40 CFR Part 63, Subpart UUUUU
Mercury CEMS
Certification Test Report

RECEIVED
JUL 22 2016
AIR QUALITY DIV.

Consumers Energy
JH Campbell Generating Complex
Units 1 and 2
SRN B2835

July 22, 2016

DEQ

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

RECEIVED
JUL 22 2016
AIR QUALITY DIV.

RENEWABLE OPERATING PERMIT REPORT CERTIFICATION

Authorized by 1994 P.A. 451, as amended. Failure to provide this information may result in civil and/or criminal penalties.

Reports submitted pursuant to R 336.1213 (Rule 213), subrules (3)(c) and/or (4)(c), of Michigan's Renewable Operating Permit (ROP) program must be certified by a responsible official. Additional information regarding the reports and documentation listed below must be kept on file for at least 5 years, as specified in Rule 213(3)(b)(ii), and be made available to the Department of Environmental Quality, Air Quality Division upon request.

Source Name: Consumers Energy, J.H. Campbell Plant County: Ottawa

Source Address: 17000 Croswell City: West Olive

AQD Source ID (SRN): B2835 ROP No.: MI-ROP-B2835-2013a ROP Section No.: 1

Please check the appropriate box(es):

☐ **Annual Compliance Certification (Pursuant to Rule 213(4)(c))**

Reporting period (provide inclusive dates): From _____ To _____

☐ 1. During the entire reporting period, this source was in compliance with **ALL** terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference. The method(s) used to determine compliance is/are the method(s) specified in the ROP.

☐ 2. During the entire reporting period this source was in compliance with all terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference, **EXCEPT** for the deviations identified on the enclosed deviation report(s). The method used to determine compliance for each term and condition is the method specified in the ROP, unless otherwise indicated and described on the enclosed deviation report(s).

☐ **Semi-Annual (or More Frequent) Report Certification (Pursuant to Rule 213(3)(c))**

Reporting period (provide inclusive dates): From _____ To _____

☐ 1. During the entire reporting period, **ALL** monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred.

☐ 2. During the entire reporting period, all monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred, **EXCEPT** for the deviations identified on the enclosed deviation report(s).

☒ **Other Report Certification**

Reporting period (provide inclusive dates): From NA To NA

Additional monitoring reports or other applicable documents required by the ROP are attached as described:

Submission of the Certification Report for Mercury CEMS compliance testing for MATS regulations, as required by 40 CFR Part 63.10031.

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in this report and the supporting enclosures are true, accurate and complete

Neil J. Dziedzic	Plant Business Manager	616-738-3510
Name of Responsible Official (print or type)	Title	Phone Number

Signature of Responsible Official

21 July 2016
Date

* Photocopy this form as needed.

EQP 5736 (Rev 11-04)

1 INTRODUCTION

The JH Campbell Generating Complex is subject to 40 CFR Part 63, Subpart UUUUU—*National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units*. The preceding rule is also known as the Mercury and Air Toxics Standard, or MATS. In order to comply with the mercury monitoring obligations of MATS, Consumers Energy has elected to install a mercury continuous emissions monitoring system (CEMS) on all of the boiler units.

The purpose of this test program is to satisfy the mercury CEMS certification requirements for boiler Units 1 and 2, as specified in Appendix A of 40 CFR Part 63, Subpart UUUUU. Consistent with Section 4.0 of Appendix A, the required certification tests consist of a 7-day calibration error test, linearity check, three-level system integrity check, and relative accuracy test audit (RATA). Each of required certification checks or tests has been conducted on the mercury CEMS; all but the RATA were conducted by Consumers Energy employees with assistance from the mercury CEMS vendor's technical staff. The mercury CEMS RATA was conducted by C.E.M. Solutions, Inc. of Hernando, Florida.

The applicable MATS mercury emission rate limit for existing non-low rank coal-fired generating units are 1.2 pounds per trillion British Thermal Units (lb/TBtu), or 0.013 pounds per gigawatt-hour (lb/GWh). At this time, Consumers Energy has decided to demonstrate compliance with the 1.2 lb/TBtu limit. The mercury CEMS records mercury concentrations in the exhaust gas in micrograms per standard cubic meter (µg/scm). Auxiliary CEMS measurements such as the diluent concentration of the exhaust gas needed to calculate the lb/TBtu emission rate are obtained from CO_2 and/or flow CEMS which were previously certified pursuant to 40 CFR Part 75. The CO_2 and flow CEMS continue to follow the quality assurance and quality control procedures found within 40 CFR Part 75, Appendices A and B. Therefore, certification of auxiliary CEMS is not required for purposes of conducting mercury monitoring pursuant to 40 CFR Part 63, Subpart UUUUU.

The mercury CEMS RATA was conducted on May 25, 2016 for Unit 2 and June 7, 2016 for Unit 1. Consumers Energy conducted the other certification tests prior to the mercury CEMS RATA. The detailed RATA test report, which covers Unit 1 and 2 is contained in Attachment 4 and will not be further discussed in the body of this report. The non-RATA certification test results are provided in Attachments 1 through 3 describing the outcome of the 7-day calibration error test, linearity test check, and 3-level system integrity check respectively. Consumers Energy asserted in the protocol that the mercury CEMS is exempted from the cycle time test requirement, without exception from MDEQ (please refer to Section 3.4).

2 SOURCE DESCRIPTION

The JH Campbell Generating Facility is operated to comply with the requirements described in Renewable Operating Permit (ROP) MI-ROP-B2835_2013a.

Boiler Unit 1 is a 2490 mmBtu/hr, 260 MW net, dry bottom wall coal-fired boiler designated as EUBOILER1 the ROP. Unit 1 fires low sulfur pulverized subbituminous coal and incorporates the following pollution control equipment:

- Pulse-Jet Fabric Filter bag house to control particulate matter
- Dry Sorbent Injection (DSI) to control SO_2 and other acid gases
- Activated Carbon Injection system for mercury control

Boiler Unit 2 is a 3560 mmBtu/hr with a rated capacity of 360 MW net on blended fuel, and 280 MW net on 100% PRB fuel. Boiler Unit 2 is a dry bottom wall coal-fired boiler designated as EUBOILER2 the ROP. Unit 2 mainly fires low sulfur pulverized subbituminous coal; however also fires eastern bituminous coal on occasion, and incorporates the following pollution control equipment:

- Selective Catalytic Reduction (SCR) system for nitrogen oxide control
- Pulse-Jet Fabric Filter bag house to control particulate matter
- Dry Sorbent Injection (DSI) to control SO_2 and other acid gases
- Activated Carbon Injection system for mercury control

Thermo Scientific (Thermo) dilution-extractive CO_2, SO_2 and NO_X CEMS, a dilution-extractive Tekran Model 3300 mercury CEMS, and Teledyne ultrasonic air flow CEMS are installed at the exhaust duct of each unit prior to the exhaust streams discharging through the main common stack. The air flow CEMS incorporate dual ultrasonic flow monitors (A and B) configured in an X-pattern in each Unit's duct. In this configuration the individual monitors act in tandem as components of the primary flow system or as redundant backup flow systems, if necessary.

The preceding CEMS interface with a data acquisition handling system (DAHS) manufactured by Environmental Systems Corporation (ESC), with the associated software referred to as StackVision™. The DAHS records various data including exhaust gas flow rates, concentrations and emissions, as well as operating unit parameters such as unit load. The DAHS is used to generate certification test reports for the 7-day calibration error test, linearity check, and three-level system integrity check, as well as per run printouts containing 1-minute and average data for the mercury CEMS RATA.

Figures 1 and 2 provide a general schematic of the monitoring equipment, boiler control equipment and testing location relative to upstream and downstream disturbances for each boiler. The mercury CEMS is located with other CEMS equipment.

Figure 1: JHC Unit 1 CEMS Configuration

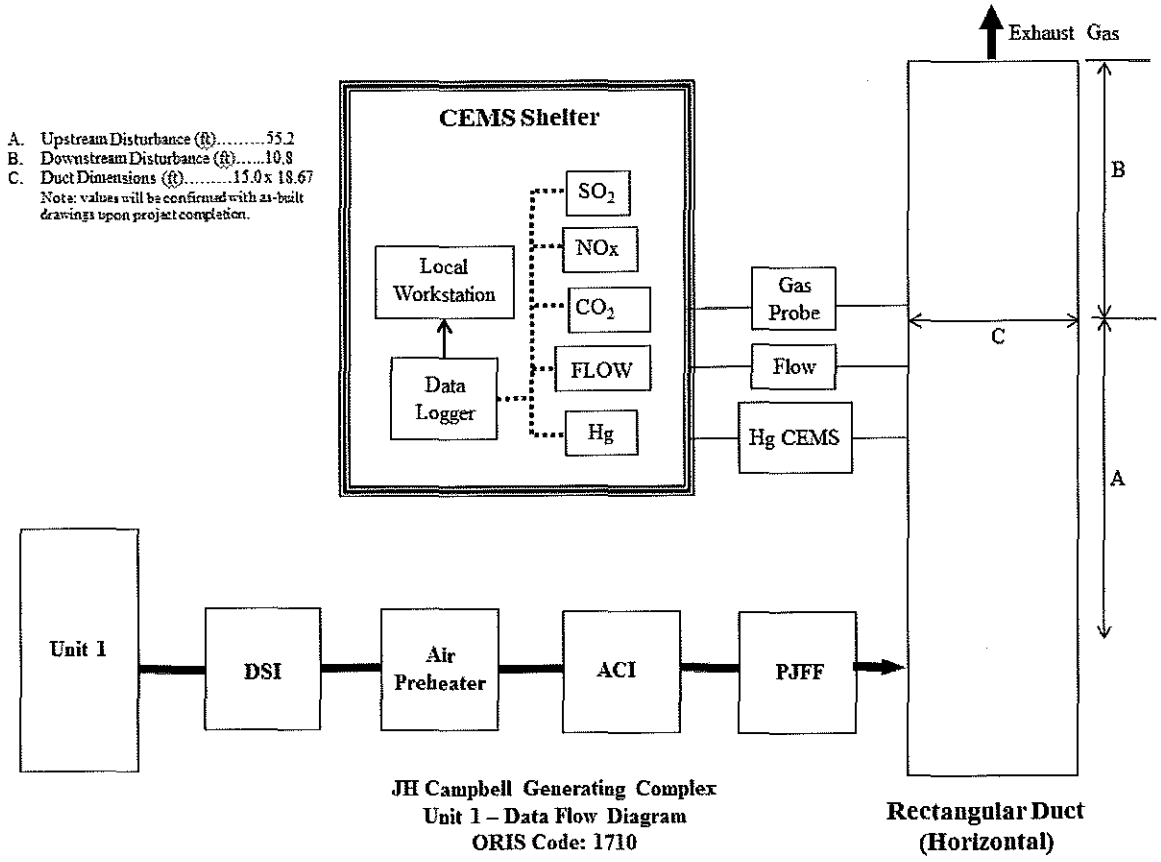
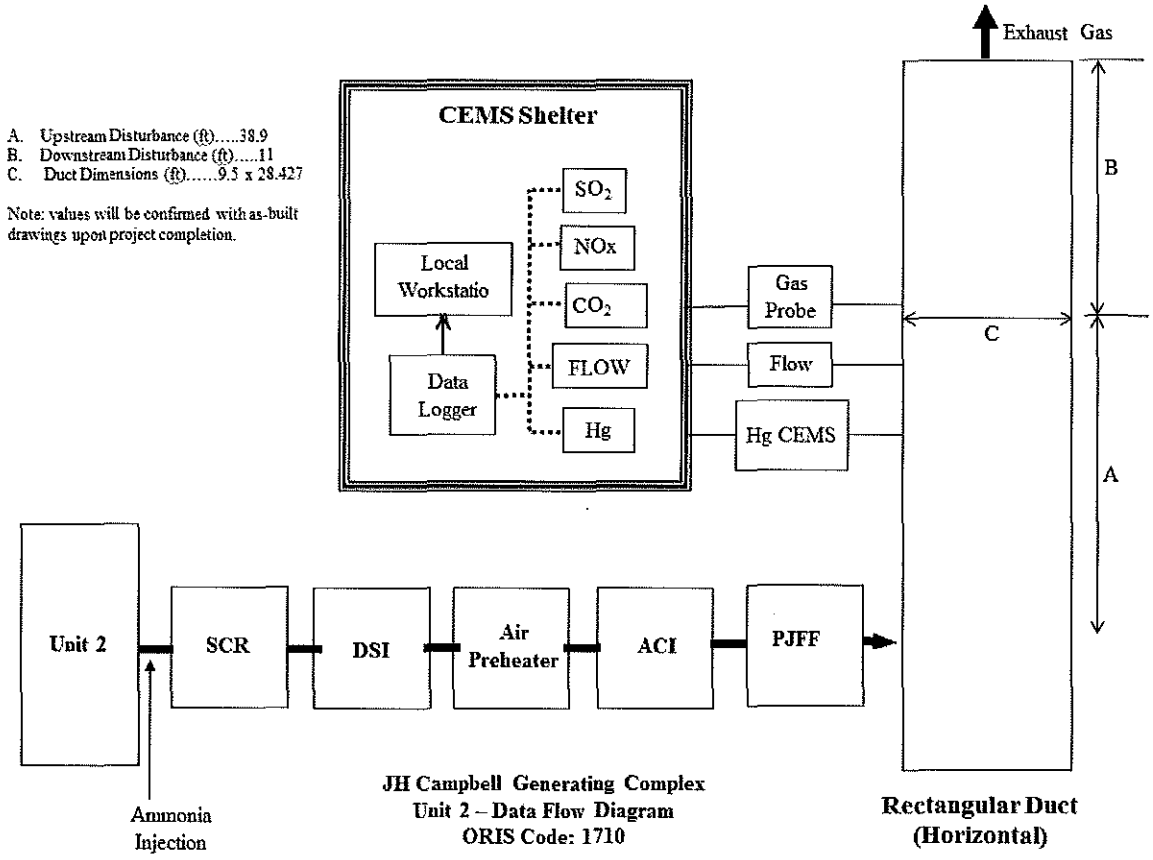


Figure 2: JHC Unit 2 CEMS Configuration



3 CERTIFICATION TEST REPORT

All certification testing for the mercury CEMS was performed in accordance with the requirements in Appendix A of 40 CFR Part 63, Subpart UUUUU, as well as the applicable EPA Reference Methods in Appendix A of 40 CFR Part 60. A description of the certification test procedures is presented in the subsections below.

The RATAs were performed by C.E.M. Solutions, Inc., with support provided by the CEMS vendor and JH Campbell Plant personnel. The testing contractor followed all procedures and policies specified in their Quality Manual and Standard Operating Procedures, both of which were developed in accordance with ASTM D-7036-04, *Standard Practice for Competence of Air Emission Testing Bodies*. Please note that the ASTM D-7036-04 requirements do not directly apply to the mercury CEMS RATA, but such principles were applied to the RATA test as a matter of quality assurance.

The remaining certification tests were conducted by JH Campbell Plant personnel with support from Tekran, the mercury CEMS vendor.

3.1 7-Day Calibration Error Test

A 7-day calibration error test for the mercury CEMS was performed in accordance with the certification procedures specified in Section 4.1.1.1 of Appendix A, 40 CFR Part 63, Subpart UUUUU. This test measures the stability of the instrument by recording the results of the analyzer's daily calibration error check during seven consecutive unit operating days (versus calendar days).

The test commenced on May 19 through May 25 for both Units. A normal calibration error check was conducted approximately 24-hours apart while the unit was operating. The mercury CEMS was challenged at each of two calibration levels while the monitor was operating in its normal sampling mode: (1) zero-level, below the level detectable by the mercury CEMS; and (2) mid-level, at 50.0 – 60.0% of the instrument span. The mid-level calibration gas is generated by a NIST-Traceable Elemental Hg Standard generator (the NIST traceability certification of the Hg Standard generator is provided in Attachment 6). The calibration gas passed through all filters, sample conditioners and other monitor components used to collect the exhaust gas samples, including as much of the sampling probe as is practical. No manual adjustments were made to the instrument during the calibration.

The 7-day calibration error test results are acceptable for the mercury CEMS if none of the test results differ from the reference value of the calibration gas by more than 5.0% of span or an absolute difference of no more than 1.0. µg/scm, whichever is least restrictive. The equation used to determine the calibration error results is:

$$CE = \frac{|R-A|}{S} \times 100 \qquad \textbf{Equation 1}$$

Where:

CE = Percentage calibration error based upon span of the instrument.

R = Reference value of zero- or upscale calibration gas introduced into the monitoring system.

A = Actual monitoring system response to the calibration gas.

S = Span of the instrument.

The mercury CEMS passed the 7-day calibration error test, with results summarized below in Table 1. The results of the 7-day calibration error test, along with calibration error check details from each of the seven days of the test, are provided in Attachment 1.

Table 1. Summary of Hg CEMS 7-Day Calibration Error Test Results

	Parameter	Calibration Error (Maximum)	Required Performance	Pass/Fail
Unit 1	Zero-Level	0.0%	≤ 5.0%	Pass
	Span-Level	0.1%	≤ 5.0%	Pass
Unit 2	Zero-Level	0.0%	≤ 5.0%	Pass
	Span-Level	0.2%	≤ 5.0%	Pass

3.2 Linearity Check

A 3-point linearity check was performed for the mercury CEMS in accordance with the requirements specified in Section 4.1.1.2 of Appendix A, 40 CFR Part 63, Subpart UUUUU on April 17, 2016 for both units. This check measures the ability of the instrument to accurately measure the elemental mercury content of the exhaust gas across a range of reference values reflective of the measurement span of the instrument. For the linearity check, NIST traceable elemental mercury standards were introduced in the same manner as the daily span calibration gases, consistent with the requirements in Section 3.2.1.1.3.6 of Appendix A. The mercury CEMS was challenged three times at each of three calibration levels; low, mid, and high. The three calibration gas levels are defined in Sections 3.1.9, 3.1.10 and 3.1.11 as follows: (1) a low-level concentration between 20.0 to 30.0% of span, (2) a mid-level concentration between 50.0 to 60.0% of span, and (3) a high-level concentration between 80.0 to 100.0% of span.

Results of the linearity checks are acceptable if the mercury CEMS reading differs from the audit gas concentration by no more than 10.0% of the audit gas concentration or if the absolute value of the average difference between the monitor response and the audit gas concentration does not exceed 0.8 µg/scm, whichever is less restrictive. An analyzer is considered out of control from the time that an unacceptable linearity check is completed until the time that an acceptable linearity check is completed, following corrective maintenance.

The equation used to determine the results of the linearity check is as follows:

$$LE = \frac{|R-A|}{R} \times 100 \qquad \textbf{Equation 2}$$

Where:

LE = Percentage linearity error, based upon the reference value

R = Reference value of calibration gas introduced into the monitoring system

A = Average of the monitoring system responses

The mercury CEMS passed the linearity check with results summarized below in Table 2. The detailed results of the linearity test are provided in Attachment 2.

Table 2. Summary of Hg CEMS Linearity Check Results

	Parameter, Linearity Error	Audit Result (%)	Required Performance	Pass/Fail
Unit 1	Zero-Level	3.2	≤ 10.0%	Pass
	Mid-Level	2.2	≤ 10.0%	Pass
	High-Level	2.4	≤ 10.0%	Pass
Unit 2	Zero-Level	3.4	≤ 10.0%	Pass
	Mid-Level	3.0	≤ 10.0%	Pass
	High-Level	5.5	≤ 10.0%	Pass

3.3 3-Level System Integrity Check

A 3-level system integrity check was performed for the mercury CEMS in accordance with the requirements specified in Section 4.1.1.3 of Appendix A, 40 CFR Part 63, Subpart on May 19 for Unit 1 and April 24 for Unit 2. Similar to the linearity check, this check measures the ability of the instrument to accurately measure the oxidized mercury content of the exhaust gas across a range of reference values reflective of the measurement span of the instrument. For the 3-level system integrity check, gases from a NIST traceable source of oxidized Hg were introduced in the same manner as the daily span calibration gases, consistent with the requirements in Section 3.2.1.1.3.6 of Appendix A. The calibration gas levels were consistent with those described for the linearity check.

Results of the system integrity checks are acceptable if the mercury CEMS reading differs from the audit gas concentration by no more than 10.0% of the audit gas concentration or if the absolute value of the average difference between the monitor response and the audit gas concentration does not exceed 0.8 µg/scm, whichever is less restrictive. An analyzer is considered out of control from the time that an unacceptable system integrity check is completed until the time that an acceptable system integrity check is completed, following corrective maintenance. The equation used to determine the results of the system integrity check is the same as that for the linearity test.

The mercury CEMS passed the 3-level system integrity check with results summarized in Table 3. The results of the 3-level system integrity check are provided in Attachment 3. The title of the test report is shown as "Linearity Test" rather than "3-Level System Integrity Test". Contained in the summary of the test at the top of the report is a line that reads, "Hg Integrity Check?". It should be noted that this option is selected indicating that this is, in fact, a 3-level system integrity check report despite the title printed (a software default that cannot be edited).

Table 3. Summary of Hg CEMS Three-Level System Integrity Check Results

	Parameter, System Integrity Error	Audit Result (%)	Required Performance	Pass/Fail
Unit 1	Zero-Level	9.5%	≤ 10.0%	Pass
	Mid-Level	3.4%	≤ 10.0%	Pass
	High-Level	3.0%	≤ 10.0%	Pass
Unit 2	Zero-Level	1.4%	≤ 10.0%	Pass
	Mid-Level	4.3%	≤ 10.0%	Pass
	High-Level	5.9%	≤ 10.0%	Pass

3.4 Cycle Time Test

A cycle time test is required to certify mercury CEMS according to Section 4.1.1 and 4.1.1.4 of Appendix A, 40 CFR Part 63, Subpart UUUUU. However, Section 4.1.1.4 states,

...Integrated batch sampling type Hg CEMS are exempted from this test; however, these must be capable of delivering a measured Hg concentration reading at least once every 15 minutes.

The Tekran Model 2537S Mercury Vapor Analyzer User Manual (as indicated in the protocol) describes the sampling methodology of the mercury CEMS and verifies that the installed CEMS collect batch samples at a user selected interval with a recommended range of 150 seconds (2.5 minutes) to 900 seconds (15 minutes). Therefore, the mercury CEMS qualifies for the cycle time test exemption and no cycle time test has been conducted on it.

3.5 Relative Accuracy Test Audit

A RATA was performed on the mercury CEMS in accordance with the requirements specified in Section 4.1.1.5 of Appendix A, 40 CFR Part 63, Subpart UUUUU on May 25, 2016 for Unit 1 and June 7-9, 2016 for Unit 2. A complete report of that RATA including the passing test results and the testing contractor's methods and quality assurance tests are included in Attachment 4. Table 4 presents a summary of the RATA results.

Table 4. Summary of Hg CEMS RATA Results

Parameter	Difference (CEMs vs. RM)	Performance Criteria	Pass/Fail
Unit 1 Relative Accuracy	0.210 ug/m^3	RA ≤ 20.0% or ± 0.5 ug/m^3	Pass
Unit 2 Relative Accuracy	0.365 ug/m^3	RA ≤ 20.0% or ± 0.5 ug/m^3	Pass

4 CERTIFICATION APPLICATION

As required in Section 7.2.4 of Appendix A, 40 CFR Part 63, Subpart UUUUU, the results of all certification tests will be submitted electronically using the EPA's ECMPS Client Tool concurrent with the quarterly report for the 2nd quarter of 2016.

5 MERCURY CEMS CERTIFICATION TEST CONTACT

JH Campbell Generating Complex

Joseph Firlit
17000 Croswell
West Olive, MI
Office: (616) 738-3260
joseph.firlit@cmsenergy.com

6 SUMMARY OF ANALYZER SERIAL NUMBER AND SPAN VALUE

Unit	Parameter	Analyzer Manufacturer & Model Number	Analyzer Serial Number	Span Value
1	Hg	Tekran Model 2537 S	3080	10.0 $\mu g/m^3$
2	Hg	Tekran Model 2537 S	3075	10.0 $\mu g/m^3$

7-Day Calibration Error Test

Plant: J.H. CAMPBELL

Report Period: 04/01/2016 00:00 Through 07/11/2016 23:59

Source: CAMP1 **Instrument Span:** 10.000

Parameter: U1HGT **Test Number:** XML (H01-1) / EDR (1)

Component ID: H01 **Reason for Test:** C

Span Scale: H **Test Type Code:** 7DAY

	Zero-Level					Span-Level				
Date	Reference Value	Actual Value	Percent Limit	Cal. Error	Result	Reference Value	Actual Value	Percent Limit	Cal. Error	Result
05/19/2016 07:19	0.000	0.000	0.5	0.0	Pass	5.796	5.817	0.5	0.0	Pass
05/20/2016 07:19	0.000	0.000	0.5	0.0	Pass	5.796	5.655	0.5	0.1	Pass
05/21/2016 07:19	0.000	0.000	0.5	0.0	Pass	5.796	5.862	0.5	0.1	Pass
05/22/2016 07:18	0.000	0.000	0.5	0.0	Pass	5.796	5.795	0.5	0.0	Pass
05/23/2016 07:18	0.000	0.000	0.5	0.0	Pass	5.796	5.806	0.5	0.0	Pass
05/24/2016 07:18	0.000	0.006	0.5	0.0	Pass	5.796	5.746	0.5	0.1	Pass
05/25/2016 07:18	0.000	0.000	0.5	0.0	Pass	5.796	5.840	0.5	0.0	Pass

7-Day Calibration Error Test

Plant: J.H. CAMPBELL

Report Period: 04/01/2016 00:00 Through 07/11/2016 23:59

Source: CAMP2 **Instrument Span:** 10.000

Parameter: U2HGT **Test Number:** XML (H02-1) / EDR (1)

Component ID: H02 **Reason for Test:** C

Span Scale: H **Test Type Code:** 7DAY

	Zero-Level					Span-Level				
Date	Reference Value	Actual Value	Percent Limit	Cal. Error	Result	Reference Value	Actual Value	Percent Limit	Cal. Error	Result
05/19/2016 07:18	0.000	0.000	0.5	0.0	Pass	5.651	5.712	0.5	0.1	Pass
05/20/2016 07:18	0.000	0.006	0.5	0.0	Pass	5.651	5.647	0.5	0.0	Pass
05/21/2016 07:18	0.000	0.000	0.5	0.0	Pass	5.651	5.803	0.5	0.2	Pass
05/22/2016 07:20	0.000	0.001	0.5	0.0	Pass	5.651	5.505	0.5	0.1	Pass
05/23/2016 07:23	0.000	0.000	0.5	0.0	Pass	5.651	5.653	0.5	0.0	Pass
05/24/2016 07:25	0.000	0.008	0.5	0.0	Pass	5.651	5.603	0.5	0.0	Pass
05/25/2016 06:20	0.000	0.000	0.5	0.0	Pass	5.651	5.593	0.5	0.1	Pass

Facility Name: J H Campbell
Facility ID (ORISPL): 1710

QA/Cert Test Detail Report
July 18, 2016 07:59 AM

Unit/Stack/Pipe ID: 1
Mercury Linearity

Component ID:	H01	Component Type:	HG	Test Completion:	04/17/2016 19:02
Test Number:	HO1-Q2-2016-2	Reason for Test:	INITIAL	Reported Test Results:	PASSED
Span Scale Level:	High	Span Value:	10.000	EPA Calculated Result:	PASSED
Evaluation Status:	No Errors			Submission Status:	Not Submitted
Grace period Tested?				Submission Date/Time:	

Summary Statistics:

	High		Mid		Low	
	Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
Reference Value	9.070	9.070	5.796	5.796	2.830	2.830
Mass CEM Value	8.853	8.853	5.669	5.669	2.740	2.740
Alt. Perf. Indicator						
Results	2.4	2.4	2.2	2.2	3.2	3.2

Injection Statistics:

Date	Gas Level	Measured Value	Reference Value	Reference Value as % of Span
04/17/2016 15:52	MID	5.711	5.796	58.0%
04/17/2016 18:52	MID	5.638	5.796	58.0%
04/17/2016 16:57	MID	5.657	5.796	58.0%
04/17/2016 16:47	LOW	2.733	2.830	28.3%
04/17/2016 18:42	LOW	2.715	2.830	28.3%
04/17/2016 15:42	LOW	2.773	2.830	28.3%
04/17/2016 18:02	HIGH	8.935	9.070	90.7%
04/17/2016 19:02	HIGH	8.855	9.070	90.7%
04/17/2016 17:07	HIGH	8.768	9.070	90.7%

Additional Information:
No comment.

Facility Name: J H Campbell
Facility ID (ORISPL): 1710

QA/Cert Test Detail Report
July 18, 2016 08:11 AM

Unit/Stack/Pipe ID: 2
Mercury Linearity

Component ID:	H02	Component Type:	HG	Test Completion:	04/17/2016 22:02
Test Number:	HO2-Q2_2016-2	Reason for Test:	INITIAL	Reported Test Results:	PASSED
Span Scale Level:	High	Span Value:	10.000	EPA Calculated Result:	PASSED
Evaluation Status:	No Errors			Submission Status:	Not Submitted
Grace period Tested?				Submission Date/Time:	

Summary Statistics:

	High		Mid		Low	
	Reported	Recalculated	Reported	Recalculated	Reported	Recalculated
Reference Value	8.882	8.882	5.651	5.651	2.795	2.795
Mass CEM Value	9.371	9.371	5.819	5.819	2.699	2.699
Alt. Perf. Indicator						
Results	5.5	5.5	3.0	3.0	3.4	3.4

Injection Statistics:

Date	Gas Level	Measured Value	Reference Value	Reference Value as % of Span
04/17/2016 17:42	LOW	2.642	2.795	28.0%
04/17/2016 21:42	LOW	2.717	2.795	28.0%
04/17/2016 19:42	LOW	2.737	2.795	28.0%
04/17/2016 17:52	MID	5.785	5.651	56.5%
04/17/2016 21:52	MID	5.850	5.651	56.5%
04/17/2016 19:52	MID	5.822	5.651	56.5%
04/17/2016 22:02	HIGH	9.397	8.882	88.8%
04/17/2016 20:02	HIGH	9.340	8.882	88.8%
04/17/2016 18:02	HIGH	9.376	8.882	88.8%

Additional Information:
No comment.

Linearity Test

Plant: J.H. CAMPBELL

Report Period: 04/16/2016 00:00 Through 07/13/2016 23:59

Source: CAMP2
Parameter: U2HGT
System ID: 260
Component ID: H02
Span Value: 10.000
Span Scale Code: H

Test End Date/Time: 04/24/16 15:55
Test Number: XML (H02-Q2-2016-1) / EDR (1)
Reason for Test: Initial Certification
Test Result: Pass
Abbreviated?: No
Hg Integrity Check?: Yes

Injection Time	Reference Value	Measured Value	Difference	% of Reference
Mid-Level				
04/24/16 11:18	5.651	6.080	-0.400	7.6
04/24/16 13:41	5.651	5.743	-0.100	1.6
04/24/16 15:36	5.651	5.862	-0.200	3.7

Reference Mean: 5.651
Measured Mean: 5.895
Level Error: 4.3
APS Indicator: False
Gas Type Code:
Vendor Identifier:
Cylinder #:
Cylinder Exp. Date:

Injection Time	Reference Value	Measured Value	Difference	% of Reference
High-Level				
04/24/16 11:38	8.882	9.110	-0.200	2.6
04/24/16 14:00	8.882	9.530	-0.600	7.3
04/24/16 15:55	8.882	9.568	-0.700	7.7

Reference Mean: 8.882
Measured Mean: 9.403
Level Error: 5.9
APS Indicator: False
Gas Type Code:
Vendor Identifier:
Cylinder #:
Cylinder Exp. Date:

Injection Time	Reference Value	Measured Value	Difference	% of Reference
Low-Level				
04/24/16 10:58	2.795	2.816	0.000	0.8
04/24/16 13:21	2.795	2.727	0.100	2.4
04/24/16 15:16	2.795	2.725	0.100	2.5

Reference Mean: 2.795
Measured Mean: 2.756
Level Error: 1.4
APS Indicator: False
Gas Type Code:
Vendor Identifier:
Cylinder #:
Cylinder Exp. Date:

Linearity Test

Plant: J.H. CAMPBELL

Report Period: 04/16/2016 00:00 Through 07/13/2016 23:59

Source: CAMP1
Parameter: U1HGT
System ID: 160
Component ID: H01
Span Value: 10.000
Span Scale Code: H

Test End Date/Time: 05/19/16 22:45
Test Number: XML (H01-Q2-2016-1) / EDR (1)
Reason for Test: Initial Certification
Test Result: Pass
Abbreviated?: No
Hg Integrity Check?: Yes

Injection Time	Reference Value	Measured Value	Difference	% of Reference
Mid-Level				
05/19/16 16:59	5.796	5.540	0.300	4.4
05/19/16 18:54	5.796	5.647	0.100	2.6
05/19/16 22:21	5.796	5.617	0.200	3.1

Reference Mean: 5.796
Measured Mean: 5.601
Level Error: 3.4
APS Indicator: False
Gas Type Code:
Vendor Identifier:
Cylinder #:
Cylinder Exp. Date:

Injection Time	Reference Value	Measured Value	Difference	% of Reference
High-Level				
05/19/16 17:23	9.070	8.772	0.300	3.3
05/19/16 19:18	9.070	8.847	0.200	2.5
05/19/16 22:45	9.070	8.766	0.300	3.4

Reference Mean: 9.070
Measured Mean: 8.795
Level Error: 3.0
APS Indicator: False
Gas Type Code:
Vendor Identifier:
Cylinder #:
Cylinder Exp. Date:

Injection Time	Reference Value	Measured Value	Difference	% of Reference
Low-Level				
05/19/16 16:34	2.830	2.513	0.300	11.2
05/19/16 18:29	2.830	2.603	0.200	8.0
05/19/16 21:56	2.830	2.563	0.300	9.4

Reference Mean: 2.830
Measured Mean: 2.560
Level Error: 9.5
APS Indicator: False
Gas Type Code:
Vendor Identifier:
Cylinder #:
Cylinder Exp. Date: