002670
Titanium	334.941														
Tungsten	207.911														
Vanadium	292.402		0												
Zinc	213.856				0.005447										

10-IN
ICP-AES INTERELEMENT CORRECTION FACTORS
METALS

Lab Name: Eurofins TestAmerica, Knoxville Job Number: 140-17625-1

SDG No.: _____

ICP-AES Instrument ID: DUO Date: 08/29/2019

Analyte	Wave Length	W	Zn												
Aluminum	308.215														
Antimony	206.833														
Arsenic	189.042														
Beryllium	313.042														
Boron	249.678														
Cadmium	226.502														
Chromium	267.716														
Cobalt	228.616														
Copper	324.754														
Lead	220.353														
Manganese	257.610														
Nickel	231.604														
Selenium	196.090														
Silicon	250.690														
Silver	328.068														
Sodium	589.592														
Strontium	421.552														
Thallium	190.856														
Titanium	334.941														
Tungsten	207.911														
Vanadium	292.402														
Zinc	213.856														

11-IN
LINEAR RANGES
METALS

Lab Name: Eurofins TestAmerica, Knoxville

Job No: 140-17625-1

SDG No.: _____

Instrument ID: DUO

Date: 03/05/2019 11:36

Analyte	Integ. Time (Sec.)	Concentration (ug/L)	Method
Pb		90000	5/12/6010B

12-IN
PREPARATION LOG
METALS

Lab Name: Eurofins TestAmerica, Knoxville Job No.: 140-17625-1

SDG No.: _____

Prep Method: 5/12 Prep

Lab Sample ID	Preparation Date	Prep Batch	Initial Weight (Sample)	Initial Volume	Final Volume (mL)
140-17625-1	12/18/2019 08:00	36159	1		100
140-17625-2	12/18/2019 08:00	36159	1		100
140-17625-3	12/18/2019 08:00	36159	1		100
140-17625-4	12/18/2019 08:00	36159	1		100
140-17625-5	12/18/2019 08:00	36159	1		100
MB 140-36159/6-A	12/18/2019 08:00	36159	1		100
LCS 140-36159/7-A	12/18/2019 08:00	36159	1		100
LCSD 140-36159/8-A	12/18/2019 08:00	36159	1		100

13-IN
ANALYSIS RUN LOG
METALS

Lab Name: Eurofins TestAmerica, Knoxville Job No.: 140-17625-1

SDG No.: _____

Instrument ID: DUO Analysis Method: 5/12/6010B

Start Date: 12/20/2019 09:39 End Date: 12/20/2019 11:46

Lab Sample Id	D/F	T y p e	Time	Analytes																									
				P b																									
ICIS 140-36264/1	1		09:39	X																									
ZZZZZZ			09:45																										
CCVL 140-36264/3	1		09:50	X																									
ICV 140-36264/4	1		09:55	X																									
ICB 140-36264/5	1		10:00	X																									
ICSA 140-36264/6	1		10:05	X																									
ICSAB 140-36264/7	1		10:10	X																									
CRI 140-36264/8	1		10:16	X																									
CCV 140-36264/9	1		10:21	X																									
CCB 140-36264/10	1		10:26	X																									
MB 140-36159/6-A	1	T	10:31	X																									
LCS 140-36159/7-A	1	T	10:36	X																									
LCSD 140-36159/8-A	1	T	10:41	X																									
140-17625-1	1	T	10:46	X																									
140-17625-2	1	T	10:51	X																									
140-17625-2 PDS	1	T	10:56	X																									
140-17625-2 PDSD	1	T	11:01	X																									
140-17625-3	1	T	11:06	X																									
140-17625-4	1	T	11:11	X																									
140-17625-2 SD	5	T	11:16	X																									
CCV 140-36264/21	1		11:21	X																									
CCB 140-36264/22	1		11:26	X																									
140-17625-5	1	T	11:31	X																									
CRI 140-36264/24	1		11:36	X																									
CCV 140-36264/25	1		11:41	X																									
CCB 140-36264/26	1		11:46	X																									

Prep Types: _____
T = Total/NA

15-IN
ICP INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
METALS

Lab Name: Eurofins TestAmerica, Knoxville Job No.: 140-17625-1

SDG No.: _____

ICP Instrument ID: DUO Start Date: 12/20/2019 End Date: 12/20/2019

Lab Sample ID	Time	Internal Standards %RI For:									
		Element Y 224.306	Q	Element Y 371.030	Q	Element	Q	Element	Q	Element	Q
ICIS 140-36264/1	09:39										
CCVL 140-36264/3	09:50	99		99							
ICV 140-36264/4	09:55	99		100							
ICB 140-36264/5	10:00	100		100							
ICSA 140-36264/6	10:05	92		92							
ICSAB 140-36264/7	10:10	96		96							
CRI 140-36264/8	10:16	99		99							
CCV 140-36264/9	10:21	98		99							
CCB 140-36264/10	10:26	99		99							
MB 140-36159/6-A	10:31	99		100							
LCS 140-36159/7-A	10:36	97		97							
LCSD 140-36159/8-A	10:41	94		95							
140-17625-1	10:46	98		99							
140-17625-2	10:51	98		100							
140-17625-2 PDS	10:56	95		96							
140-17625-2 PDSD	11:01	95		97							
140-17625-3	11:06	98		100							
140-17625-4	11:11	99		100							
140-17625-2 SD	11:16	101		101							
CCV 140-36264/21	11:21	98		98							
CCB 140-36264/22	11:26	100		99							
140-17625-5	11:31	98		99							
CRI 140-36264/24	11:36	100		100							
CCV 140-36264/25	11:41	98		99							
CCB 140-36264/26	11:46	100		100							

METALS BATCH WORKSHEET

Lab Name: Eurofins TestAmerica, Knoxville Job No.: 140-17625-1

SDG No.: _____

Batch Number: 36159 Batch Start Date: 12/18/19 08:00 Batch Analyst: Collins, Kerry NBatch Method: 5/12 Prep Batch End Date: 12/19/19 16:00

Lab Sample ID	Client Sample ID	Method Chain	Basis	ProbeRinseVol	ImpingerVol	InitialAmount	FinalAmount	90SPKNX10P 00005	90SPKNX8P 00004
140-17625-A-1	M12-COMBINED-1	5/12 Prep, 5/12/6010B	T	33 mL	630 mL	1 Sample	100 mL		
140-17625-A-2	M12-COMBINED-2	5/12 Prep, 5/12/6010B	T	105 mL	540 mL	1 Sample	100 mL		
140-17625-A-3	M12-COMBINED-3	5/12 Prep, 5/12/6010B	T	95 mL	530 mL	1 Sample	100 mL		
140-17625-A-4	M12-COMBINED-BLA NK	5/12 Prep, 5/12/6010B	T	100 mL	0 mL	1 Sample	100 mL		
140-17625-A-5	A-6940 M12 MEDIA CHECK FILTER	5/12 Prep, 5/12/6010B	T			1 Sample	100 mL		
MB 140-36159/6		5/12 Prep, 5/12/6010B				1 Sample	100 mL		
LCS 140-36159/7		5/12 Prep, 5/12/6010B				1 Sample	100 mL	1 mL	1 mL
LCSD 140-36159/8		5/12 Prep, 5/12/6010B				1 Sample	100 mL	1 mL	1 mL

Lab Sample ID	Client Sample ID	Method Chain	Basis	90SPKNX9P 00005	AnalysisComment				
140-17625-A-1	M12-COMBINED-1	5/12 Prep, 5/12/6010B	T						
140-17625-A-2	M12-COMBINED-2	5/12 Prep, 5/12/6010B	T						
140-17625-A-3	M12-COMBINED-3	5/12 Prep, 5/12/6010B	T						
140-17625-A-4	M12-COMBINED-BLA NK	5/12 Prep, 5/12/6010B	T						
140-17625-A-5	A-6940 M12 MEDIA CHECK FILTER	5/12 Prep, 5/12/6010B	T		filter only				
MB 140-36159/6		5/12 Prep, 5/12/6010B							
LCS 140-36159/7		5/12 Prep, 5/12/6010B		1 mL					
LCSD 140-36159/8		5/12 Prep, 5/12/6010B		1 mL					

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.

METALS BATCH WORKSHEET

Lab Name: Eurofins TestAmerica, Knoxville Job No.: 140-17625-1

SDG No.: _____

Batch Number: 36159 Batch Start Date: 12/18/19 08:00 Batch Analyst: Collins, Kerry NBatch Method: 5/12 Prep Batch End Date: 12/19/19 16:00

Batch Notes	
Batch Comment	pH<2 all samples pH paper lot# HC991818
Filter Paper ID	30426505-9171-CC
Hydrogen Peroxide Reagent ID Number	266532 10ml
Nitric Acid ID	272287 50ml
Hot Block ID	hotplate B
Oven, Bath or Block Temperature 1	12-18 91 12-19 91 Degrees C
Pipette/Syringe/Dispenser ID	met-016
Thermometer ID	metals 6

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.

	Pos ID	Rack	Row	Col	Type	Samplename	Comment	Custom ID1	Custom ID2
1	1	1	1	1	QC	CCVL			
2	2	1	2	1	QC	ICV			
3	3	1	3	1	Unk	ICB			
4	4	1	4	1	Unk	ICSA			
5	5	1	5	1	Unk	ICSAB			
6	6	1	6	1	QC	CRI			
7	7	1	7	1	QC	CCV			
8	8	1	8	1	Unk	CCB			
9	9	1	9	1	Unk	mb 140-36159/6-a			
10	10	1	10	1	QC	lcs 140-36159/7-a			
11	11	1	11	1	QC	lcsd 140-36159/8-a			
12	12	1	12	1	Unk	140-17625-a-1-a			
13	13	1	1	2	Unk	140-17625-a-2-a			
14	14	1	2	2	Unk	140-17625-a-2-a PDS			
15	15	1	3	2	Unk	140-17625-a-2-a PDSD			
16	16	1	4	2	Unk	140-17625-a-3-a			
17	17	1	5	2	Unk	140-17625-a-4-a			
18	18	1	6	2	Unk	140-17625-a-2-a SD@5	2ML TO 10ML		
19	19	1	7	2	QC	CCV			
20	20	1	8	2	Unk	CCB			
21	21	1	9	2	Unk	140-17625-a-5-a			
22	22	1	10	2	QC	CRI			
23	23	1	11	2	QC	CCV			
24	24	1	12	2	Unk	CCB			
25	25	1	1	3	Unk	Sample-16			
26	26	1	2	3	Unk	Sample-17			
27	27	1	3	3	Unk	Sample-18			
28	28	1	4	3	Unk	Sample-19			

	Pos ID	Rack	Row	Col	Type	Samplename	Comment	Custom ID1	Custom ID2
1	1	1	1	1	QC	CCVL			
2	2	1	2	1	QC	ICV			
3	3	1	3	1	Unk	ICB			
4	4	1	4	1	Unk	ICSA			
5	5	1	5	1	Unk	ICSAB			
6	6	1	6	1	QC	CRI			
7	7	1	7	1	QC	CCV			
8	8	1	8	1	Unk	CCB			
9	9	1	9	1	Unk	mb 140-36159/6-a			
10	10	1	10	1	QC	lcs 140-36159/7-a			
11	11	1	11	1	QC	lcsd 140-36159/8-a			
12	12	1	12	1	Unk	140-17625-a-1-a			
13	13	1	1	2	Unk	140-17625-a-2-a			
14	14	1	2	2	Unk	140-17625-a-2-a PDS			
15	15	1	3	2	Unk	140-17625-a-2-a PDSD			
16	16	1	4	2	Unk	140-17625-a-3-a			
17	17	1	5	2	Unk	140-17625-a-4-a			
18	18	1	6	2	Unk	140-17625-a-2-a SD@5	2ML TO 10ML		
19	19	1	7	2	QC	CCV			
20	20	1	8	2	Unk	CCB			
21	21	1	9	2	Unk	140-17625-a-5-a			
22	22	1	10	2	QC	CRI			
23	23	1	11	2	QC	CCV			
24	24	1	12	2	Unk	CCB			
25	25	1	1	3	Unk	Sample-16			
26	26	1	2	3	Unk	Sample-17			
27	27	1	3	3	Unk	Sample-18			
28	28	1	4	3	Unk	Sample-19			

F122019

Pb

SI-127

CCVL-456

ICV-118

ICSA-30

ICSAB-38

CRI-502

CCV-488

Y-70

H2O-22

TestAmerica Knoxville

Data Quality Checks

Sequence: F122019

Internal Standard	ICB Internal Standard	Area	LCL	UCL
	Y_2243A	12734	8914	16554
	Y_3710A	143331	100332	186330
	Y_3710R	11635	8144	15125
20-Dec-19 11:51 AM	26 Samples were checked against the internal standard area limits			
20-Dec-19 11:51 AM	0 Sample(s) failed the limits check			
Date/Time	Lab ID	Problem		

Relative Standard Deviation

20-Dec-19 11:51 AM	5 Standards were checked against the CCV/ICV %RSD limits			
20-Dec-19 11:51 AM	0 Standard(s) failed the limits check			
Date/Time	Lab ID	Problem		

5_12_Prep Analysis Sheet

(To Accompany Samples to Instruments)

Batch Number: 140-36159

Analyst: Collins, Kerry N

Batch Open: 12/18/2019 8:00:00AM

Batch End: 12/19/2019 4:00:00PM

Preparation, Stationary Source

Input Sample Lab ID (Analytical Method)	SDG (Job #)	Matrix	Initial Amount	Final Amount	Due Date	Analytical TAT	Div Rank	Comments	Output Sample Lab ID
140-17625-A-1 (5_12_6010B)	N/A (140-17625-1)	Air Train	1 Sample	100 mL	12/30/19	10_Days	4		140-17625-A-1-A
140-17625-A-2 (5_12_6010B) XX	N/A (140-17625-1)	Air Train	1 Sample	100 mL	12/30/19	10_Days	4		140-17625-A-2-A
140-17625-A-3 (5_12_6010B)	N/A (140-17625-1)	Air Train	1 Sample	100 mL	12/30/19	10_Days	4		140-17625-A-3-A
140-17625-A-4 (5_12_6010B)	N/A (140-17625-1)	Air Train	1 Sample	100 mL	12/30/19	10_Days	4		140-17625-A-4-A
140-17625-A-5 (5_12_6010B)	N/A (140-17625-1)	Air Train	1 Sample	100 mL	12/30/19	10_Days	4	filter only	140-17625-A-5-A
MB~140-36159/6 N/A	N/A		1 Sample	100 mL	N/A	N/A	N/A		MB 140-36159/6-A
LCS~140-36159/7 N/A	N/A		1 Sample	100 mL	N/A	N/A	N/A		LCS 140-36159/7-A
LCSD~140-36159/8 N/A	N/A		1 Sample	100 mL	N/A	N/A	N/A		LCSD 140-36159/8-A

1

2

3

4

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12/26/2019

Printed : 12/19/2019

Page 1 of 4

Eurofins TestAmerica, Knoxville

Sample Name: ICIS Acquired: 12/20/2019 9:39:57 Type: Cal
Method: MT0007(v23) HF 082919(v13) Mode: IR Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	-.00021	-.00021	-.00064	.00065	.00939	-.00006
Stddev	.00008	.00018	.00004	.00004	.00053	.00004
%RSD	38.416	84.774	5.7671	6.6188	5.6902	70.375

#1	-.00027	-.00033	-.00066	.00062	.00936	-.00011
#2	-.00012	-.00029	-.00059	.00063	.00994	-.00004
#3	-.00025	-.00001	-.00065	.00070	.00887	-.00003

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	.00579	-.00085	-.00123	-.00005	.00124	-.00008
Stddev	.00084	.00003	.00007	.00003	.00002	.00016
%RSD	14.495	3.2063	6.0077	59.661	2.0075	207.20

#1	.00487	-.00083	-.00129	-.00005	.00127	-.00019
#2	.00598	-.00083	-.00115	-.00007	.00124	.00011
#3	.00652	-.00088	-.00126	-.00002	.00122	-.00015

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	.00297	-.00049	.00014	.00006	.00014	.00001
Stddev	.00211	.00228	.00038	.00002	.00004	.00045
%RSD	71.201	462.24	278.00	27.645	31.377	3559.3

#1	.00538	-.00116	.00036	.00005	.00019	-.00049
#2	.00144	-.00237	.00036	.00004	.00012	.00039
#3	.00208	.00205	-.00031	.00007	.00010	.00013

Sample Name: ICIS Acquired: 12/20/2019 9:39:57 Type: Cal
Method: MT0007(v23) HF 082919(v13) Mode: IR Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	-.01209	-.00088	.00007	.00006	.00134	.00069
Stddev	.00121	.00008	.00002	.00001	.00009	.00003
%RSD	10.005	9.5280	31.259	19.546	6.6833	4.0317

#1	-.01073	-.00095	.00006	.00005	.00126	.00068
#2	-.01304	-.00078	.00010	.00006	.00133	.00072
#3	-.01251	-.00090	.00006	.00008	.00143	.00066

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Tl1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	.00037	.00046	.00029	.00251	-.00092	-.00035
Stddev	.00008	.00019	.00008	.00140	.00065	.00002
%RSD	21.727	41.502	28.312	55.814	70.910	6.5553

#1	.00035	.00068	.00039	.00300	-.00079	-.00037
#2	.00045	.00036	.00024	.00093	-.00034	-.00033
#3	.00029	.00034	.00025	.00359	-.00162	-.00037

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	Cts/S	Cts/S
Avg	-.00014	.00406
Stddev	.00004	.00005
%RSD	26.348	1.3346

#1	-.00018	.00412
#2	-.00011	.00402
#3	-.00013	.00403

Sample Name: ICIS Acquired: 12/20/2019 9:39:57 Type: Cal
Method: MT0007(v23) HF 082919(v13) Mode: IR Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12757.	143050.	11786.
Stddev	59.	209.	130.
%RSD	.46409	.14639	1.1044
#1	12693.	142840.	11888.
#2	12769.	143260.	11639.
#3	12809.	143050.	11831.

Sample Name: S1 Acquired: 12/20/2019 9:45:05 Type: Cal
Method: MT0007(v23) HF 082919(v13) Mode: IR Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	.28477	1.1993	.07063	.20390	23.799	13.992
Stddev	.00012	.0027	.00019	.00048	.041	.198
%RSD	.04326	.22898	.26827	.23623	.17274	1.4157

#1	.28469	1.2022	.07048	.20345	23.797	13.896
#2	.28491	1.1968	.07084	.20383	23.758	14.219
#3	.28471	1.1989	.07057	.20441	23.840	13.860

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	21.893	1.6353	3.8358	.51879	.80199	5.9763
Stddev	.032	.0006	.0014	.00052	.00069	.0050
%RSD	.14655	.03510	.03718	.09995	.08586	.08398

#1	21.929	1.6359	3.8374	.51938	.80265	5.9735
#2	21.881	1.6348	3.8352	.51857	.80128	5.9821
#3	21.869	1.6351	3.8347	.51841	.80205	5.9734

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	5.9165	6.4935	1.8618	3.0958	1.3337	.04276
Stddev	.0145	.0066	.0081	.0047	.0012	.00094
%RSD	.24472	.10194	.43585	.15089	.09214	2.1944

#1	5.9315	6.5005	1.8615	3.0995	1.3327	.04368
#2	5.9026	6.4926	1.8701	3.0974	1.3350	.04180
#3	5.9154	6.4873	1.8538	3.0906	1.3333	.04278

Sample Name: S1 Acquired: 12/20/2019 9:45:05 Type: Cal
Method: MT0007(v23) HF 082919(v13) Mode: IR Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	19.671	2.7412	.17485	.01042	.14884	.07105
Stddev	.392	.0022	.00021	.00009	.00028	.00010
%RSD	1.9907	.08088	.12068	.85017	.18851	.14709

#1	19.230	2.7389	.17477	.01041	.14914	.07093
#2	19.807	2.7414	.17469	.01051	.14880	.07113
#3	19.977	2.7434	.17509	.01033	.14858	.07110

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Tl1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S	Cts/S
Avg	.03876	.07000	.74853	27.664	1.8680	.07850
Stddev	.00006	.00017	.00034	.416	.0070	.00007
%RSD	.15976	.24847	.04503	1.5033	.37694	.09492

#1	.03871	.07002	.74882	27.784	1.8693	.07844
#2	.03874	.07017	.74816	28.006	1.8604	.07858
#3	.03883	.06982	.74860	27.201	1.8743	.07847

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	Cts/S	Cts/S
Avg	.84772	5.7611
Stddev	.00106	.0003
%RSD	.12448	.00518

#1	.84893	5.7608
#2	.84720	5.7610
#3	.84702	5.7614

Sample Name: S1 Acquired: 12/20/2019 9:45:05 Type: Cal
 Method: MT0007(v23) HF 082919(v13) Mode: IR Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12185.	137870.	11470.
Stddev	51.	716.	105.
%RSD	.41783	.51902	.91232
#1	12126.	137120.	11394.
#2	12214.	137960.	11427.
#3	12216.	138540.	11589.

Sample Name: CCVL Acquired: 12/20/2019 9:50:27 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.49130	12.404	.24845	1.0025	.99024	1.0495
Stddev	.00088	.079	.00075	.0006	.00452	.0044
%RSD	.17942	.63603	.30160	.05459	.45653	.42108
#1	.49028	12.355	.24875	1.0021	.98634	1.0462
#2	.49183	12.495	.24760	1.0031	.99520	1.0545
#3	.49178	12.362	.24900	1.0023	.98920	1.0478

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	25.032	.25429	1.0073	1.0143	.98587	12.625
Stddev	.044	.00044	.0002	.0029	.00144	.073
%RSD	.17636	.17304	.01906	.29062	.14587	.58115
#1	24.988	.25394	1.0072	1.0133	.98630	12.542
#2	25.076	.25414	1.0072	1.0177	.98427	12.682
#3	25.032	.25478	1.0075	1.0121	.98705	12.650

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Sample Name: CCVL Acquired: 12/20/2019 9:50:27 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	25.223	.98298	24.820	1.0195	1.0054	24.644
Stddev	.125	.00377	.076	.0015	.0016	.394
%RSD	.49700	.38383	.30793	.14389	.15483	1.5967
#1	25.192	.97863	24.741	1.0178	1.0069	24.605
#2	25.360	.98532	24.827	1.0206	1.0038	25.055
#3	25.115	.98501	24.893	1.0201	1.0055	24.271

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	25.287	1.0177	.99517	.25355	.25421	.24540
Stddev	.118	.0013	.00246	.00146	.00084	.00170
%RSD	.46595	.12614	.24693	.57432	.33104	.69172
#1	25.230	1.0168	.99461	.25196	.25516	.24705
#2	25.422	1.0172	.99786	.25387	.25355	.24366
#3	25.207	1.0192	.99304	.25483	.25392	.24549

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Sample Name: CCVL Acquired: 12/20/2019 9:50:27 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Ti1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.24659	.98030	1.0152	.99564	.99959	.50806
Stddev	.00123	.01228	.0002	.00502	.00474	.00026
%RSD	.49858	1.2524	.02390	.50464	.47372	.05109
#1	.24574	.97562	1.0155	.99049	.99704	.50836
#2	.24800	.99423	1.0150	1.0005	1.0051	.50789
#3	.24602	.97106	1.0153	.99590	.99668	.50793

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	ppm	ppm
Avg	1.0047	.99892
Stddev	.0015	.00027
%RSD	.14565	.02733
#1	1.0044	.99862
#2	1.0064	.99898
#3	1.0035	.99916

Check ?	Chk Pass	Chk Pass
Value		
Range		

Sample Name: CCVL Acquired: 12/20/2019 9:50:27 Type: QC
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12628.	142130.	11657.
Stddev	27.	728.	64.
%RSD	.21605	.51218	.55241
#1	12597.	141680.	11615.
#2	12640.	141750.	11731.
#3	12647.	142970.	11624.

Sample Name: ICV Acquired: 12/20/2019 9:55:29 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.48229	12.284	.24833	.99592	.98696	1.0401
Stddev	.00095	.026	.00098	.00074	.00101	.0037
%RSD	.19790	.21201	.39485	.07389	.10190	.35694
#1	.48314	12.313	.24855	.99560	.98721	1.0375
#2	.48248	12.278	.24918	.99540	.98783	1.0444
#3	.48126	12.262	.24726	.99676	.98586	1.0384

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	24.801	.25339	1.0050	1.0028	.97793	12.662
Stddev	.073	.00036	.0013	.0029	.00134	.017
%RSD	.29515	.14252	.12710	.28375	.13685	.13727
#1	24.742	.25323	1.0049	1.0046	.97860	12.674
#2	24.777	.25314	1.0038	.99956	.97639	12.670
#3	24.883	.25380	1.0064	1.0044	.97881	12.642

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Sample Name: ICV Acquired: 12/20/2019 9:55:29 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	25.004	.98303	24.764	1.0163	1.0031	25.231
Stddev	.046	.00097	.043	.0007	.0015	.726
%RSD	.18443	.09894	.17548	.06879	.14588	2.8763
#1	24.964	.98415	24.714	1.0167	1.0044	25.823
#2	24.994	.98237	24.782	1.0155	1.0015	24.421
#3	25.054	.98257	24.796	1.0168	1.0035	25.450

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	25.155	1.0127	.99477	.24804	.24932	.24530
Stddev	.034	.0017	.00434	.00247	.00021	.00099
%RSD	.13392	.16928	.43579	.99607	.08481	.40359
#1	25.118	1.0129	.99555	.24780	.24908	.24500
#2	25.185	1.0109	.99009	.24570	.24940	.24640
#3	25.162	1.0143	.99866	.25063	.24948	.24449

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Sample Name: ICV Acquired: 12/20/2019 9:55:29 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Ti1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.24450	1.0014	1.0111	.99386	.99050	.50128
Stddev	.00376	.0092	.0017	.00264	.00215	.00333
%RSD	1.5360	.91957	.17092	.26528	.21710	.66475
#1	.24681	.99075	1.0096	.99644	.98839	.50325
#2	.24017	1.0061	1.0107	.99399	.99269	.49743
#3	.24652	1.0072	1.0130	.99117	.99042	.50315

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	ppm	ppm
Avg	.99241	.99566
Stddev	.00222	.00132
%RSD	.22404	.13297
#1	.99480	.99671
#2	.99041	.99417
#3	.99200	.99610

Check ?	Chk Pass	Chk Pass
Value		
Range		

Sample Name: ICV Acquired: 12/20/2019 9:55:29 Type: QC
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12679.	143360.	11669.
Stddev	35.	420.	75.
%RSD	.27601	.29330	.64212
#1	12640.	142870.	11582.
#2	12708.	143620.	11715.
#3	12688.	143580.	11709.

Sample Name: ICB Acquired: 12/20/2019 10:00:31 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00022	.01739	.00007	.00063	-.00010	-.00003
Stddev	.00030	.02030	.00059	.00067	.00015	.00001
%RSD	136.43	116.77	788.61	105.78	155.58	49.269
#1	-.00008	.02318	.00068	.00140	-.00025	-.00004
#2	.00053	-.00518	-.00049	.00018	.00005	-.00002
#3	.00022	.03416	.00003	.00032	-.00009	-.00002

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00010	-.00006	.00022	.00039	-.00074	-.00001
Stddev	.00069	.00006	.00003	.00021	.00036	.00169
%RSD	705.02	108.86	14.129	53.615	48.891	16214.
#1	.00066	-.00011	.00025	.00016	-.00033	.00165
#2	.00030	-.00007	.00019	.00046	-.00090	.00003
#3	-.00067	.00001	.00022	.00056	-.00100	-.00172

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: ICB Acquired: 12/20/2019 10:00:31 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00763	.00116	-.00488	-.00003	.00010	-1.2438
Stddev	.02602	.00027	.00526	.00002	.00013	.3394
%RSD	340.99	23.395	107.69	70.268	133.76	27.289

#1	.00256	.00119	-.00170	-.00005	.00000	-1.5634
#2	.01175	.00142	-.00199	-.00001	.00024	-.88750
#3	-.03720	.00088	-.01095	-.00004	.00004	-1.2805

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.01178	-.00006	-.00031	-.00092	-.00007	-.00027
Stddev	.00317	.00010	.00101	.00096	.00036	.00052
%RSD	26.939	175.68	330.53	103.58	503.64	195.37

#1	-.00907	-.00003	.00045	-.00167	-.00027	-.00000
#2	-.01100	-.00018	-.00146	-.00125	.00035	.00007
#3	-.01527	.00003	.00008	.00015	-.00029	-.00086

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: ICB Acquired: 12/20/2019 10:00:31 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Ti1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00052	-.00571	-.00004	.00009	.00027	.00084
Stddev	.00094	.01342	.00008	.00023	.00068	.00149
%RSD	182.11	235.17	199.88	264.83	247.92	177.80

#1	-.00077	-.02003	.00004	-.00006	.00104	.00238
#2	.00053	.00657	-.00012	.00035	-.00025	-.00059
#3	-.00131	-.00365	-.00004	-.00003	.00003	.00072

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	ppm	ppm
Avg	.00032	-.00002
Stddev	.00016	.00005
%RSD	49.414	255.98

#1	.00026	.00003
#2	.00050	-.00003
#3	.00020	-.00007

Check ?	Chk Pass	Chk Pass
High Limit		
Low Limit		

Sample Name: ICB Acquired: 12/20/2019 10:00:31 Type: Unk
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12734.	143330.	11635.
Stddev	63.	776.	148.
%RSD	.49396	.54155	1.2690
#1	12662.	142520.	11671.
#2	12761.	143400.	11472.
#3	12779.	144070.	11761.

Sample Name: ICSA Acquired: 12/20/2019 10:05:39 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00017	520.82	-.00032	.03236	.00112	-.00052
Stddev	.00059	.81	.00006	.00089	.00012	.00002
%RSD	345.90	.15643	18.774	2.7525	10.937	3.8699
#1	-.00057	519.91	-.00036	.03277	.00106	-.00052
#2	-.00045	521.48	-.00025	.03134	.00126	-.00054
#3	.00051	521.07	-.00034	.03297	.00104	-.00050

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	477.07	-.00012	-.00061	.00550	-.00019	195.36
Stddev	4.49	.00006	.00011	.00026	.00031	1.55
%RSD	.94072	52.224	17.179	4.7844	163.64	.79446
#1	472.27	-.00017	-.00050	.00552	-.00043	196.78
#2	477.79	-.00013	-.00063	.00576	-.00029	195.60
#3	481.15	-.00005	-.00071	.00524	.00016	193.70

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: ICSA Acquired: 12/20/2019 10:05:39 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.05441	.00940	514.21	.00053	-.00174	-1.6986
Stddev	.00843	.00117	.93	.00004	.00052	.3523
%RSD	15.494	12.484	.18039	6.9346	29.889	20.742
#1	.05429	.00985	513.38	.00050	-.00115	-2.1055
#2	.06291	.00807	514.05	.00057	-.00194	-1.4980
#3	.04605	.01028	515.21	.00050	-.00214	-1.4924

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.22515	.00075	.00372	F .01276	.00370	-.00134
Stddev	.01386	.00016	.00078	.00055	.00069	.00209
%RSD	6.1579	21.490	20.970	4.3385	18.620	155.27
#1	.22787	.00086	.00324	.01284	.00291	.00029
#2	.23746	.00082	.00462	.01216	.00416	-.00369
#3	.21013	.00056	.00330	.01326	.00404	-.00062

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Fail	Chk Pass	Chk Pass
High Limit				.00800		
Low Limit				-.00800		

Sample Name: ICSA Acquired: 12/20/2019 10:05:39 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Ti1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	F .01289	.00340	-.00004	-.00801	.01354	-.00031
Stddev	.00028	.01576	.00015	.00011	.00041	.00180
%RSD	2.1370	463.77	402.58	1.3177	3.0008	576.10

#1	.01314	.01927	-.00010	-.00791	.01345	-.00119
#2	.01292	-.01225	.00013	-.00802	.01318	-.00150
#3	.01259	.00318	-.00015	-.00812	.01398	.00175

Check ?	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit	.01000					
Low Limit	-.01000					

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	ppm	ppm
Avg	.00193	-.00218
Stddev	.00035	.00020
%RSD	18.042	9.1390

#1	.00205	-.00238
#2	.00154	-.00217
#3	.00221	-.00198

Check ?	Chk Pass	Chk Pass
High Limit		
Low Limit		

Sample Name: ICSA Acquired: 12/20/2019 10:05:39 Type: Unk
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	11785.	132220.	11194.
Stddev	42.	641.	24.
%RSD	.35838	.48471	.21100
#1	11737.	132460.	11199.
#2	11805.	131500.	11168.
#3	11814.	132710.	11214.

Sample Name: ICSAB Acquired: 12/20/2019 10:10:56 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.20598	257.42	.10223	1.0300	.50398	.53302
Stddev	.00050	1.31	.00070	.0045	.00291	.00519
%RSD	.24092	.50721	.68188	.43986	.57806	.97313
#1	.20617	255.92	.10148	1.0248	.50066	.53126
#2	.20636	258.06	.10285	1.0335	.50523	.52895
#3	.20542	258.29	.10236	1.0316	.50607	.53886

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	245.57	.97059	.48627	.50276	.51349	101.19
Stddev	4.46	.00240	.00075	.00378	.00243	1.01
%RSD	1.8170	.24725	.15459	.75173	.47405	.99678
#1	243.36	.96842	.48550	.49938	.51070	100.06
#2	250.70	.97019	.48630	.50207	.51518	101.99
#3	242.64	.97317	.48701	.50684	.51460	101.52

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: ICSAB Acquired: 12/20/2019 10:10:56 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	10.958	1.0293	255.50	.50541	.98870	10.443
Stddev	.052	.0064	2.70	.00151	.00365	.481
%RSD	.47404	.62229	1.0570	.29847	.36945	4.6015
#1	10.905	1.0219	252.75	.50384	.98451	10.428
#2	10.959	1.0330	258.15	.50552	.99119	10.930
#3	11.009	1.0330	255.60	.50685	.99040	9.9692

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	10.667	.97891	.98510	.05251	.04988	.63912
Stddev	.033	.00173	.00298	.00282	.00196	.00235
%RSD	.31204	.17677	.30283	5.3740	3.9255	.36804
#1	10.636	.97693	.98841	.05514	.05144	.64158
#2	10.662	.97973	.98425	.04953	.05052	.63689
#3	10.702	.98009	.98262	.05286	.04768	.63888

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: ICSAB Acquired: 12/20/2019 10:10:56 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Ti1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.05661	1.0598	.97887	1.0142	1.0128	.09843
Stddev	.00188	.0133	.00302	.0067	.0060	.00162
%RSD	3.3208	1.2568	.30899	.66555	.58793	1.6447
#1	.05715	1.0520	.97544	1.0065	1.0059	.09759
#2	.05452	1.0522	.98001	1.0168	1.0165	.10029
#3	.05817	1.0752	.98116	1.0193	1.0160	.09740

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	ppm	ppm
Avg	.49823	.99545
Stddev	.00316	.00118
%RSD	.63336	.11884
#1	.49466	.99411
#2	.49942	.99590
#3	.50062	.99634

Check ?	Chk Pass	Chk Pass
High Limit		
Low Limit		

Sample Name: ICSAB Acquired: 12/20/2019 10:10:56 Type: Unk
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12221.	137040.	11297.
Stddev	27.	292.	197.
%RSD	.22154	.21329	1.7460
#1	12217.	136850.	11434.
#2	12196.	137370.	11071.
#3	12250.	136890.	11385.

Sample Name: CRI Acquired: 12/20/2019 10:16:05 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.01022	.21904	.01184	.20945	.01089	.00576
Stddev	.00023	.01759	.00108	.00202	.00031	.00003
%RSD	2.2505	8.0287	9.0910	.96285	2.8014	.43742

#1	.01000	.20650	.01069	.20899	.01054	.00573
#2	.01046	.23914	.01201	.21166	.01113	.00578
#3	.01021	.21148	.01282	.20771	.01099	.00576

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	5.5483	.00571	.05549	.01120	.02624	.11096
Stddev	.0220	.00006	.00018	.00034	.00034	.00167
%RSD	.39714	1.1162	.33085	3.0186	1.3043	1.5049

#1	5.5233	.00570	.05545	.01117	.02660	.11197
#2	5.5564	.00566	.05569	.01155	.02592	.11187
#3	5.5651	.00578	.05533	.01088	.02619	.10903

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Sample Name: CRI Acquired: 12/20/2019 10:16:05 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	5.5014	.05368	5.3000	.01659	.04343	4.5280
Stddev	.0120	.00157	.0277	.00012	.00017	.8890
%RSD	.21749	2.9276	.52280	.73928	.38915	19.633
#1	5.5007	.05287	5.2696	.01655	.04362	4.4183
#2	5.5137	.05269	5.3066	.01672	.04339	3.6990
#3	5.4898	.05549	5.3239	.01649	.04328	5.4668

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	5.4030	.04430	.32004	.00857	.01064	.06722
Stddev	.0257	.00024	.00171	.00096	.00024	.00139
%RSD	.47632	.54485	.53275	11.172	2.2106	2.0751
#1	5.3747	.04436	.32164	.00751	.01047	.06818
#2	5.4251	.04451	.32024	.00936	.01054	.06785
#3	5.4092	.04404	.31825	.00885	.01091	.06562

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Sample Name: CRI Acquired: 12/20/2019 10:16:05 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Ti1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.01021	.51191	.10925	.05428	.05250	.01125
Stddev	.00092	.02316	.00048	.00032	.00178	.00144
%RSD	8.9750	4.5242	.44014	.58468	3.3875	12.818
#1	.01050	.52632	.10915	.05394	.05189	.01009
#2	.01095	.52421	.10978	.05457	.05111	.01286
#3	.00919	.48519	.10883	.05433	.05450	.01080

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	ppm	ppm
Avg	.02721	.02299
Stddev	.00025	.00020
%RSD	.92403	.87315
#1	.02700	.02302
#2	.02749	.02317
#3	.02714	.02277

Check ?	Chk Pass	Chk Pass
Value		
Range		

Sample Name: CRI Acquired: 12/20/2019 10:16:05 Type: QC
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12608.	141090.	11443.
Stddev	46.	1023.	74.
%RSD	.36689	.72506	.65092
#1	12572.	140370.	11357.
#2	12593.	140620.	11490.
#3	12660.	142260.	11481.

Sample Name: CCV Acquired: 12/20/2019 10:21:09 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.96973	24.481	.48957	1.9548	1.9552	2.0334
Stddev	.00049	.019	.00176	.0040	.0024	.0138
%RSD	.05070	.07859	.35933	.20588	.12266	.68052
#1	.96964	24.459	.48915	1.9534	1.9567	2.0278
#2	.96929	24.495	.49150	1.9517	1.9524	2.0233
#3	.97026	24.489	.48806	1.9594	1.9565	2.0492

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	49.023	.49601	1.9715	1.9787	1.9423	24.546
Stddev	.054	.00082	.0022	.0042	.0007	.053
%RSD	.11080	.16594	.11327	.20987	.03514	.21683
#1	49.061	.49653	1.9738	1.9780	1.9422	24.581
#2	48.961	.49643	1.9713	1.9749	1.9416	24.572
#3	49.047	.49506	1.9694	1.9831	1.9430	24.484

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Sample Name: CCV Acquired: 12/20/2019 10:21:09 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	49.588	1.9302	48.473	1.9893	1.9739	47.615
Stddev	.163	.0025	.084	.0043	.0034	1.372
%RSD	.32927	.12982	.17256	.21614	.17475	2.8818

#1	49.610	1.9331	48.486	1.9888	1.9773	49.161
#2	49.414	1.9292	48.549	1.9853	1.9740	46.540
#3	49.738	1.9284	48.383	1.9939	1.9704	47.146

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	50.114	1.9882	1.9634	.49461	.49617	.48722
Stddev	.103	.0030	.0078	.00326	.00035	.00254
%RSD	.20595	.15030	.39687	.65820	.06988	.52172

#1	50.102	1.9903	1.9722	.49710	.49655	.48982
#2	50.016	1.9895	1.9604	.49093	.49588	.48474
#3	50.222	1.9848	1.9575	.49580	.49608	.48710

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Sample Name: CCV Acquired: 12/20/2019 10:21:09 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Ti1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.48959	1.9307	1.9918	1.9606	1.9693	.99719
Stddev	.00034	.0202	.0028	.0032	.0057	.00416
%RSD	.06937	1.0434	.13925	.16416	.29083	.41675
#1	.48933	1.9336	1.9948	1.9642	1.9728	1.0003
#2	.48997	1.9492	1.9912	1.9593	1.9627	.99883
#3	.48946	1.9092	1.9893	1.9582	1.9724	.99247

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	ppm	ppm
Avg	1.9665	1.9630
Stddev	.0043	.0027
%RSD	.21621	.13758
#1	1.9632	1.9661
#2	1.9649	1.9611
#3	1.9713	1.9617

Check ?	Chk Pass	Chk Pass
Value		
Range		

Sample Name: CCV Acquired: 12/20/2019 10:21:09 Type: QC
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12481.	141200.	11473.
Stddev	64.	953.	94.
%RSD	.51221	.67476	.81563
#1	12428.	140170.	11365.
#2	12463.	142040.	11537.
#3	12552.	141390.	11516.

Sample Name: CCB Acquired: 12/20/2019 10:26:10 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00015	-.00709	.00029	.00017	.00012	-.00000
Stddev	.00027	.02857	.00077	.00027	.00005	.00001
%RSD	181.74	402.98	262.62	160.21	44.253	197.31
#1	-.00032	.01909	.00037	.00040	.00009	-.00001
#2	.00016	-.00280	.00102	.00022	.00010	.00001
#3	-.00028	-.03756	-.00051	-.00012	.00019	-.00001

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00038	.00002	.00016	.00025	-.00039	.00085
Stddev	.00219	.00005	.00021	.00012	.00026	.00140
%RSD	569.47	233.98	130.47	48.494	66.050	163.83
#1	.00200	-.00003	.00014	.00039	-.00014	.00231
#2	-.00230	.00006	.00038	.00020	-.00066	.00073
#3	-.00086	.00003	-.00003	.00016	-.00037	-.00048

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: CCB Acquired: 12/20/2019 10:26:10 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00562	.00139	-.01515	-.00008	.00010	-.62106
Stddev	.03152	.00086	.01423	.00006	.00009	.84548
%RSD	560.55	62.051	93.916	75.474	88.859	136.13
#1	-.04200	.00213	-.02735	-.00002	.00013	-1.4345
#2	.01173	.00044	-.01859	-.00013	.00016	.25313
#3	.01340	.00161	.00048	-.00007	-.00000	-.68177

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00103	.00006	-.00077	-.00058	-.00015	-.00009
Stddev	.00401	.00022	.00118	.00064	.00031	.00186
%RSD	387.96	370.85	153.58	109.75	201.78	1997.0
#1	-.00543	.00030	-.00155	-.00002	-.00025	-.00031
#2	-.00011	.00001	-.00134	-.00128	.00019	-.00184
#3	.00243	-.00013	.00059	-.00044	-.00041	.00187

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: CCB Acquired: 12/20/2019 10:26:10 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Ti1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00073	.00149	-.00005	-.00002	-.00013	-.00182
Stddev	.00220	.02167	.00053	.00020	.00051	.00166
%RSD	300.07	1454.2	1008.3	1197.8	395.01	91.074
#1	.00172	.01348	-.00014	.00014	.00044	-.00325
#2	-.00253	-.02352	-.00053	.00004	-.00028	-.00001
#3	-.00139	.01452	.00051	-.00024	-.00055	-.00220

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	ppm	ppm
Avg	.00003	-.00010
Stddev	.00021	.00008
%RSD	715.70	75.368
#1	.00028	-.00004
#2	-.00007	-.00008
#3	-.00012	-.00019

Check ?	Chk Pass	Chk Pass
High Limit		
Low Limit		

Sample Name: CCB Acquired: 12/20/2019 10:26:10 Type: Unk
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12617.	141080.	11362.
Stddev	38.	428.	49.
%RSD	.30470	.30359	.43078
#1	12575.	140590.	11306.
#2	12650.	141280.	11390.
#3	12627.	141370.	11391.

Sample Name: mb 140-36159/6-a Acquired: 12/20/2019 10:31:19 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00018	.02451	-.00181	.01776	.00027	-.00001
Stddev	.00040	.04230	.00079	.00048	.00024	.00001
%RSD	224.74	172.59	43.791	2.7204	91.129	80.437
#1	-.00024	.00932	-.00114	.01827	.00000	-.00000
#2	.00022	-.00810	-.00160	.01772	.00048	-.00001
#3	.00056	.07231	-.00268	.01731	.00032	-.00002

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.03111	-.00009	.00029	.00063	-.00005	.00588
Stddev	.00200	.00002	.00012	.00032	.00009	.00054
%RSD	6.4423	18.609	40.951	50.598	192.12	9.1287
#1	.03335	-.00010	.00041	.00096	-.00015	.00609
#2	.02948	-.00010	.00017	.00058	.00002	.00628
#3	.03050	-.00007	.00028	.00033	-.00001	.00527

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: mb 140-36159/6-a Acquired: 12/20/2019 10:31:19 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.02806	-.00140	-.02161	.00025	.00023	.42134
Stddev	.01646	.00126	.00544	.00009	.00024	1.4271
%RSD	58.651	89.755	25.151	35.668	104.38	338.71

#1	.04682	-.00093	-.02246	.00020	-.00004	2.0334
#2	.02131	-.00045	-.02657	.00020	.00043	-.08855
#3	.01605	-.00282	-.01580	.00035	.00031	-.68078

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.04591	-.00002	.00403	-.00088	.00045	.00558
Stddev	.00601	.00010	.00059	.00521	.00061	.00070
%RSD	13.087	387.97	14.732	590.88	135.18	12.524

#1	.04815	.00003	.00446	-.00687	.00019	.00482
#2	.03910	.00003	.00335	.00254	.00002	.00574
#3	.05047	-.00014	.00426	.00169	.00115	.00619

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: mb 140-36159/6-a Acquired: 12/20/2019 10:31:19 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Ti1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00139	.34746	.00486	-.00014	-.00044	-.00177
Stddev	.00184	.01229	.00028	.00012	.00081	.00229
%RSD	132.25	3.5359	5.8064	88.968	183.64	128.95
#1	.00251	.33331	.00469	.00000	.00021	-.00368
#2	-.00073	.35540	.00519	-.00022	-.00134	.00076
#3	.00240	.35367	.00471	-.00019	-.00019	-.00240

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	ppm	ppm
Avg	.00018	.00364
Stddev	.00025	.00003
%RSD	139.90	.85305
#1	.00000	.00360
#2	.00046	.00364
#3	.00007	.00367

Check ?	Chk Pass	Chk Pass
High Limit		
Low Limit		

Sample Name: mb 140-36159/6-a Acquired: 12/20/2019 10:31:19 Type: Unk
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12612.	142710.	11466.
Stddev	134.	1932.	78.
%RSD	1.0617	1.3539	.68285
#1	12464.	140520.	11375.
#2	12647.	144170.	11510.
#3	12724.	143430.	11512.

Sample Name: lcs 140-36159/7-a Acquired: 12/20/2019 10:36:30 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.04774	1.9849	.09312	.99343	.09773	.05086
Stddev	.00039	.0241	.00129	.00637	.00046	.00013
%RSD	.80890	1.2146	1.3850	.64087	.46561	.25139
#1	.04732	2.0122	.09178	.99778	.09824	.05073
#2	.04783	1.9761	.09435	.99639	.09761	.05098
#3	.04807	1.9665	.09323	.98612	.09735	.05088

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	49.271	.04956	.09983	.20401	.24709	1.0028
Stddev	.041	.00009	.00021	.00045	.00048	.0019
%RSD	.08386	.18398	.21149	.21829	.19605	.19246
#1	49.245	.04965	.10003	.20364	.24752	1.0045
#2	49.249	.04947	.09961	.20450	.24718	1.0007
#3	49.319	.04956	.09985	.20389	.24656	1.0033

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Sample Name: lcs 140-36159/7-a Acquired: 12/20/2019 10:36:30 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	49.194	.09517	9.6274	.10041	.50656	49.808
Stddev	.153	.00041	.0282	.00027	.00080	.688
%RSD	.31060	.43351	.29325	.26934	.15827	1.3804
#1	49.231	.09558	9.6280	.10041	.50746	50.427
#2	49.026	.09517	9.5989	.10069	.50629	49.068
#3	49.325	.09475	9.6553	.10015	.50592	49.928

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	49.226	.50093	4.7655	.09712	.09734	.48666
Stddev	.163	.00089	.0129	.00135	.00107	.00278
%RSD	.33012	.17731	.27017	1.3864	1.1021	.57137
#1	49.376	.50156	4.7786	.09608	.09621	.48832
#2	49.054	.50131	4.7651	.09665	.09834	.48822
#3	49.247	.49991	4.7528	.09864	.09747	.48345

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Sample Name: lcs 140-36159/7-a Acquired: 12/20/2019 10:36:30 Type: QC
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Ti1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.14228	F 6.0004	.49852	.48874	.10245	.39046
Stddev	.00134	.0122	.00057	.00176	.00139	.00112
%RSD	.93876	.20344	.11397	.35987	1.3580	.28631
#1	.14333	5.9916	.49903	.49053	.10335	.39160
#2	.14078	6.0143	.49862	.48867	.10316	.39042
#3	.14274	5.9952	.49791	.48701	.10085	.38936

Check ?	Chk Pass	Chk Fail	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value		5.0000				
Range		20.000%				

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	ppm	ppm
Avg	.20073	.48427
Stddev	.00067	.00090
%RSD	.33540	.18580
#1	.20029	.48512
#2	.20151	.48437
#3	.20040	.48333

Check ?	Chk Pass	Chk Pass
Value		
Range		

Sample Name: lcs 140-36159/7-a Acquired: 12/20/2019 10:36:30 Type: QC
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12356.	139460.	11272.
Stddev	79.	1302.	36.
%RSD	.63558	.93345	.31974
#1	12270.	138200.	11236.
#2	12377.	139380.	11308.
#3	12422.	140800.	11271.

Sample Name: lcsd 140-36159/8-a Acquired: 12/20/2019 10:41:25 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.04821	2.0437	.09478	.94384	.09937	.05274
Stddev	.00026	.0470	.00199	.00395	.00142	.00060
%RSD	.54050	2.2980	2.1018	.41884	1.4317	1.1392
#1	.04840	1.9994	.09266	.94828	.09777	.05342
#2	.04833	2.0387	.09507	.94257	.09986	.05228
#3	.04791	2.0930	.09662	.94069	.10049	.05251

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	50.075	.05094	.10284	.21227	.25648	1.0251
Stddev	.737	.00006	.00017	.00205	.00209	.0151
%RSD	1.4714	.11410	.16945	.96481	.81601	1.4704
#1	49.254	.05091	.10301	.21452	.25887	1.0085
#2	50.294	.05100	.10266	.21051	.25560	1.0288
#3	50.678	.05090	.10285	.21178	.25498	1.0379

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Sample Name: lcsd 140-36159/8-a Acquired: 12/20/2019 10:41:25 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	50.064	.09713	9.6541	.10333	.52328	50.732
Stddev	.614	.00259	.2014	.00062	.00053	1.160
%RSD	1.2261	2.6674	2.0862	.60168	.10195	2.2862
#1	49.396	.09454	9.4280	.10389	.52360	52.048
#2	50.195	.09713	9.7200	.10266	.52266	49.861
#3	50.602	.09972	9.8142	.10343	.52357	50.287

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	50.113	.51742	4.9093	.09876	.10049	.50190
Stddev	.547	.00082	.0158	.00285	.00121	.00173
%RSD	1.0919	.15807	.32275	2.8815	1.2031	.34565
#1	49.540	.51836	4.9271	.09575	.10133	.50089
#2	50.170	.51698	4.8968	.10141	.10105	.50391
#3	50.630	.51691	4.9038	.09913	.09911	.50092

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Sample Name: lcsd 140-36159/8-a Acquired: 12/20/2019 10:41:25 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Ti1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.14466	5.5975	.51576	.49573	.10436	.40103
Stddev	.00340	.0747	.00133	.00700	.00253	.00447
%RSD	2.3511	1.3347	.25734	1.4120	2.4211	1.1150
#1	.14123	5.5172	.51724	.48826	.10155	.40616
#2	.14474	5.6105	.51534	.49678	.10505	.39899
#3	.14803	5.6649	.51469	.50214	.10646	.39794

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	ppm	ppm
Avg	.20802	.49986
Stddev	.00200	.00095
%RSD	.96228	.19066
#1	.21033	.50094
#2	.20679	.49952
#3	.20693	.49913

Check ?	Chk Pass	Chk Pass
Value		
Range		

Sample Name: lcsd 140-36159/8-a Acquired: 12/20/2019 10:41:25 Type: QC
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12007.	136100.	11175.
Stddev	92.	2270.	125.
%RSD	.76676	1.6682	1.1191
#1	11904.	133600.	11318.
#2	12039.	138040.	11121.
#3	12080.	136650.	11086.

Sample Name: 140-17625-a-1-a Acquired: 12/20/2019 10:46:21 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00007	.79386	.00335	.83729	.01426	.00001
Stddev	.00015	.01029	.00058	.00570	.00007	.00002
%RSD	219.72	1.2962	17.314	.68037	.45746	156.57
#1	.00021	.80023	.00398	.84268	.01433	.00002
#2	.00009	.79936	.00325	.83787	.01424	.00003
#3	-.00009	.78199	.00283	.83133	.01420	-.00001

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	10.854	.00388	.00162	.02583	.07230	.87325
Stddev	.048	.00002	.00019	.00016	.00060	.00343
%RSD	.44086	.58262	11.779	.63242	.82787	.39252
#1	10.906	.00389	.00182	.02602	.07280	.87702
#2	10.846	.00389	.00144	.02574	.07164	.87241
#3	10.811	.00385	.00161	.02573	.07247	.87032

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: 140-17625-a-1-a Acquired: 12/20/2019 10:46:21 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	2.2067	.00409	.61830	.05362	.00290	4.8918
Stddev	.0130	.00148	.02120	.00035	.00016	.8415
%RSD	.59063	36.101	3.4288	.64405	5.6103	17.202
#1	2.1930	.00392	.63789	.05392	.00297	4.2627
#2	2.2190	.00271	.59579	.05324	.00301	5.8477
#3	2.2082	.00565	.62120	.05369	.00271	4.5651

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	4.3313	.07069	.17288	.10041	.10164	.00878
Stddev	.0256	.00014	.00031	.00168	.00066	.00074
%RSD	.59004	.19682	.17785	1.6737	.64952	8.4033
#1	4.3599	.07076	.17256	.09962	.10099	.00796
#2	4.3107	.07078	.17289	.09928	.10231	.00900
#3	4.3233	.07052	.17318	.10234	.10161	.00939

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: 140-17625-a-1-a Acquired: 12/20/2019 10:46:21 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Ti1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00575	3.9226	.00807	.00973	.01047	-.00090
Stddev	.00146	.0048	.00011	.00017	.00233	.00091
%RSD	25.384	.12154	1.4023	1.7779	22.272	100.75
#1	.00668	3.9172	.00812	.00988	.00849	-.00194
#2	.00651	3.9263	.00795	.00976	.00988	-.00050
#3	.00407	3.9243	.00816	.00954	.01304	-.00026

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	ppm	ppm
Avg	.00207	.91485
Stddev	.00023	.00294
%RSD	11.100	.32135
#1	.00181	.91822
#2	.00214	.91277
#3	.00226	.91357

Check ?	Chk Pass	Chk Pass
High Limit		
Low Limit		

Sample Name: 140-17625-a-1-a Acquired: 12/20/2019 10:46:21 Type: Unk
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12511.	141230.	11342.
Stddev	89.	1461.	129.
%RSD	.71409	1.0346	1.1334
#1	12408.	139540.	11303.
#2	12564.	142160.	11238.
#3	12562.	141980.	11486.

Sample Name: 140-17625-a-2-a Acquired: 12/20/2019 10:51:26 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00051	.43707	.00082	.56680	.01002	-.00001
Stddev	.00038	.02308	.00074	.00025	.00028	.00000
%RSD	74.316	5.2800	89.656	.04495	2.8199	39.325
#1	.00090	.42199	.00006	.56684	.01035	-.00001
#2	.00050	.42557	.00086	.56704	.00988	-.00002
#3	.00014	.46363	.00153	.56653	.00984	-.00001

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	6.1379	.00111	.00093	.02782	.04305	.81990
Stddev	.0284	.00004	.00009	.00008	.00042	.00302
%RSD	.46273	3.3042	10.073	.28973	.96460	.36817
#1	6.1118	.00108	.00087	.02774	.04350	.82275
#2	6.1338	.00110	.00104	.02781	.04269	.81673
#3	6.1682	.00115	.00088	.02790	.04295	.82021

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: 140-17625-a-2-a Acquired: 12/20/2019 10:51:26 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.41982	.00056	.46563	.03484	.00295	2.7386
Stddev	.01510	.00082	.02937	.00001	.00011	.9563
%RSD	3.5968	145.94	6.3079	.03378	3.6396	34.919
#1	.42693	-.00031	.48051	.03485	.00306	2.7162
#2	.40247	.00067	.43180	.03485	.00285	3.7060
#3	.43005	.00131	.48459	.03483	.00295	1.7937

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	2.6815	.03514	.07181	.03399	.03750	.00753
Stddev	.0061	.00026	.00125	.00154	.00064	.00153
%RSD	.22712	.73618	1.7357	4.5405	1.7047	20.331
#1	2.6832	.03544	.07081	.03514	.03711	.00769
#2	2.6747	.03501	.07321	.03224	.03823	.00593
#3	2.6865	.03498	.07142	.03460	.03715	.00898

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: 140-17625-a-2-a Acquired: 12/20/2019 10:51:26 Type: Unk
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Ti1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00899	3.8650	.01336	.00564	.00833	-.00108
Stddev	.00090	.0392	.00035	.00002	.00053	.00238
%RSD	10.046	1.0135	2.6084	.40752	6.3576	220.54
#1	.00803	3.8203	.01296	.00567	.00844	-.00185
#2	.00982	3.8931	.01360	.00562	.00880	-.00298
#3	.00912	3.8817	.01351	.00564	.00776	.00159

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	ppm	ppm
Avg	.00139	.26883
Stddev	.00012	.00029
%RSD	8.4472	.10649
#1	.00138	.26898
#2	.00151	.26850
#3	.00128	.26901

Check ?	Chk Pass	Chk Pass
High Limit		
Low Limit		

Sample Name: 140-17625-a-2-a Acquired: 12/20/2019 10:51:26 Type: Unk
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12557.	142460.	11387.
Stddev	133.	600.	39.
%RSD	1.0618	.42127	.34547
#1	12413.	142330.	11392.
#2	12583.	141940.	11346.
#3	12676.	143120.	11424.

Sample Name: 140-17625-a-2-a PDS Acquired: 12/20/2019 10:56:31 Type: Unk
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.04736	2.4150	.09968	1.4845	.10994	.05260
Stddev	.00159	.0847	.00270	.0305	.00283	.00166
%RSD	3.3658	3.5071	2.7041	2.0510	2.5719	3.1500

#1	.04571	2.3289	.09657	1.4535	.10736	.05092
#2	.04749	2.4178	.10137	1.4855	.10949	.05264
#3	.04889	2.4983	.10110	1.5144	.11297	.05423

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	56.664	.05265	.10469	.23746	.29941	1.8267
Stddev	1.500	.00157	.00293	.00707	.00611	.0353
%RSD	2.6466	2.9891	2.7942	2.9755	2.0417	1.9311

#1	55.227	.05088	.10147	.23074	.29345	1.7912
#2	56.547	.05317	.10539	.23682	.29910	1.8271
#3	58.220	.05389	.10719	.24482	.30566	1.8618

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: 140-17625-a-2-a PDS Acquired: 12/20/2019 10:56:31 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	50.878	.09903	10.306	.13749	.52952	53.914
Stddev	1.374	.00273	.328	.00350	.01235	.627
%RSD	2.7006	2.7521	3.1810	2.5427	2.3318	1.1633
#1	49.566	.09628	10.011	.13399	.51585	53.722
#2	50.762	.09908	10.247	.13751	.53287	53.406
#3	52.307	.10173	10.659	.14098	.53986	54.615

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	53.172	.55718	5.0141	.13467	.13730	.50486
Stddev	1.475	.01477	.1189	.00456	.00166	.01144
%RSD	2.7750	2.6501	2.3706	3.3828	1.2117	2.2655
#1	51.717	.54080	4.8809	.12945	.13545	.49188
#2	53.132	.56126	5.0519	.13788	.13777	.50923
#3	54.668	.56947	5.1094	.13666	.13867	.51347

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: 140-17625-a-2-a PDS Acquired: 12/20/2019 10:56:31 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Ti1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.15354	9.8674	.52900	.50760	.11129	.40242
Stddev	.00358	.1730	.01278	.01377	.00280	.01322
%RSD	2.3293	1.7534	2.4167	2.7133	2.5172	3.2848
#1	.15130	9.7003	.51468	.49468	.10863	.38789
#2	.15165	9.8560	.53307	.50603	.11102	.40564
#3	.15766	10.046	.53925	.52209	.11421	.41374

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	ppm	ppm
Avg	.20911	.77235
Stddev	.00648	.01394
%RSD	3.0967	1.8050
#1	.20254	.75669
#2	.20932	.77698
#3	.21548	.78339

Check ?	Chk Pass	Chk Pass
High Limit		
Low Limit		

Sample Name: 140-17625-a-2-a PDS Acquired: 12/20/2019 10:56:31 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12156.	137690.	11179.
Stddev	57.	410.	23.
%RSD	.47253	.29812	.20338
#1	12098.	137280.	11165.
#2	12157.	138100.	11166.
#3	12213.	137670.	11205.

Sample Name: 140-17625-a-2-a PDSB Acquired: 12/20/2019 11:01:24 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.04825	2.4328	.10138	1.4939	.11050	.05277
Stddev	.00070	.0323	.00092	.0146	.00232	.00077
%RSD	1.4588	1.3259	.91057	.97849	2.0958	1.4511
#1	.04796	2.3957	.10035	1.4802	.10783	.05197
#2	.04773	2.4542	.10169	1.4923	.11169	.05285
#3	.04905	2.4486	.10212	1.5093	.11198	.05350

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	57.719	.05297	.10531	.23762	.30255	1.8335
Stddev	.915	.00028	.00067	.00311	.00256	.0362
%RSD	1.5856	.52886	.63529	1.3078	.84666	1.9724
#1	56.665	.05266	.10455	.23446	.29983	1.7917
#2	58.187	.05304	.10557	.23772	.30292	1.8548
#3	58.306	.05320	.10581	.24067	.30491	1.8540

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: 140-17625-a-2-a PDSB Acquired: 12/20/2019 11:01:24 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	51.969	.09942	10.480	.13832	.54377	55.266
Stddev	.976	.00187	.191	.00146	.00309	1.083
%RSD	1.8783	1.8764	1.8182	1.0584	.56810	1.9587
#1	50.843	.09728	10.260	.13671	.54021	54.345
#2	52.485	.10032	10.597	.13867	.54530	56.458
#3	52.579	.10067	10.582	.13958	.54579	54.994

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	54.148	.56017	5.1301	.13419	.13747	.51891
Stddev	.865	.00315	.0207	.00108	.00084	.00211
%RSD	1.5968	.56218	.40332	.80327	.61397	.40615
#1	53.154	.55657	5.1064	.13295	.13667	.51692
#2	54.561	.56238	5.1445	.13483	.13835	.51869
#3	54.728	.56156	5.1393	.13480	.13739	.52112

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: 140-17625-a-2-a PDSD Acquired: 12/20/2019 11:01:24 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Ti1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.15436	9.9726	.54320	.50957	.11436	.40522
Stddev	.00105	.2160	.00307	.01058	.00328	.00202
%RSD	.68235	2.1662	.56553	2.0769	2.8654	.49886
#1	.15480	9.7232	.53970	.49739	.11059	.40318
#2	.15316	10.096	.54445	.51485	.11589	.40722
#3	.15512	10.099	.54545	.51647	.11659	.40527

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	ppm	ppm
Avg	.21017	.77882
Stddev	.00284	.00170
%RSD	1.3499	.21886
#1	.20705	.77707
#2	.21087	.78048
#3	.21259	.77891

Check ?	Chk Pass	Chk Pass
High Limit		
Low Limit		

Sample Name: 140-17625-a-2-a PDSD Acquired: 12/20/2019 11:01:24 Type: Unk
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12095.	138450.	11177.
Stddev	61.	517.	114.
%RSD	.50734	.37334	1.0203
#1	12031.	138090.	11072.
#2	12101.	139050.	11160.
#3	12153.	138230.	11298.

Sample Name: 140-17625-a-3-a Acquired: 12/20/2019 11:06:16 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00172	.62922	.00853	.57643	.01614	.00000
Stddev	.00067	.01095	.00141	.00162	.00016	.00001
%RSD	38.971	1.7397	16.483	.28033	1.0173	514.63
#1	.00152	.64141	.01006	.57828	.01595	.00000
#2	.00247	.62023	.00822	.57566	.01627	.00001
#3	.00118	.62601	.00730	.57533	.01618	-.00001

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	15.990	.00484	.00231	2.4020	.06943	15.558
Stddev	.060	.00006	.00005	.0090	.00020	.068
%RSD	.37266	1.1593	1.9848	.37348	.28459	.43902
#1	15.988	.00488	.00234	2.4116	.06966	15.480
#2	16.050	.00486	.00232	2.4007	.06929	15.606
#3	15.931	.00477	.00225	2.3938	.06934	15.589

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: 140-17625-a-3-a Acquired: 12/20/2019 11:06:16 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.66706	.00103	.78649	.12764	.61243	4.5129
Stddev	.00888	.00110	.02229	.00006	.00258	1.5066
%RSD	1.3315	106.84	2.8347	.04908	.42131	33.384
#1	.66693	.00123	.76096	.12757	.61506	5.8788
#2	.67601	.00202	.79636	.12763	.61231	4.7628
#3	.65824	-.00016	.80215	.12770	.60991	2.8969

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	2.3020	.14152	.12779	.06443	.06820	.00592
Stddev	.0065	.00035	.00141	.00178	.00051	.00074
%RSD	.28324	.24730	1.1012	2.7591	.74442	12.438
#1	2.3033	.14166	.12940	.06242	.06866	.00669
#2	2.3078	.14179	.12715	.06506	.06830	.00523
#3	2.2949	.14113	.12681	.06581	.06765	.00582

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: 140-17625-a-3-a Acquired: 12/20/2019 11:06:16 Type: Unk
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Ti1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.01128	4.3186	.01517	.01100	.01753	-.00339
Stddev	.00217	.0162	.00058	.00009	.00014	.00200
%RSD	19.214	.37392	3.8178	.86072	.81863	58.949
#1	.01373	4.3086	.01458	.01106	.01769	-.00109
#2	.00960	4.3099	.01574	.01105	.01747	-.00467
#3	.01051	4.3372	.01517	.01089	.01743	-.00441

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	ppm	ppm
Avg	.01069	.58175
Stddev	.00020	.00193
%RSD	1.9058	.33177
#1	.01086	.58331
#2	.01074	.58235
#3	.01046	.57960

Check ?	Chk Pass	Chk Pass
High Limit		
Low Limit		

Sample Name: 140-17625-a-3-a Acquired: 12/20/2019 11:06:16 Type: Unk
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12495.	142560.	11459.
Stddev	117.	1323.	102.
%RSD	.93635	.92789	.88902
#1	12369.	141130.	11541.
#2	12518.	142830.	11345.
#3	12599.	143730.	11491.

Sample Name: 140-17625-a-4-a Acquired: 12/20/2019 11:11:17 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00045	.01961	-.00171	.01237	.00078	-.00003
Stddev	.00008	.00743	.00095	.00048	.00025	.00001
%RSD	18.557	37.871	55.590	3.8493	32.348	37.598
#1	-.00051	.01116	-.00192	.01182	.00060	-.00004
#2	-.00050	.02259	-.00067	.01262	.00107	-.00003
#3	-.00036	.02509	-.00254	.01266	.00069	-.00002

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.45101	-.00011	.00026	.00392	.00209	.02587
Stddev	.00242	.00007	.00012	.00022	.00010	.00293
%RSD	.53688	57.444	48.434	5.5266	4.6294	11.337
#1	.44907	-.00017	.00039	.00416	.00218	.02923
#2	.45372	-.00004	.00015	.00377	.00199	.02386
#3	.45024	-.00013	.00023	.00382	.00210	.02451

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: 140-17625-a-4-a Acquired: 12/20/2019 11:11:17 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.02375	-.00155	.00629	.00059	.00075	.15985
Stddev	.03177	.00096	.00610	.00007	.00023	1.1552
%RSD	133.74	61.943	97.061	11.532	30.855	722.67

#1	-.00725	-.00253	.01330	.00052	.00100	.77152
#2	.05624	-.00062	.00337	.00060	.00073	-1.1726
#3	.02227	-.00148	.00219	.00065	.00053	.88063

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.19320	.00043	.00795	-.00046	.00052	.00614
Stddev	.01442	.00009	.00105	.00045	.00090	.00213
%RSD	7.4611	20.536	13.202	96.915	174.24	34.746

#1	.20985	.00035	.00889	-.00088	.00118	.00857
#2	.18494	.00041	.00813	.00002	.00089	.00457
#3	.18482	.00052	.00682	-.00053	-.00051	.00527

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: 140-17625-a-4-a Acquired: 12/20/2019 11:11:17 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Ti1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00217	2.2531	.00384	.00019	-.00031	-.00247
Stddev	.00048	.0409	.00028	.00002	.00123	.00142
%RSD	22.196	1.8163	7.4009	8.9200	390.73	57.495
#1	.00172	2.2338	.00386	.00018	-.00165	-.00162
#2	.00268	2.2255	.00411	.00021	-.00006	-.00411
#3	.00211	2.3002	.00354	.00018	.00077	-.00168

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	ppm	ppm
Avg	.00001	.00877
Stddev	.00010	.00004
%RSD	1162.4	.45317
#1	-.00011	.00873
#2	.00007	.00881
#3	.00006	.00875

Check ?	Chk Pass	Chk Pass
High Limit		
Low Limit		

Sample Name: 140-17625-a-4-a Acquired: 12/20/2019 11:11:17 Type: Unk
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12659.	143440.	11546.
Stddev	71.	978.	67.
%RSD	.56060	.68148	.57852
#1	12599.	142460.	11605.
#2	12642.	144420.	11473.
#3	12737.	143460.	11561.

Sample Name: 140-17625-a-2-a SD@5 Acquired: 12/20/2019 11:16:24 Type: Unk
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment: 2ML TO 10ML

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00003	.08820	-.00010	.11801	.00222	-.00002
Stddev	.00045	.01169	.00096	.00086	.00013	.00001
%RSD	1283.9	13.258	997.08	.72733	5.6696	55.548
#1	.00038	.09489	-.00104	.11713	.00219	-.00003
#2	-.00051	.07470	.00088	.11885	.00236	-.00003
#3	.00002	.09502	-.00012	.11806	.00211	-.00001

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	1.2495	.00021	.00017	.00579	.00985	.17544
Stddev	.0031	.00005	.00006	.00033	.00032	.00050
%RSD	.24514	22.996	34.690	5.6318	3.2167	.28294
#1	1.2526	.00024	.00020	.00612	.01018	.17503
#2	1.2495	.00015	.00021	.00547	.00955	.17530
#3	1.2465	.00023	.00010	.00578	.00982	.17599

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: 140-17625-a-2-a SD@5 Acquired: 12/20/2019 11:16:24 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment: 2ML TO 10ML

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.11108	.00047	.08603	.00710	.00058	1.9319
Stddev	.00171	.00084	.01384	.00002	.00008	1.1437
%RSD	1.5362	180.12	16.088	.32934	13.181	59.202
#1	.10913	.00011	.07782	.00708	.00063	1.5074
#2	.11230	.00142	.10200	.00713	.00060	1.0611
#3	.11181	-.00014	.07825	.00710	.00049	3.2272

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.58537	.00733	.01417	.00543	.00663	.00103
Stddev	.01085	.00011	.00112	.00104	.00022	.00043
%RSD	1.8542	1.5208	7.9202	19.174	3.3774	42.074
#1	.59454	.00725	.01287	.00424	.00664	.00061
#2	.58820	.00729	.01481	.00587	.00686	.00102
#3	.57339	.00746	.01483	.00617	.00641	.00147

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: 140-17625-a-2-a SD@5 Acquired: 12/20/2019 11:16:24 Type: Unk
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment: 2ML TO 10ML

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Ti1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00058	.77450	.00291	.00108	.00087	-.00171
Stddev	.00118	.00861	.00015	.00006	.00058	.00017
%RSD	201.94	1.1115	5.1080	5.7224	66.851	10.126
#1	.00018	.78273	.00274	.00109	.00151	-.00174
#2	.00191	.77522	.00299	.00113	.00069	-.00187
#3	-.00034	.76556	.00300	.00101	.00039	-.00153

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	ppm	ppm
Avg	.00053	.05855
Stddev	.00026	.00011
%RSD	50.135	.18218
#1	.00055	.05864
#2	.00078	.05843
#3	.00025	.05859

Check ?	Chk Pass	Chk Pass
High Limit		
Low Limit		

Sample Name: 140-17625-a-2-a SD@5 Acquired: 12/20/2019 11:16:24 Type: Unk
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment: 2ML TO 10ML

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12859.	144480.	11646.
Stddev	119.	903.	9.
%RSD	.92917	.62497	.07765
#1	12732.	143450.	11638.
#2	12875.	144830.	11645.
#3	12969.	145150.	11656.

Sample Name: CCV Acquired: 12/20/2019 11:21:30 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.98196	24.680	.49374	1.9752	1.9725	2.0711
Stddev	.00105	.056	.00132	.0017	.0011	.0222
%RSD	.10741	.22599	.26639	.08801	.05613	1.0739
#1	.98190	24.623	.49231	1.9768	1.9716	2.0519
#2	.98304	24.735	.49490	1.9754	1.9737	2.0954
#3	.98094	24.682	.49401	1.9733	1.9721	2.0658

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	49.696	.50045	1.9876	2.0104	1.9689	24.697
Stddev	.146	.00020	.0015	.0022	.0051	.099
%RSD	.29422	.04059	.07388	.10688	.25858	.39924
#1	49.528	.50061	1.9892	2.0113	1.9744	24.621
#2	49.772	.50022	1.9873	2.0120	1.9681	24.661
#3	49.789	.50052	1.9863	2.0080	1.9643	24.808

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Sample Name: CCV Acquired: 12/20/2019 11:21:30 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	50.125	1.9412	49.106	2.0092	1.9925	50.533
Stddev	.076	.0041	.342	.0018	.0020	.809
%RSD	.15073	.20893	.69566	.08898	.10220	1.6012
#1	50.202	1.9445	48.797	2.0112	1.9948	50.590
#2	50.122	1.9367	49.049	2.0081	1.9909	51.312
#3	50.051	1.9426	49.473	2.0082	1.9917	49.696

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	50.592	2.0047	1.9850	.50583	.50032	.49023
Stddev	.062	.0015	.0009	.00286	.00109	.00131
%RSD	.12275	.07688	.04629	.56485	.21847	.26680
#1	50.561	2.0061	1.9851	.50913	.50155	.48896
#2	50.663	2.0031	1.9859	.50414	.49947	.49014
#3	50.551	2.0048	1.9841	.50422	.49995	.49158

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Sample Name: CCV Acquired: 12/20/2019 11:21:30 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Ti1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.49297	1.9609	2.0048	1.9720	1.9910	1.0041
Stddev	.00231	.0133	.0013	.0013	.0015	.0013
%RSD	.46952	.68035	.06407	.06582	.07365	.13256
#1	.49245	1.9486	2.0061	1.9713	1.9900	1.0056
#2	.49096	1.9592	2.0036	1.9711	1.9927	1.0037
#3	.49550	1.9751	2.0048	1.9735	1.9904	1.0030

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	ppm	ppm
Avg	1.9948	1.9791
Stddev	.0032	.0016
%RSD	.16262	.07958
#1	1.9983	1.9802
#2	1.9942	1.9799
#3	1.9919	1.9773

Check ?	Chk Pass	Chk Pass
Value		
Range		

Sample Name: CCV Acquired: 12/20/2019 11:21:30 Type: QC
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12516.	140790.	11391.
Stddev	18.	273.	96.
%RSD	.14088	.19423	.84662
#1	12496.	140580.	11470.
#2	12529.	140680.	11420.
#3	12522.	141100.	11284.

Sample Name: CCB Acquired: 12/20/2019 11:26:29 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00033	-.02997	.00085	-.00146	.00005	-.00001
Stddev	.00034	.01272	.00084	.00136	.00007	.00002
%RSD	103.87	42.438	98.852	93.392	144.12	447.51

#1	-.00067	-.02693	.00183	.00007	.00000	.00002
#2	.00001	-.04394	.00036	-.00254	.00001	-.00002
#3	-.00032	-.01905	.00038	-.00191	.00013	-.00002

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00344	-.00003	.00021	.00011	-.00032	.00020
Stddev	.00075	.00006	.00008	.00029	.00015	.00338
%RSD	21.724	215.79	37.382	266.14	46.172	1692.9

#1	.00286	-.00008	.00029	.00022	-.00017	.00401
#2	.00428	.00003	.00013	.00033	-.00046	-.00099
#3	.00317	-.00003	.00022	-.00022	-.00033	-.00242

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: CCB Acquired: 12/20/2019 11:26:29 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00965	.00058	-.02040	-.00006	.00013	1.0837
Stddev	.02451	.00100	.01460	.00002	.00007	.8651
%RSD	253.98	172.21	71.568	40.861	51.827	79.829
#1	.00602	.00147	-.03418	-.00005	.00008	.45288
#2	.03578	-.00050	-.02193	-.00008	.00010	.72831
#3	-.01284	.00076	-.00510	-.00004	.00021	2.0699

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00011	-.00001	.00030	-.00146	-.00034	-.00012
Stddev	.00953	.00013	.00122	.00077	.00081	.00059
%RSD	8551.1	899.60	404.04	53.072	241.66	495.62
#1	-.00725	-.00006	.00014	-.00220	-.00050	.00047
#2	-.00380	-.00011	.00160	-.00065	.00055	-.00071
#3	.01071	.00013	-.00083	-.00152	-.00106	-.00012

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: CCB Acquired: 12/20/2019 11:26:29 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Ti1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00227	.00113	.00018	-.00007	.00008	.00124
Stddev	.00071	.03266	.00034	.00008	.00064	.00167
%RSD	31.436	2889.5	189.54	119.11	783.58	134.84
#1	-.00211	.03865	.00049	-.00011	.00076	.00271
#2	-.00164	-.01431	.00024	.00002	-.00001	.00158
#3	-.00305	-.02095	-.00019	-.00011	-.00051	-.00058

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	ppm	ppm
Avg	.00014	-.00002
Stddev	.00035	.00010
%RSD	244.36	447.54
#1	.00018	-.00012
#2	-.00022	.00007
#3	.00048	-.00001

Check ?	Chk Pass	Chk Pass
High Limit		
Low Limit		

Sample Name: CCB Acquired: 12/20/2019 11:26:29 Type: Unk
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12711.	141720.	11479.
Stddev	81.	571.	51.
%RSD	.64016	.40283	.44487
#1	12689.	141230.	11423.
#2	12643.	142350.	11491.
#3	12801.	141600.	11523.

Sample Name: 140-17625-a-5-a Acquired: 12/20/2019 11:31:38 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00023	.00237	-.00094	.00461	.00060	-.00001
Stddev	.00053	.02760	.00068	.00017	.00006	.00001
%RSD	227.74	1164.4	72.670	3.7126	10.061	209.11
#1	-.00083	.02111	-.00052	.00447	.00055	.00000
#2	-.00008	.01532	-.00056	.00456	.00067	-.00000
#3	.00021	-.02932	-.00172	.00480	.00059	-.00002

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.23149	-.00018	.00036	.00354	-.00010	.02708
Stddev	.00314	.00003	.00009	.00003	.00004	.00118
%RSD	1.3571	18.032	24.366	.85669	41.171	4.3614
#1	.23037	-.00021	.00027	.00352	-.00013	.02641
#2	.23504	-.00017	.00036	.00358	-.00005	.02639
#3	.22906	-.00015	.00044	.00354	-.00012	.02844

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: 140-17625-a-5-a Acquired: 12/20/2019 11:31:38 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00833	-.00076	-.01240	.00053	.00082	.21866
Stddev	.02512	.00095	.00712	.00003	.00007	1.1099
%RSD	301.44	124.18	57.397	5.9943	7.9521	507.59

#1	.01708	.00033	-.00449	.00051	.00089	.37792
#2	-.03315	-.00124	-.01441	.00057	.00082	1.2403
#3	-.00893	-.00138	-.01829	.00052	.00076	-.96226

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.08908	.00024	.00615	.00047	-.00017	.00691
Stddev	.01062	.00032	.00065	.00136	.00079	.00216
%RSD	11.923	134.01	10.499	290.19	459.03	31.328

#1	.08849	-.00009	.00541	-.00014	-.00010	.00731
#2	.09999	.00055	.00661	-.00048	-.00099	.00884
#3	.07877	.00025	.00642	.00203	.00058	.00457

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: 140-17625-a-5-a Acquired: 12/20/2019 11:31:38 Type: Unk
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Ti1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00194	2.4094	.00378	.00006	.00121	-.00340
Stddev	.00064	.0301	.00034	.00008	.00071	.00084
%RSD	32.981	1.2481	8.8954	126.01	58.547	24.824
#1	.00251	2.3757	.00341	-.00001	.00085	-.00423
#2	.00206	2.4193	.00386	.00005	.00203	-.00344
#3	.00125	2.4333	.00406	.00015	.00076	-.00254

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	ppm	ppm
Avg	.00022	.00374
Stddev	.00010	.00010
%RSD	43.802	2.6423
#1	.00032	.00385
#2	.00022	.00368
#3	.00012	.00368

Check ?	Chk Pass	Chk Pass
High Limit		
Low Limit		

Sample Name: 140-17625-a-5-a Acquired: 12/20/2019 11:31:38 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12543.	141430.	11346.
Stddev	70.	835.	74.
%RSD	.56115	.59017	.65130
#1	12466.	140850.	11279.
#2	12558.	141050.	11334.
#3	12605.	142390.	11426.

Sample Name: CRI Acquired: 12/20/2019 11:36:49 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.01011	.22194	.01109	.20522	.01100	.00576
Stddev	.00030	.01445	.00148	.00120	.00008	.00002
%RSD	2.9634	6.5106	13.389	.58241	.73119	.31462
#1	.00984	.23816	.01213	.20637	.01103	.00577
#2	.01005	.21724	.01175	.20531	.01107	.00577
#3	.01043	.21043	.00939	.20399	.01091	.00574

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	5.5355	.00565	.05515	.01144	.02670	.11371
Stddev	.0173	.00002	.00024	.00023	.00029	.00285
%RSD	.31307	.34117	.43602	2.0418	1.0859	2.5090
#1	5.5160	.00565	.05529	.01162	.02694	.11041
#2	5.5492	.00566	.05487	.01152	.02677	.11544
#3	5.5412	.00563	.05529	.01118	.02638	.11527

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Sample Name: CRI Acquired: 12/20/2019 11:36:49 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	5.5074	.05330	5.1975	.01650	.04345	6.0190
Stddev	.0267	.00117	.0235	.00009	.00014	1.1026
%RSD	.48577	2.1965	.45207	.56539	.31584	18.319
#1	5.4832	.05448	5.1888	.01651	.04359	5.7108
#2	5.5362	.05213	5.2241	.01659	.04345	5.1033
#3	5.5029	.05328	5.1796	.01641	.04331	7.2430

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	5.3932	.04402	.31862	.00867	.00958	.06656
Stddev	.0149	.00015	.00163	.00272	.00071	.00109
%RSD	.27537	.35100	.51073	31.346	7.4481	1.6445
#1	5.4100	.04417	.32040	.01033	.00947	.06750
#2	5.3820	.04403	.31721	.00554	.01034	.06683
#3	5.3875	.04386	.31824	.01016	.00892	.06536

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Sample Name: CRI Acquired: 12/20/2019 11:36:49 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Ti1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00974	.49838	.10882	.05361	.05274	.01166
Stddev	.00189	.01008	.00089	.00007	.00054	.00159
%RSD	19.396	2.0216	.81783	.13534	1.0250	13.666
#1	.01055	.50778	.10912	.05366	.05302	.01313
#2	.01109	.49961	.10953	.05353	.05308	.00997
#3	.00758	.48774	.10782	.05365	.05212	.01190

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	ppm	ppm
Avg	.02720	.02394
Stddev	.00037	.00001
%RSD	1.3755	.05515
#1	.02746	.02394
#2	.02737	.02393
#3	.02677	.02395

Check ?	Chk Pass	Chk Pass
Value		
Range		

Sample Name: CRI Acquired: 12/20/2019 11:36:49 Type: QC
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12750.	142720.	11633.
Stddev	11.	1303.	70.
%RSD	.08413	.91263	.60285
#1	12747.	141230.	11714.
#2	12741.	143340.	11592.
#3	12762.	143600.	11593.

Sample Name: CCV Acquired: 12/20/2019 11:41:53 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.98360	24.695	.49904	1.9783	1.9796	2.0699
Stddev	.00230	.176	.00214	.0040	.0056	.0284
%RSD	.23346	.71226	.42977	.20274	.28513	1.3694
#1	.98097	24.511	.50099	1.9739	1.9740	2.0476
#2	.98465	24.712	.49674	1.9793	1.9794	2.0602
#3	.98519	24.862	.49938	1.9817	1.9853	2.1018

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	49.431	.50323	1.9996	2.0106	1.9720	24.863
Stddev	.329	.00057	.0023	.0080	.0027	.050
%RSD	.66527	.11274	.11408	.39659	.13424	.19912
#1	49.099	.50261	1.9971	2.0026	1.9735	24.832
#2	49.435	.50336	2.0014	2.0108	1.9737	24.837
#3	49.757	.50372	2.0005	2.0185	1.9690	24.920

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Sample Name: CCV Acquired: 12/20/2019 11:41:53 Type: QC
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	49.978	1.9529	48.972	2.0138	2.0050	48.759
Stddev	.200	.0047	.241	.0065	.0018	1.051
%RSD	.40069	.24037	.49259	.32272	.09201	2.1563
#1	49.791	1.9531	48.715	2.0084	2.0035	47.703
#2	49.953	1.9481	49.008	2.0120	2.0070	48.769
#3	50.190	1.9574	49.194	2.0210	2.0043	49.805

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	50.591	2.0168	1.9986	.50422	.50313	.49605
Stddev	.261	.0021	.0086	.00106	.00119	.00077
%RSD	.51567	.10231	.43143	.21064	.23743	.15453
#1	50.315	2.0146	2.0076	.50521	.50402	.49517
#2	50.627	2.0170	1.9905	.50434	.50177	.49650
#3	50.833	2.0188	1.9977	.50310	.50360	.49649

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Sample Name: CCV Acquired: 12/20/2019 11:41:53 Type: QC
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Ti1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.49520	1.9717	2.0150	1.9850	1.9859	1.0034
Stddev	.00066	.0273	.0017	.0032	.0149	.0039
%RSD	.13316	1.3845	.08467	.16046	.75094	.38730
#1	.49529	1.9540	2.0130	1.9835	1.9732	.99902
#2	.49581	2.0032	2.0159	1.9829	1.9822	1.0046
#3	.49450	1.9580	2.0161	1.9887	2.0023	1.0065

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
Value						
Range						

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	ppm	ppm
Avg	1.9961	1.9920
Stddev	.0057	.0007
%RSD	.28509	.03311
#1	1.9908	1.9915
#2	1.9954	1.9928
#3	2.0021	1.9917

Check ?	Chk Pass	Chk Pass
Value		
Range		

Sample Name: CCV Acquired: 12/20/2019 11:41:53 Type: QC
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12453.	141240.	11547.
Stddev	27.	629.	24.
%RSD	.21618	.44531	.20576
#1	12422.	141210.	11555.
#2	12466.	141880.	11521.
#3	12471.	140630.	11566.

Sample Name: CCB Acquired: 12/20/2019 11:46:54 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Ag3280A	Al3082R	As1890A	B_2496A	Ba4554R	Be3130A
Line	328.068 {103}	308.215 {109}	189.042 {478}	249.678 {135}	455.403 { 74}	313.042 {108}
IS Ref	(Y_3710A)	(Y_3710R)	(Y_2243A)	(Y_3710A)	(Y_3710R)	(Y_3710A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00003	.02559	.00071	-.00145	.00015	-.00000
Stddev	.00014	.02043	.00082	.00108	.00024	.00004
%RSD	436.91	79.858	114.88	74.721	164.40	1753.4
#1	.00001	.00979	.00130	-.00099	.00032	.00004
#2	-.00010	.01830	.00105	-.00067	.00024	-.00003
#3	.00018	.04866	-.00022	-.00268	-.00013	-.00002

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Ca3179R	Cd2265A	Co2286A	Cr2677A	Cu3247A	Fe2599R
Line	317.933 {106}	226.502 {449}	228.616 {447}	267.716 {126}	324.754 {104}	259.940 {130}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_3710A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00193	-.00001	.00007	.00027	-.00022	.00105
Stddev	.00239	.00003	.00014	.00021	.00014	.00128
%RSD	123.39	346.47	200.13	78.921	65.251	121.88
#1	-.00116	-.00005	.00008	.00004	-.00007	.00151
#2	-.00461	-.00000	.00021	.00045	-.00036	.00205
#3	-.00003	.00002	-.00007	.00032	-.00024	-.00040

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: CCB Acquired: 12/20/2019 11:46:54 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	K_7664R	Li6707R	Mg2790R	Mn2576A	Mo2020A	aN
Line	766.490 { 44}	670.784 { 50}	279.079 {121}	257.610 {131}	202.030 {467}	330.237 {102}
IS Ref	(Y_3710R)	(Y_3710R)	(Y_3710R)	(Y_3710A)	(Y_2243A)	(Y_3710R)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.01721	-.00023	-.01761	-.00002	.00017	.70401
Stddev	.01427	.00044	.01537	.00003	.00006	1.4354
%RSD	82.927	188.27	87.300	157.94	34.124	203.89
#1	.00127	.00021	-.03532	-.00001	.00011	1.5388
#2	.02881	-.00023	-.00976	.00001	.00018	1.5266
#3	.02155	-.00067	-.00774	-.00006	.00022	-.95341

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	Na5895R	Ni2316A	P_1782A	bP	Pb2203A	Sb2068A
Line	589.592 { 57}	231.604 {445}	178.284 {489}	220.353 {153}	220.353 {453}	206.833 {463}
IS Ref	(Y_3710R)	(Y_2243A)	(Y_2243A)	(Y_3710A)	(Y_2243A)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	.00392	-.00006	-.00131	-.00041	-.00081	.00020
Stddev	.00479	.00017	.00054	.00109	.00102	.00142
%RSD	122.21	281.66	41.173	268.55	127.10	704.40
#1	.00463	-.00026	-.00092	-.00167	.00033	-.00140
#2	.00832	.00003	-.00108	.00025	-.00109	.00071
#3	-.00118	.00004	-.00192	.00020	-.00165	.00129

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Sample Name: CCB Acquired: 12/20/2019 11:46:54 Type: Unk
Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
User: kerry Custom ID1: Custom ID2: Custom ID3:
Comment:

Elem	Se1960A	Si2506R	Sn1899A	Sr4215R	Ti3349R	Ti1908A
Line	196.090 {472}	250.690 {134}	189.989 {477}	421.552 { 80}	334.941 {101}	190.856 {477}
IS Ref	(Y_2243A)	(Y_3710R)	(Y_2243A)	(Y_3710R)	(Y_3710R)	(Y_2243A)
Units	ppm	ppm	ppm	ppm	ppm	ppm
Avg	-.00065	-.00045	.00007	.00003	.00061	.00031
Stddev	.00115	.04645	.00002	.00006	.00064	.00101
%RSD	175.37	10351.	24.137	203.08	104.43	322.73

#1	-.00001	.03164	.00006	.00010	.00113	.00101
#2	.00002	.02073	.00009	-.00001	.00080	-.00085
#3	-.00198	-.05372	.00005	-.00000	-.00010	.00078

Check ?	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass	Chk Pass
High Limit						
Low Limit						

Elem	V_2924A	Zn2138A
Line	292.402 {115}	213.856 {457}
IS Ref	(Y_3710A)	(Y_2243A)
Units	ppm	ppm
Avg	-.00001	-.00016
Stddev	.00012	.00009
%RSD	845.88	53.932

#1	-.00006	-.00012
#2	-.00010	-.00026
#3	.00012	-.00010

Check ?	Chk Pass	Chk Pass
High Limit		
Low Limit		

Sample Name: CCB Acquired: 12/20/2019 11:46:54 Type: Unk
 Method: MT0007(v23) HF 082919(v13) Mode: CONC Corr. Factor: 1.000000
 User: kerry Custom ID1: Custom ID2: Custom ID3:
 Comment:

Int. Std.	Y_2243A	Y_3710A	Y_3710R
Line	224.306 {450}	371.030 { 91}	371.030 { 91}2
Units	Cts/S	Cts/S	Cts/S
Avg	12761.	142920.	11661.
Stddev	53.	1223.	153.
%RSD	.41906	.85557	1.3106
#1	12703.	142400.	11528.
#2	12771.	142040.	11828.
#3	12808.	144320.	11627.

Eurofins/TestAmerica Knoxville ICP Batch Review Checklist – SOPs: KNOX-MT-0007r16, KNOX-MT-0008r7

Chart Name:	Analysis Batch #:	Analyst:	Instrument:
F122019	36264	KNC	DUO
A. Calibration/Instrument Run QC			
	1st	2nd	Why is data reportable?
1. Instrument calibrated per SOP?	Y	Y	
2. Was CCVL within limits? (90-110%R)	Y	Y	
3. ICV analyzed within limits? (90-110%R and <5.0% RSD)	Y	Y	
4. CCV analyzed at required frequency & within limits? (90 - 110%R and <5.0% RSD)	Y	Y	<input type="checkbox"/> CCV reanalyzed one time; reanalysis within limits <input type="checkbox"/> CCV - %D, High, Sample ND (NCM# _____)
5. ICB/CCB analyzed at required frequency & within limits? (Water/Soil/Waste <MDL; Air/SEP/PM10/JN Waste <RL)	Y	Y	<input type="checkbox"/> CCB reanalyzed one time; reanalysis within limits <input type="checkbox"/> CCB-Out, Samples ND or 10x (NCM# _____)
6. ICSA/ICSAB run before samples?	Y	Y	
7. ICSAB interferents and analytes within limits? (80 - 120%R)	Y	Y	
8. ICSA criteria for non-interfering elements met? (Water/Soil/Waste ±1x RL) (Air/SEP/PM10/JN ±2x RL if RL ≤10 µg/L; +1x RL if RL >10 µg/L)	Y	Y	<input type="checkbox"/> ICSA->2X MDL; Stock Impurities (NCM# _____)
9. Reporting Limit Check Standard (CRI) within limits? (Water/Soil/Waste=70-130%R; Air/SEP/PM10/JN Waste=50-150%)	Y	Y	
10. 6010C samples bracketed by RL Check Standards?	Y	Y	
B. Client Sample and QC Sample Results			
1. Were samples with target element concentrations > the linear range (LR) diluted and reanalyzed?	NA	NA	Comments:
2. Were all hits reported from a run with interfering elements < LR?	Y	Y	
3. Elements with F, k or ^ flags reported from a dilution if necessary?	NA	NA	
4. Were sample results reported as ND with elevated RLs?	NA	L	<input type="checkbox"/> RL-Dilution, Matrix (NCM# _____) <input type="checkbox"/> RL-Dilution, Interferents (NCM# _____) <input type="checkbox"/> RL-Dilution, Matrix, Neg. Analyte (NCM# _____)
5. Internal standard (IS) response ±30% of ICB IS? If no, list details:	Y	Y	<input type="checkbox"/> ISTD - Matrix, DL Required (NCM# _____) <input type="checkbox"/> Low IS response. Reanalyzed.
6. Report flag turned to No for Mg-SEP Step1 and Na-Steps 2 & 5?	NA	NA	
7. Calculations checked for error? (Document manual calc in comments.)	Y	Y	
C. Preparation/Matrix QC			
1. Method blank done per prep batch and within limits? (Waters/Soils/Waste < ½ RL; Zn <RL; Air/SEP/PM10/JN Waste <RL)	Y	Y	<input type="checkbox"/> Method Blank-Report, ND (NCM# _____) <input type="checkbox"/> Method Blank - Report, 10X (NCM# _____) <input type="checkbox"/> Method Blank-Insufficient Sample (NCM# _____) <input type="checkbox"/> See narrative-common analyte in SEP leachate.
2. LCS done per prep batch & within QC limits?	Y	Y	<input type="checkbox"/> LCS/LCSD -Insufficient Sample (NCM# _____) <input type="checkbox"/> LCS/LCSD - %R High (NCM# _____) <input type="checkbox"/> See narrative-SEP LCS within historical limits.
3. MS/MSD or MS/DUP run at required frequency?	NA	NA	<input type="checkbox"/> MS/MSD/DUP-Insufficient Volume (NCM# _____)
4. MS/MSD %R and RPD within QC limits?	NA	L	<input type="checkbox"/> LCS acceptable-matrix effects <input type="checkbox"/> Native analyte > 4x spike level
5. DUP RPD within limits?	NA	L	<input type="checkbox"/> MS/MSD/DUP - %RPD (NCM# _____)
6. PDS/PDSD run at required frequency & within QC limits? (75-125%R)	Y	Y	<input type="checkbox"/> Post Digestion Spike - %R (NCM# _____) <input type="checkbox"/> MS/MSD; High Bias; PDS Acceptable (NCM# _____)
7. Serial dilution per prep batch & ≤ 10% D for analytes >50X MDL?	Y	Y	<input type="checkbox"/> Serial Dilution - %D (NCM# _____)
D. TALS Review			
TALS Run Log Tab	Date and time match raw data (to verify TALS import worked properly)		1st
TALS Worksheet Tab	Dilutions are correct (instrument sample ID vs. Dilution column)		Y
TALS Reagents Tab	Complete and correct (Final amount and notes populated where needed)		Y
TALS QC Links Tab	Complete and correct		Y
TALS Sample Results Tab	All samples, standards and QC linked correctly		Y
TALS Batch Information Screen	All unused data are marked Rejected or Accepted		Y
TALS Sample List Tab	All reported analytes are marked Primary or Secondary		Y
TALS Sample List Tab	Documentation is complete		Y
TALS Sample List Tab	TALS Status set to appropriate review level		Y
1st Level Review by: KNC 12-20-19		2nd Level Review by: DDU 12/23/19	
Calculation: Pb at 1046			
0.10164 mg/L x 0.100L x 1000 µg/mg = 10.164 µg			

Shipping and Receiving Documents

[illegible]

EUROFINS/TEST AMERICA KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Log In Number:

Review Items	Yes	No	NA	If No, what was the problem?	Comments/Actions Taken
1. Are the shipping containers intact?	/			<input type="checkbox"/> Containers, Broken	
2. Were ambient air containers received intact?			/	<input type="checkbox"/> Checked in lab	
3. The coolers/containers custody seal if present, is it intact?			/	<input type="checkbox"/> Yes <input type="checkbox"/> NA	
4. Is the cooler temperature within limits? (> freezing temp. of water to 6°C, VOST: 10°C) Thermometer ID: _____ Correction factor: _____			/	<input type="checkbox"/> Cooler Out of Temp, Client Contacted, Proceed/Cancel <input type="checkbox"/> Cooler Out of Temp, Same Day Receipt	
5. Were all of the sample containers received intact?	/			<input type="checkbox"/> Containers, Broken	
6. Were samples received in appropriate containers?	/			<input type="checkbox"/> Containers, Improper; Client Contacted; Proceed/Cancel	
7. Do sample container labels match COC? (IDs, Dates, Times)	/			<input type="checkbox"/> COC & Samples Do Not Match <input type="checkbox"/> COC Incorrect/Incomplete <input type="checkbox"/> COC Not Received	
8. Were all of the samples listed on the COC received?	/			<input type="checkbox"/> Sample Received, Not on COC <input type="checkbox"/> Sample on COC, Not Received	
9. Is the date/time of sample collection noted?	/			<input type="checkbox"/> COC; No Date/Time; Client Contacted	
10. Was the sampler identified on the COC?	/		/	<input type="checkbox"/> Sampler Not Listed on COC	
11. Is the client and project name/# identified?	/			<input type="checkbox"/> COC Incorrect/Incomplete	
12. Are tests/parameters listed for each sample?	/			<input type="checkbox"/> COC No tests on COC	
13. Is the matrix of the samples noted?	/			<input type="checkbox"/> COC Incorrect/Incomplete	
14. Was COC relinquished? (Signed/Dated/Timed)	/			<input type="checkbox"/> COC Incorrect/Incomplete	
15. Were samples received within holding time?	/			<input type="checkbox"/> Holding Time - Receipt	
16. Were samples received with correct chemical preservative (excluding Encore)?			/	<input type="checkbox"/> pH Adjusted, pH Included (See box 16A) <input type="checkbox"/> Incorrect Preservative	
17. Were VOA samples received without headspace?			/	<input type="checkbox"/> Headspace (VOA only) <input type="checkbox"/> Residual Chlorine	
18. Did you check for residual chlorine, if necessary? (e.g. 1613B, 1668) Chlorine test strip lot number: _____			/		
19. For 1613B water samples is pH<9?			/	<input type="checkbox"/> If no, notify lab to adjust	
20. For rad samples was sample activity info. Provided?			/	<input type="checkbox"/> Project missing info	
Project #: _____ PM Instructions: _____					
Sample Receiving Associate: <u>Thompson</u> Date: <u>12-13-19</u>					
Sample Receiving Associate: _____ Date: _____					

Box 16A: pH Preservation	Box 18A: Residual Chlorine
Preservative: _____	
Lot Number: _____	
Exp Date: _____	
Analyst: _____	
Date: _____	
Time: _____	

Labeling Verified by: _____ Date: _____

pH test strip lot number: _____

Appendix D
CALIBRATION INFORMATION

CDS-04S

5 Point Console Dry Gas Meter Calibration

Console ID	URS-001
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Calibrated by	WCT	Initials	Date
Reviewed by	CS	CS	3/11/19
Prepared	WCT	WCT	3/9/19
Reviewed	CS	CS	3/11/19
Affixed	WCT	WCT	3/9/19
MCL-01 or MCL-33 Prepared			

Console Calibration Expiration Date	8-Mar-2020
--	------------

Orifice ID: Orifice K':	IX-40 0.2384		IX-48 0.3480		IX-55 0.4592		IX-63 0.5885		IX-73 0.8125	
	Run #1a	Run #1b	Run #2a	Run #2b	Run #3a	Run #3b	Run #4a	Run #4b	Run #5a	Run #5b
Dry Gas Meter										
Initial Reading, (ft ³)	892.295	897.648	903.962	909.992	864.631	870.688	939.507	948.114	955.993	966.842
Final Reading, (ft ³)	897.648	903.962	909.992	916.021	870.688	876.778	948.114	955.993	966.842	977.715
Difference, (ft ³)	5.353	6.314	6.030	6.029	6.057	6.090	8.607	7.879	10.849	10.873
Initial Meter Temp., (°F)	70	71	72	72	64	66	67	68	70	71
Final Meter Temp., (°F)	71	72	72	73	66	67	68	70	71	73
Average Meter Temp., (°F)	70.5	71.5	72.0	72.5	65.0	66.5	67.5	69.0	70.5	72.0
Test Time (min.)	17	20	13	13	10	10	11	10	10	10
Orifice Manometer Reading, ("H ₂ O)	0.33	0.33	0.68	0.68	1.20	1.20	1.90	1.90	3.60	3.60
Barometric Pressure, ("Hg)	29.26		29.26		29.26		29.23		29.23	
Ambient Temperature, (°F)	71		71		71		71		71	
Pump Vacuum, ("Hg)	22	22	19	19	15	15	19.5	19.5	16.5	16.5
Standard Volume of the Meter, (V _{mstd})	5.212	6.137	5.860	5.854	5.973	5.988	8.453	7.716	10.640	10.634
Standard Volume of Critical Orifice, (V _{crstd})	5.146	6.054	5.744	5.744	5.831	5.831	8.211	7.465	10.306	10.306
Flow Rate (cfm)	0.307	0.307	0.451	0.450	0.597	0.599	0.768	0.772	1.064	1.063
DGM Calibration Factor, (Y)	0.987	0.987	0.980	0.981	0.976	0.974	0.971	0.967	0.969	0.969
Average DGM Calibration Factor (Y)	0.987		0.981		0.975		0.969		0.969	
Delta H@, ("H ₂ O)	1.975	1.971	1.908	1.906	1.964	1.959	1.893	1.888	1.887	1.882
Average ΔH@, ("H ₂ O)	1.973		1.907		1.962		1.891		1.885	

Current Average Y	0.976
All Individual Y within 2% of mean?	TRUE
Average Delta H@	1.923
All individual ΔH@ within 0.20"H ₂ O of mean	TRUE

CDS-04S DGM 5 point against orifice
Per EM SOP-002
Issued: January 2018

Temperature Readout Calibration Isokinetic Sampling Consoles

Readout ID Number	URS-001
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Calibrated by	Initials	WCT
	Date	3/9/19
Reviewed by	Initials	CS
	Date	3/11/19

Reference Thermometer	ID Number	2490
	Calibration Exp Date	7/22/19
Reference Thermocouple	ID Number	SR2
	Calibration Exp Date	3/9/19
Voltage Generator	ID Number	T-311348
	Calibration Exp Date	

Temperature Readout Calibration	
Reference Thermometer (°F)	70
Temperature Readout (°F)	68
Was readout adjusted?	Y/N
Do these agree within 2°F	Y/N

Temperature Readout Linearity Check

Channel	Voltage (mV)	Temperature (°F)		
		Theoretical	Observed	Difference ¹
Stack 1	-0.0	32		
	-1.0	-10	-8	+2
	0.0	32	32	0
	1.0	77	76	-1
	3.0	165	165	0
	5.0	251	252	1
	7.0	341	342	1
	10.0	475	473	-2
	15.0	692	693	1
	20.0	905	905	0
	30.0	1329	1328	-1
	40.0	1772	1771	-1

Channel	Voltage (mV)	Temperature (°F)		
		Theoretical	Observed	Difference ¹
Probe 2	0.0	32	32	0
	5.0	251	252	1
Filter 3	0.0	32	32	0
	5.0	251	252	1
Exit 4	0.0	32	32	0
	1.0	77	76	-1
Aux 5	0.0	32	32	0
	1.0	77	121	0
6	0.0	32		
	2.0	121		
7	0.0	32		
	2.0	121		

¹ Difference is calculated as follows: Difference = Temp_{Observed} - Temp_{Theoretical}	Acceptable difference is $\pm 5^\circ\text{F}$ for temperatures below 1000 °F and $\pm 10^\circ\text{F}$ for temperatures above 1000 °F	Are these met?
		Y/N

Pre/Post Test Console Calibration Check

Console ID		URS-001	
Calibrated by	Initials	WCT	
	Date	12/17/19	
Reviewed by	Initials	JC	
	Date	12/18/19	

Orifice ID:	IX-48		IX-55		IX-63	
Orifice K':	0.3480 ✓		0.4592 ✓		0.5885 ✓	
Dry Gas Meter	Run #1a	Run #1b	Run #2a	Run #2b	Run #3a	Run #3b
Initial Reading, (ft ³)	548.023 ✓	553.709 ✓	559.393 ✓	565.648	571.907 ✓	579.902 ✓
Final Reading, (ft ³)	553.709 ✓	559.393 ✓	565.648 ✓	571.907	579.902 ✓	587.942
Difference, (ft ³)	5.686	5.684	6.255	6.259	7.995	8.040
Initial Meter Temp., (°F)	70 ✓	70 ✓	72 ✓	73	74 ✓	75
Final Meter Temp., (°F)	70 ✓	72 ✓	73 ✓	74	75 ✓	75
Average Meter Temp., (°F)	70.0	71.0	72.5	73.5	74.5	75.0
Test Time (min.)	12 ✓	12 ✓	10 ✓	10	10 ✓	10
Orifice Manometer Reading, ("H ₂ O)	0.70 ✓	0.70 ✓	1.20 ✓	1.20	2.00 ✓	2.00
Barometric Pressure, ("Hg)	29.19 ✓	29.19 ✓	29.19 ✓	29.19	29.19 ✓	29.19 ✓
Ambient Temperature, (°F)	70 ✓	70 ✓	70 ✓	70	70 ✓	70 ✓
Pump Vacuum, ("Hg)	20 ✓	20 ✓	18.5 ✓	18.5	17 ✓	17 ✓
Standard Volume of the Meter, (V _{std})	5.534	5.522	6.067	6.059	7.741	7.777
Standard Volume of Critical Orifice, (V _{crstd})	5.295	5.295	5.822	5.822	7.462	7.462
DGM Calibration Factor, (Y)	0.957	0.959	0.960	0.961	0.964	0.959
Delta H@	1.97	1.97	1.94	1.93	1.97	1.97

Average Y =	0.960
Reference Y _d =	0.976
Percent Difference =	-1.7
Is Measured Y within 5% of Reference Y _d ?	TRUE
Average Delta H@ =	1.958

cds-0453: DGM 3 point cal check against orifice
Per EM SOP-003
Issued: August 2017

CDS-04S

5 Point Console Dry Gas

Meter Calibration

Console ID
URS-002

Calibrated by	WCT	Initials	Date
Reviewed by	CS	CS	3/16/19
Prepared	WCT	WCT	3/18/19
Reviewed	CS	CS	3/18/19
Affixed	WCT	WCT	3/18/19
MCL-01 or MCL-33 Prepared			

Console Calibration Expiration Date
15-Mar-2020

Orifice ID:	IX-40	IX-48	IX-55	IX-63	IX-73
Orifice K':	0.2384	0.3480	0.4592	0.5885	0.8125
Dry Gas Meter	Run #1a	Run #2a	Run #3a	Run #4a	Run #5a
Initial Reading, (ft ³)	3.344	14.273	26.448	38.848	54.777
Final Reading, (ft ³)	8.880	20.342	32.641	46.796	66.887
Difference, (ft ³)	5.536	6.069	6.193	7.948	12.110
Initial Meter Temp., (°F)	70	73	73	73	75
Final Meter Temp., (°F)	72	73	73	74	76
Average Meter Temp., (°F)	71.0	73.0	73.0	73.5	75.5
Test Time (min.)	17	13	10	10	10
Orifice Manometer Reading, ("H ₂ O)	0.33	0.68	1.20	1.90	3.60
Barometric Pressure, ("Hg)	29.44	29.44	29.44	29.44	29.44
Ambient Temperature, (°F)	70	70	70	70	70
Pump Vacuum, ("Hg)	23.5	22	20.5	19	16.5
Standard Volume of the Meter, (V _{std})	5.418	5.923	6.052	7.773	11.850
Standard Volume of Critical Orifice, (V _{crstd})	5.183	5.785	5.872	7.526	11.429
Flow Rate (cfm)	0.319	0.456	0.605	0.777	1.077
DGM Calibration Factor, (Y)	0.957	0.977	0.970	0.968	0.965
Average DGM Calibration Factor (Y)	0.971	0.974	0.969	0.967	0.963
Delta H@, ("H ₂ O)	1.957	1.889	1.919	1.855	1.853
Average ΔH@, ("H ₂ O)	1.955	1.889	1.919	1.853	1.851

Current Average Y	0.969
All Individual Y within 2% of mean?	TRUE
Average Delta H@	1.893
All individual ΔH@ within 0.20"H ₂ O of mean	TRUE

CDS-04S DGM 5 point against orifice
Per EM SOP-002
Issued: January 2018

Temperature Readout Calibration Isokinetic Sampling Consoles

Readout ID Number	4RS-002
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Calibrated by	Initials	WCT
	Date	3/16/19
Reviewed by	Initials	CS
	Date	3/19/19

Reference Thermometer	ID Number	2490
	Calibration Exp Date	5/22/19
Reference Thermocouple	ID Number	SR2
	Calibration Exp Date	3/9/19
Voltage Generator	ID Number	T-31134B
	Calibration Exp Date	

Temperature Readout Calibration	
Reference Thermometer (°F)	70
Temperature Readout (°F)	70
Was readout adjusted?	Y/N
Do these agree within 2°F	Y/N

Temperature Readout Linearity Check

Channel	Voltage (mV)	Temperature (°F)		
		Theoretical	Observed	Difference ¹
Stack 1	-0.0	32		
	-1.0	-10	-8	2
	0.0	32	32	0
	1.0	77	76	-1
	3.0	165	165	0
	5.0	251	252	1
	7.0	341	341	0
	10.0	475	474	-1
	15.0	692	693	1
	20.0	905	906	1
	30.0	1329	1329	0
	40.0	1772	1772	0

Channel	Voltage (mV)	Temperature (°F)		
		Theoretical	Observed	Difference ¹
Purge 2	0.0	32	32	0
	5.0	251	252	1
Filter 3	0.0	32	32	0
	5.0	251	252	1
Exit 4	0.0	32	32	0
	1.0	77	76	-1
Box 5	0.0	32		
	1.0	77		
Box 6	0.0	32	32	0
	2.0	121	120	-1
7	0.0	32		
	2.0	121		

¹ Difference is calculated as follows:

$$\text{Difference} = \text{Temp}_{\text{Observed}} - \text{Temp}_{\text{Theoretical}}$$

Acceptable difference is $\pm 5^\circ\text{F}$ for temperatures below 1000°F and $\pm 10^\circ\text{F}$ for temperatures above 1000°F

Are these met?

Y/N

Pre/Post Test Console Calibration Check

Console ID		URS-002	
Calibrated by	Initials	WCT	
	Date	12/12/19	
Reviewed by	Initials	CS	
	Date	12/13/19	

Orifice ID:	IX-48		IX-55		IX-63	
Orifice K':	0.3480		0.4592		0.5885	
Dry Gas Meter	Run #1a	Run #1b	Run #2a	Run #2b	Run #3a	Run #3b
Initial Reading, (ft ³)	865.463	871.091	876.740	882.960	889.190	897.192
Final Reading, (ft ³)	871.091	876.740	882.960	889.190	897.192	905.195
Difference, (ft ³)	5.628	5.649	6.220	6.230	8.002	8.003
Initial Meter Temp., (°F)	68	70	71	72	73	73
Final Meter Temp., (°F)	70	71	72	73	73	74
Average Meter Temp., (°F)	69.0	70.5	71.5	72.5	73.0	73.5
Test Time (min.)	12	12	10	10	10	10
Orifice Manometer Reading, ("H ₂ O)	0.69	0.69	1.20	1.20	1.90	1.90
Barometric Pressure, ("Hg)	29.73		29.73		29.73	
Ambient Temperature, (°F)	70		70		70	
Pump Vacuum, ("Hg)	20	20	19	19	17.5	17.5
Standard Volume of the Meter, (V _{std})	5.589	5.594	6.156	6.154	7.910	7.904
Standard Volume of Critical Orifice, (V _{critd})	5.393	5.393	5.930	5.930	7.600	7.600
DGM Calibration Factor, (Y)	0.965	0.964	0.963	0.964	0.961	0.962
Delta H@	1.91	1.91	1.91	1.90	1.84	1.84

Average Y =	0.963
Reference Y _d =	0.969
Percent Difference =	-0.6
Is Measured Y within 5% of Reference Y _d ?	TRUE
Average Delta H@ =	1.884

CDS-0455: DGM 3 point cal check against orifice
Per EM SOP-003
Issued: August 2017

S-Type Pitot Tube Inspection

Pitot ID	6-003
Caliper ID	
Caliper Calibration Expiration Date	
Angle Finder ID	
Angle Finder Expiration Date	

Calibrated by	Initials	WCT
	Date	7/13/19
Reviewed by	Initials	CS
	Date	7/18/19

General Pitot Tube Alignment	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>End View</p> </div> <div style="text-align: center;"> <p>Side View</p> </div> </div> <div style="text-align: right; margin-top: 10px;"> <p>$A = 0.915$ "</p> <p>$D_1 = 0.375$ "</p> <p>$0.188 \leq D_1 \leq 0.375$?</p> <p>$0.375$ (y/n)</p> <p>$1.05 \leq A/D_1 \leq 1.50$?</p> <p>$1.22$ (y/n)</p> </div>
Misalignment	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>α_1</p> </div> <div style="text-align: center;"> <p>α_1</p> </div> </div> <div style="text-align: right; margin-top: 10px;"> <p>$\alpha_1 = 1$ °</p> <p>$\alpha_2 = 1$ °</p> <p>$\alpha_1 \leq 10^\circ$?</p> <p>$\alpha_2 \leq 10^\circ$?</p> </div>
	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Flow</p> </div> <div style="text-align: center;"> <p>Flow</p> </div> <div style="text-align: center;"> <p>Flow</p> </div> </div> <div style="text-align: right; margin-top: 10px;"> <p>$\beta_1 = 0$</p> <p>$\beta_2 = 0$</p> <p>$\beta_1 \leq 5^\circ$?</p> <p>$\beta_2 \leq 5^\circ$?</p> </div>
	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Z</p> <p>$\gamma = 0$ °</p> <p>$\theta = 0$ °</p> </div> <div style="text-align: center;"> <p>$Z = A \tan(\gamma) = 0$</p> <p>$W = A \tan(\theta) = 0$</p> </div> <div style="text-align: center;"> <p>$Z \leq 0.125$?</p> <p>$W \leq 0.031$?</p> </div> </div>
Acceptability for Use (Circle Selection)	<div style="display: flex; justify-content: space-between;"> <div> <p>If all answers are "Y", this pitot tube is available for use, and may be assigned a correction factor of 0.84</p> </div> <div> <p>If all answers except the first (D_1) are "Y", this pitot tube is available for use, but needs to be calibrated using a wind tunnel.</p> </div> <div> <p>Any other situation, the pitot tube must be removed from service.</p> </div> </div>

Temperature Sensor Calibration

Readout ID Number	Merc001
Thermometer ID Number	2490
Thermometer Expiration Date	
Sensor ID Number	6-003

Calibrated by	Initials WCT
	Date 7/13/19
Reviewed by	Initials CS
	Date 7/18/19

Thermometer Reading (°F)	Temperature Readout and Sensor Reading (°F)	Error
74 210	72 210	0.4% 0

Error is calculated according to the following equation:

$$\text{Error} = \frac{T_{\text{Sens}} - T_{\text{Ref}}}{T_{\text{Ref}} + 460} \times 100\%$$

CDS-09: Temperature Sensor
Per: EM SOP-001
Revised: April 2018
Document reviewed biennially

Where

T_{sens} is the temperature reading from the sensor and

T_{ref} is the temperature reading from the reference thermometer

Acceptance criteria: Error is less than $\pm 1.5\%$, absolute

S-Type Pitot Tube Inspection

Probe ID	NA
Pitot ID	H157-8

Calibrated by	Initials	JC
	Date	4/5/19
Reviewed by	Initials	
	Date	

Caliper	ID	UT-01
	Calibration Exp Date	

Angle Finder	ID	Summary G58
	Calibration Exp Date	

General Pitot Tube Alignment			$A = 0.832"$ $D_t = 0.375"$ $0.188 \leq D_t \leq 0.375?$ <input checked="" type="checkbox"/> (y/n) $1.05 \leq \frac{A}{2D_t} \leq 1.50?$ <input checked="" type="checkbox"/> (y/n)
			$\alpha_1 = 2.5^\circ$ $\alpha_2 = 4.6^\circ$ $\alpha_1 \leq 10^\circ?$ <input checked="" type="checkbox"/> (y/n) $\alpha_2 \leq 10^\circ?$ <input checked="" type="checkbox"/> (y/n)
			$\beta_1 = 1.5^\circ$ $\beta_2 = 0.8^\circ$ $\beta_1 \leq 5^\circ?$ <input checked="" type="checkbox"/> (y/n) $\beta_2 \leq 5^\circ?$ <input checked="" type="checkbox"/> (y/n)
			$\gamma = 0.8^\circ$ $\theta = 1.5^\circ$ $Z = A \tan(\gamma) = 0.012$ $W = A \tan(\theta) = 0.022$ $Z \leq 0.125?$ <input checked="" type="checkbox"/> (y/n) $W \leq 0.031?$ <input checked="" type="checkbox"/> (y/n)
Acceptability for Use (Circle Selection)	If all answers are "Y", this pitot tube is available for use, and may be assigned a correction factor of 0.84 If all answers except the first (D_t) are "Y", this pitot tube is available for use, but needs to be calibrated using a wind tunnel. Any other situation, the pitot tube must be removed from service.		

Stack Thermocouple Calibration

Thermometer (or Readout/TC)	ID	2490
	Calibration Exp Date	
Temperature Readout	ID	H14308
	Calibration Exp Date	

Calibrated by	Initials	JC
	Date	4/4/19
Reviewed by	Initials	
	Date	

Reference Thermometer $T_F = 72^\circ F$ $T_{abs, RT} = 532^\circ R^1$	Thermocouple Readout $T_F = 72.3^\circ F$ $T_{abs, TC} = 532.3^\circ R$	Compare Readings Between 0.985 and 1.015? $\frac{T_{abs, TC}}{T_{abs, RT}} = 1.00$ <input checked="" type="checkbox"/> Y <input type="checkbox"/> N	Function Check 3°F change in readout upon external temperature stimulus? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N
--	---	--	---

¹ $T_{abs, (^\circ R)} = T_F (^\circ F) + 460$

pitots good at 20°C

Temperature Sensor Calibration

Readout ID Number	HH308
Thermometer ID Number	2490
Probe ID:	HST-8

Calibrated by	Initials JC
	Date 5/14/19
Reviewed by	Initials
	Date

Thermometer Reading (°F)	Temperature Readout and Sensor Reading (°F)	Error
68	68	0%
198	196	-0.3%
294	292	-0.3%
384	381	-0.4%
492	484	-0.8%
		Good

Error is calculated according to the following equation:

$$\text{Error} = \frac{T_{\text{Sens}} - T_{\text{Ref}}}{T_{\text{Ref}} + 460} \times 100\%$$

CDS-09: Temperature Sensor
 Per: EM SOP-001
 Revised: April 2019
 Document reviewed biennially

Where

T_{sens} is the temperature reading from the sensor and

T_{ref} is the temperature reading from the reference thermometer

Acceptance criteria: Error is less than $\pm 1.5\%$, absolute

Temperature Sensor Calibration

Readout ID Number	URS-002
Thermometer ID Number	2490
Thermometer Expiration Date	5/22/20
Sensor ID Number	HST 8

Calibrated by	Initials WCT
	Date 12/13/19
Reviewed by	Initials JC
	Date 12/18/19

Thermometer Reading (°F)	Temperature Readout and Sensor Reading (°F)	Error
72	69	-0.6%
210	209	-0.1%

Error is calculated according to the following equation:

$$\text{Error} = \frac{T_{\text{sens}} - T_{\text{ref}}}{T_{\text{ref}} + 460} \times 100\%$$

CDS-09: Temperature Sensor

Per: EM SOP-001

Revised: April 2019

Document reviewed biennially

Where

T_{sens} is the temperature reading from the sensor and

T_{ref} is the temperature reading from the reference thermometer

Acceptance criteria: Error is less than $\pm 1.5\%$, absolute

Calibration Gas Certification Sheets



Praxair Distribution Mid-Atlantic
One Steel Road East,
Morrisville, PA 19067
Tel: (800) 638-6360 Fax: (215) 736 5240
PGVP ID: F32016

DocNumber: 000019374

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

CHEROKEE INSTRUMENTS INC
100 LOGAN COURT
ANGIER NC 27501

Praxair Order Number: 86503230
Customer P. O. Number: 14849
Customer Reference Number:

Fill Date: 12/19/2016
Part Number: EV AIME15ME-AS
Lot Number: 304322354501
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	12/27/2024	NIST Traceable
Cylinder Number:	CC232179	Analytical Uncertainty:
15.00 ppm METHANE	± 0.7 %	
Balance AIR		

Certification Information: Certification Date: 12/27/2016 Term: 96 Months Expiration Date: 12/27/2024

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: METHANE

Requested Concentration: 15 ppm
Certified Concentration: 15.00 ppm
Instrument Used: MKS 2031
Analytical Method: FTIR
Last Multipoint Calibration: 12/8/2016

First Analysis Date:	Date:	12/27/2018
Z: -0.04 R: 26.23 C: 15.76 Conc: 14.99		
R: 26.2 Z: -0.02 C: 15.78 Conc: 15.01		
Z: -0.01 C: 15.75 R: 26.26 Conc: 14.98		
UOM: PPM	Mean Test Assay:	15 PPM

Analyzed by:

Jeff Gosner

Reference Standard Type: GMS
Ref. Std. Cylinder #: CC246700
Ref. Std. Conc: 24.94 PPM
Ref. Std. Traceable to SRM #: 2750
SRM Sample #: 211-C-34
SRM Cylinder #: FF23248

Second Analysis Date:	Date:	
Z: 0 R: 0 C: 0 Conc: 0		
R: 0 Z: 0 C: 0 Conc: 0		
Z: 0 C: 0 R: 0 Conc: 0		
UOM: PPM	Mean Test Assay:	0 PPM

Certified by:

Jessica Goodman



Praxair Distribution Mid-Atlantic
One Steel Road East,
Morrisville, PA 19067
Tel: (800) 638-6360 Fax: (215) 736 5240
PGVP ID: F32017

DocNumber: 000022492

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

CHEROKEE INSTRUMENTS INC
100 LOGAN COURT
ANGIER NC 27501

Praxair Order Number: 41969657
Customer P. O. Number: 0050001358
Customer Reference Number:

Fill Date: 9/27/2017
Part Number: AI ME8.5MZE-AS
Lot Number: 304333270704
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	10/3/2025	NIST Traceable
Cylinder Number:	CC182395	Analytical Uncertainty:
8.56 ppm METHANE	± 0.8 %	
Balance AIR		

Certification Information: Certification Date: 10/3/2017 Term: 96 Months Expiration Date: 10/3/2025

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: METHANE

Requested Concentration: 8.5 ppm
Certified Concentration: 8.56 ppm
Instrument Used: MKS 2031
Analytical Method: FTIR
Last Multipoint Calibration: 9/15/2017

Reference Standard Type: GMIS
Ref Std. Cylinder #: CC246700
Ref Std. Conc: 24.94 PPM
Ref Std. Traceable to SRM #: 2750
SRM Sample #: 211-C-34
SRM Cylinder #: FF23248

First Analysis Data:				Date: 10/3/2017	
Z: -0.015	R: 26.5	C: 9.1	Conc: 8.57		
R: 26.5	Z: 0.013	C: 9.09	Conc: 8.56		
Z: -0.01	C: 9.1	R: 26.5	Conc: 8.57		
UOM: PPM	Mean Test Assay:		8.56 PPM		

Second Analysis Data:				Date:	
Z: 0	R: 0	C: 0	Conc: 0		
R: 0	Z: 0	C: 0	Conc: 0		
Z: 0	C: 0	R: 0	Conc: 0		
UOM: PPM	Mean Test Assay:		0 PPM		

Analyzed by:

Megha Patel

Certified by:

Jessica Goodman



Praxair Distribution Mid-Atlantic
One Steel Road East,
Morrisville, PA 19067
Tel: (800) 638-6360 Fax: (215) 736 5240
PGVP ID: F32017

DocNumber: 000021396

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

CHEROKEE INSTRUMENTS INC
PO 0050001227
ANGIER NC 27501

Praxair Order Number: 92285300
Customer P. O. Number: 0050001227
Customer Reference Number:

Fill Date: 6/17/2017
Part Number: AI ME5 25MZE-AS
Lot Number: 304322168706
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	6/21/2025	NIST Traceable
Cylinder Number:	SA11032	Analytical Uncertainty:
5.33 ppm METHANE		± 0.9 %
Balance AIR		

Certification Information: Certification Date: 6/21/2017 Term: 96 Months Expiration Date: 6/21/2025

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: METHANE

Requested Concentration: 5.25 ppm
Certified Concentration: 5.33 ppm
Instrument Used: MKS 2031
Analytical Method: FTIR
Last Multipoint Calibration: 6/21/2017

Reference Standard Type: GMIS
Ref. Std. Cylinder #: CC246700
Ref. Std. Conc.: 24.94 PPM
Ref. Std. Traceable to SRM #: 2750
SRM Sample #: 211-C-34
SRM Cylinder #: FF23248

First Analysis Date: Date: 6/21/2017
Z: 0.01 R: 26.3 C: 5.63 Conc: 5.33
R: 26.3 Z: -0.009 C: 5.63 Conc: 5.33
Z: 0.017 C: 5.64 R: 26.3 Conc: 5.33
UOM: PPM Mean Test Assay: 5.33 PPM

Second Analysis Date: Date:
Z: 0 R: 0 C: 0 Conc: 0
R: 0 Z: 0 C: 0 Conc: 0
Z: 0 C: 0 R: 0 Conc: 0
UOM: PPM Mean Test Assay: 0 PPM

Analyzed by:

Medha Patel

Certified by:

Jessica Goodman

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI58E15A02X7	Reference Number:	54-124417638-2
Cylinder Number:	CC126166	Cylinder Volume:	160.6 CF
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2014 PSIG
PGVP Number:	B12014	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Feb 10, 2014

Expiration Date: Feb 10, 2022

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	21.00 %	20.67 %	G2	+/- 2% NIST Traceable	02/10/2014
OXYGEN	21.00 %	20.99 %	G1	+/- 1.0% NIST Traceable	02/08/2014
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	08061321	CC255428	20.09 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	Jun 28, 2018
NTRM	06120210	CC195743	20.90 % OXYGEN/NITROGEN	+/- 0.4%	Dec 01, 2015

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
CO2-1 HORIBA VIA-510 V1E3H7P5	NDIR	Feb 10, 2014
O2-1 HORIBA MPA-510 3VUYL9NR	Paramagnetic	Jan 21, 2014

Triad Data Available Upon Request

Notes:

Approved for Release

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI80E15A0138	Reference Number:	54-401474856-1
Cylinder Number:	CC273267	Cylinder Volume:	150.9 CF
Laboratory:	124 - Chicago (SAP) - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12019	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Apr 18, 2019

Expiration Date: Apr 18, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	10.00 %	9.893 %	G1	+/- 1.2% NIST Traceable	04/18/2019
OXYGEN	10.00 %	10.08 %	G1	+/- 1.0% NIST Traceable	04/18/2019
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13060714	CC413664	16.939 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	May 08, 2019
NTRM	98051019	SG9168269BAL	12.05 % OXYGEN/NITROGEN	+/- 0.7%	Dec 14, 2023

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
CO2-1 HORIBA VIA-510 V1E3H7P5	NDIR	Mar 26, 2019
O2-1 HORIBA MPA-510 3VUYL9NR	Paramagnetic	Mar 23, 2019

Triad Data Available Upon Request



Alan Camp
Approved for Release