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40 CFR Part 63 Subpart UUUUU
Mercury LEE Demonstration

EUBOILER01 and 02
T.E.S. Filer City Station

T.E.S. Filer City Station
700 Mee Street
Filer City, Michigan 49634

Test Dates: November 1, 2016 – January 6, 2017

February, 2017
Work Order No. 4101441

Revision 0

Test Performed by the Consumers Energy Company
Regulatory Compliance Testing Section – Air Emissions Testing Body
Environmental Services Department
Written by G. A. Koteskey, Engineering Technical Analyst

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MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

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 T.E.S. Filer City Station County Manistee

Source Address P.O. Box 12 / 700 Mee Street City Filer City

AQD Source ID (SRN) N1685 ROP No. MI-ROP-N1685-2015a ROP Section No. N/A

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 11/01/2016 To 01/06/2017

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

Boilers 1 and 2 Mercury and Air Toxics Standard (MATS) 2016 Mercury Low Emitting EGU (LEE) Qualification Test Report

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

Henry M. Hoffman	General Manager	231-723-6573
Name of Responsible Official (print or type)	Title	Phone Number
Henry M. Hoffman		2-8-2017
Signature of Responsible Official		Date

* Photocopy this form as needed.

EQP 5736 (Rev 11-04)

T.E.S. FILER CITY STATION

February 8, 2017

Ms. Karen Kajiya-Mills
Michigan Department of Environmental Quality (MDEQ)
Air Quality Division (AQD)
525 West Allegan Street
Lansing, Michigan 48909

Re: MATS Performance Test Report
40 CFR Part 63, Subpart UUUUU
TES Filer City Station – Units 1 and 2
Facility ID: SRN = N1685; ORISPL = 50835

Dear Ms. Kajiya-Mills:

In accordance with Sections 63.10(d)(2), 63.10006 and 63.10031, TES Filer City Station (Filer City) is submitting a final Mercury Low Emitting EGU (LEE) test report for testing conducted November 1, 2016 through January 6, 2017 pursuant to the Mercury and Air Toxics Standard (MATS) rule. The 30-boiler operating day tests were conducted in accordance with the test protocol submitted in September of 2015 and the protocol acceptance litter signed by Mr. Jeremy Howe from the MDEQ-AQD Cadillac District Office and dated October 2, 2015.

An electronic copy of the test report will be submitted to the USEPA within 60 days of completing the tests using the Emissions Collection and Monitoring Plan Software (ECMPS) MATS PDF Submit function, and a hard copy of the report is enclosed. An ROP Report Certification form for the Mercury LEE test report is also enclosed.

If you have any questions concerning the contents of this submittal, please contact Todd Guenthardt of my staff at (231) 723-6573, Ext. 104.

Sincerely,

Henry Hoffman
T.E.S. Filer City Station
General Manager

cc: Ms. Caryn Owens, MDEQ-AQD Cadillac District Office

P.O. Box 12, Filer City, MI 49634 Phone 231-723-6573 Fax 231-723-4766

Attachments

1.0 INTRODUCTION

Consumers Energy Company (CECo) Regulatory Compliance Testing Section (RCTS) performed the Mercury (Hg) Low Emitting Electric Generating Unit (LEE) demonstration testing per Subpart UUUUU, 40 CFR Part 63 (commonly referred to as the Mercury and Air Toxics Standard [MATS] Rule) at the stack exhausts associated with emission units EUBOILER01 (Unit 1) and EUBOILER02 (Unit 2) in operation at the Tondu Energy Systems (TES) Filer City Station, located in Filer City, Michigan.

The test was performed to demonstrate qualification as a LEE for Hg. This was the second such test performed for each unit, with annual 30-day testing regimens required to maintain Hg LEE status. The Hg LEE demonstration requires continuous sampling at each unit over a period of 30 boiler operating days. The results of each annual test must either: 1) be less than or equal to 10 percent of the applicable Hg standard listed in Table 2 of the MATS Rule (see Table 1.1 below), equating to 0.12 lb/TBtu for each of Units 1 and 2 or 2) demonstrate that annualized emissions from each unit does not exceed 29 pounds per year (lb/yr) with the emission rate not exceeding the Hg standard listed in Table 2 of the MATS Rule. A test protocol was submitted to the Michigan Department of Environmental Quality (MDEQ) in September, 2015 and subsequently approved by Mr. Jeremy Howe, MDEQ Environmental Quality Analyst, in his letter dated October 2nd, 2015.

Table 1.1
UUUUU, 40 CFR Part 63 (MATS Rule) Emission Limit

EGU Subcategory	Pollutant Being Sampled	Emission Limit
Existing Unit, Coal-fired not low rank virgin coal	Mercury	1.2 lb/TBtu

lb/TBtu: pound per trillion British thermal unit

1.1 Summary of Test Program

The test program was conducted in accordance with applicable MATS Rule requirements and followed the sampling, calibration and quality assurance procedures specified in 40 CFR Part 60, Appendix A, Reference Methods (RM) 19 and 30B, and approved Alternative Method ALT-091 for exhaust gas moisture content determination. Carbon dioxide (CO_2) concentration data was obtained from the facility continuous emission monitoring system (CEMS) over the 30 boiler operating day test period.

1.2 Key Personnel

RCTS representatives Joe Mason and Gregg Koteskey conducted the testing November 1 through January 6, 2017. Mr. Todd Guenthardt, TES Senior Maintenance Supervisor, coordinated the test program with plant personnel. Mr. Jeremy Howe of the MDEQ observed portions of the testing.

Table 1.2
Key Personnel Contact Information

Responsible Party	Address	Contact
Test Facility	TES Filer City Station 700 Mee Street Filer City, Michigan 49634	Mr. Todd Geunthardt 231-723-4766 Sr. Maintenance Supervisor todd.guenthardt@cmsenergy.com
Test Representative & Qualified Individual	Consumers Energy Company RCTS - AETB 17010 Croswell Street West Olive, Michigan 49460	Mr. Gregg Koteskey, QI Technical Analyst 616-738-3712 gregg.koteskey@cmsenergy.com
Regulatory Agency Representative	Michigan Department of Environmental Quality 120 W. Chapin Street Cadillac, Michigan 49601	Mr. Jeremy Howe Environmental Quality Analyst 231-876-4416 howej1@michigan.gov

Please note that reproducing portions of this test report may omit critical substantiating documentation or cause information to be taken out of context. If any portion of this report is reproduced, please exercise due care in this regard.

2.0 SOURCE DESCRIPTION

2.1 Process Description

TES Filer City Station operates a cogeneration power plant with a rated output of 60-megawatts (MW) net and 50,000 pounds of process steam per hour. At full load, each of Units 1 and 2 are capable of producing approximately 320,000 pounds per hour of steam, and this steam is fed to a common steam turbine and electrical generator. The electricity and process steam are sold under contract to public and/or private companies.

At the time of testing, Units 1 and 2 were capable of firing mixtures of coal (bituminous and subbituminous), wood and wood waste, construction/demolition (C/D) material, tire-derived-fuel (TDF) and natural gas. Of the preceding fuels, C/D materials are not routinely fired in the boilers, and natural gas is generally only used for purposes of startup and shutdown of the boilers. Units 1 and 2 are classified as "coal-fired unit not low rank virgin coal" in Item 1 of Table 2 Subpart UUUUU. During the tests, bituminous coal, TDF, and wood were fired during each run.

In March of 2016, installation of natural gas-fired burners in Units 1 and 2 was completed. Natural gas is utilized as a clean startup fuel under MATS, as well as at other times for flame stabilization and other purposes. During this test event, Unit 1did not fire natural gas whereas Unit 2 fired natural gas intermittently during each run. Further, TES executed an Administrative Consent Order with the EPA which resulted in all petroleum coke having been removed from the site by March 31, 2016. Each unit has a nominal heat input rating of approximately 384 mmBtu/hour.

2.2 Control Device Description

The exhaust gas from each boiler is vented to an individual baghouse for PM control and a spray dryer absorber (SDA) flue gas desulfurization (FGD) system for sulfur dioxide (SO_2) and acid gas control. The abated exhaust gases are discharged through separate circular flues housed within a single exhaust stack; the separate flues discharge approximately 250 feet above grade.

3.0 SUMMARY OF TEST RESULTS

During the test program, Units 1 and 2 burned a mixture of coal, tire-derived fuel, and wood. Attachment 4 contains recorded operating data, including CEMS CO_2 measurements, fuel blend firing rate, steam flow and pressure data, fuel blend composite fuel factor, and SO_2 reduction rate (in lieu of scrubber flow rate). SO_2 reduction rate was included in lieu of scrubber flow rate as SO_2 reduction rate is logged automatically, while scrubber flow rate is not. Testing was conducted continuously over a minimum of 30 boiler operating days with Units 1 and Unit 2 operating under routine operating conditions.

3.1 Objectives

The objective of this test was to demonstrate that Units 1 and 2 continue to qualify as LEE's for Hg. In order to demonstrate LEE status, the results of annual test must be less than or equal to 10% of the Hg emission limit of 1.2 lb/TBtu, or the potential Units 1 and 2 Hg emissions must not exceed 29 pounds per year (lb/yr) with the emission rate not exceeding the Hg standard listed in Table 2 of the MATS Rule (1.2 lb/TBtu). Table 3.1 presents the specified sampling matrix.

Table 3.1
Test Matrix

Source	Run	Sampling Dates	Sampling Duration	Parameter	Reference Method
Unit 1	1	Nov 1 to Nov 7	5d 22h 59m	Moisture Content Mercury	ALT-091 30B
	2	Nov 7 to Nov 15	7d 21h 5m		
	3	Nov 15 to Nov 23	7d 23h 1m		
	4[a]	Dec 6 to Dec 12	6d 0h 2m		
Unit 2	1[b]	Nov 1 to Nov 7	6d 0h 11m		
	2	Nov 7 to Nov 15	7d 22h 35m		
	3[c]	Nov 15 to Nov 23	7d 23h 0m		
	4[a]	Dec 6 to Dec 12	6d 2h 8m		
	5[d]	Dec 12 to Dec 20	7d 21h 15m		
	6	Dec 20 to Dec 27	6d 21h 46m		
	7[e]	Dec 27 to Jan 6	8d 1h 3m		

[a] Both units entered a scheduled two-week maintenance outage beginning November 25, LEE testing was paused November 23 at the completion of Run 3 and resumed with Run 4 on December 6 after both units had returned to service.

[b] Unit 2 tripped offline unexpectedly during Run 1, invalidating the test run.

[c] Run 3 for Unit 2 Hg loading on Section 1 of sorbent trap exceeded the analyzer calibration curve, invalidating the test run.

[d] Run 5 for Unit 2 the sampling system moisture removal equipment froze, preventing constant rate sampling and resulting in an unacceptable total sample volume , invalidating the test run.

[e] Run 7 for Unit 2 there was a scheduled 1-day maintenance outage during the run, the test was paused prior to the unit shutdown on January 3, and resumed on January 5 after the unit returned to full load.

3.2 Test Results and Discussion

As shown in Table 3.2 below, the results of the 30 operating day tests for each unit were below the 40 CFR Part 63 Subpart UUUUU emission limit of 1.2 lb/TBtu. Unit 1 demonstrated eligibility for LEE qualification as the average emission rate was below 0.12 lb/TBtu (i.e., 10% of the Hg limit), as well as emitting less than 29 lb/yr on a potential basis while not exceeding the Hg standard listed in Table 2 of the MATS Rule (1.2 lb/TBtu). Unit 2 exceeded 10% of the Hg emission limit (0.12 lb/TBtu) during this test event. However, Unit 2 also demonstrated eligibility for LEE qualification, as annual emissions were less than 29 lb/yr on a potential basis while the average emission rate did not exceed the 1.2 lb/TBtu limit. This was the second such test performed for each unit, with annual 30-day testing regimens required to maintain Hg LEE status.

Table 3.2
TES Filer City Unit 1 and Unit 2 Hg Emission Test Summary

Source	Test Run	Hg Concentration (µg/dscm, dry)	Hg Emission Rate (lb/TBtu)		Hg Emission Rate [a] (lb/yr)	
		Result	Result	LEE	Result	LEE
UNIT 1	1	0.02550	0.02233	-	0.07513	-
	2	0.11961	0.10532	-	0.35429	-
	3	0.15824	0.14746	-	0.49604	-
	4	0.20085	0.18471	-	0.62135	-
	Average	**0.12605**	**0.11496**	**0.12**	**0.38670**	**29.0**
UNIT 2	1*	0.35207	0.36845	-	1.23939	-
	2	0.25257	0.24174	-	0.81318	-
	3*	0.51172	0.52605	-	1.76956	-
	4	0.28090	0.27952	-	0.94026	-
	5*	0.29048	0.28729	-	0.96639	-
	6	0.41956	0.40405	-	1.35917	-
	7	0.73672	0.69374	-	2.33364	-
	Average	**0.42244**	**0.40476**	**0.12**	**1.36156**	**29.0**

ug/dscm: microgram per dry square cubic meter
lb/yr: pound per year
lb/TBtu: pound per trillion British thermal units
[a] Based on multiplying the average Hg rate (as lb/TBtu) by 8,760 hrs/yr * 384 mmBtu/hr * TBtu/10^6 Btu
* Run invalidated, results excluded from emissions calculations.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

The Hg test runs were performed on Unit 1 from November 1 through December 6, 2016. Test runs were performed on Unit 2 from November 1, 2016 through January 6, 2017. The test runs collected data over a period of at least 30 boiler operating days. During the testing, each boiler was operating under routine operating conditions. Operating data collected at 1-hour intervals during the test period included CEMS CO_2 measurements, fuel blend firing rate, steam flow and pressure data, fuel blend composite fuel factor and SO_2 reduction rate.

4.1 Moisture

The exhaust gas moisture content was determined using U.S. EPA Alternative Approved Method ALT-091, in conjunction with the RM 30B sample apparatus. Exhaust gas was drawn through the RM 30B sample apparatus, which includes water knockout and desiccant vessels to remove stack gas moisture. The water knockout and desiccant vessels were weighed within 0.5 g before and after each test run to determine the amount of water vapor collected and calculate stack gas percent moisture using the applicable calculations in Section 12 of U.S. EPA RM 4. U.S. EPA Alternative Approved Method ALT-091 requires the moisture content to also be determined using the average stack gas temperature in conjunction with saturation vapor tables, specifying that the lower of the two values shall be considered the moisture content for the LEE demonstration. The stack gas temperature run averages ranged from 174.9 degrees Fahrenheit (°F) to 179.9 °F during the test period. The water vapor content at these temperatures equate to 45.9% to 51.4% moisture by volume at saturation, much higher than the average measured using the mass of water collected in RM 30B sample apparatus (Unit 1 averaged 14.1% moisture, Unit 2 averaged 13.7%). Therefore, the moisture content measured using the applicable calculations in Section 12 of RM 4 and the mass of water collected in the RM 30B sample apparatus were used in emissions calculations.

4.2 Mercury

Mercury was collected utilizing 40 CFR Part 60, U.S. EPA Reference Method 30B, *Determination of Total Vapor Phase Mercury Emissions from Coal-Fired Combustion Sources Using Carbon Sorbent Traps* with extended sample times. Each test run consisted of paired sorbent traps and ranged from 6 to 10 boiler operating days in duration. Hg emissions data was collected continuously over the entire test period except when changing sorbent traps, performing required Method 30B QA procedures, or as indicated otherwise in Section 5.1, Unit 1 Field Test Issues and Section 5.2, Unit 2 Field Test Issues. The Hg sorbent trap system probe tip was positioned within 10 percent centroidal area of each stack in accordance with sampling point specifications in Table 5 of 40 CFR Part 63 Subpart UUUUU. Following sampling, the sorbent traps were transported to Consumers Energy Trail Street Laboratory in Jackson, Michigan and analyzed in accordance with Section 11.0 of RM 30B.

5.0 QUALITY ASSURANCE PROCEDURES

Each U.S. EPA reference method performed contains specific language stating reliable results are obtained by persons equipped with a thorough knowledge of the techniques associated with each method. To that end, factors which could potentially cause sampling errors were minimized by implementing quality assurance (QA) programs into every applicable component of field testing possible. The following QA components were included in this test program.

Each Hg sampling train was leak-checked before each test run as well as immediately after. Extreme care was exercised to minimize effects of stray or ambient Hg at the sampling site, such as ensuring the sample ports are cleaned thoroughly, maintaining enough distance from duct walls and/or other sources of Hg so that bias was not introduced artificially. Time, dry gas meter temperature, sample rate, barometric pressure, source temperature and total sample volume were documented for each run.

All manual test equipment was calibrated before the test program in accordance with appropriate U.S. EPA procedures. Dry gas meter and thermocouple calibrations are included in Attachment 5. Annual and benchtop mercury analyzer calibration data and certificates of analysis for mercury standards are included in Attachment 3. The QA/QC requirements associated with the performance of RM 30B are summarized in Table 5.1below.

Table 5.1
Summary of RM 30B Sampling QA/QC Requirements

QA/QC test or specification	Acceptance criteria	Frequency	Consequences if not met
Gas flow meter calibration (At 3 settings or points)	Calibration factor (Yi) at each flow rate must be within ± 2% of the avg. value (y).	Prior to initial use and when post-test check is not within ± 5% of Y.	Recalibrate at 3 points until acceptance criteria are met.
Gas flow meter post-test calibration check	Calibration factor (Yi) at each flow rate must be within ± 5% of the Y value form most recent 3-pt. calibration.	After each field test. For mass flow meters must be done onsite, using stack gas.	Recalibrate gas flow meter at 3 pts. To determine a new value for Y. For mass flow meters, must be done onsite. Apply the new Y value to the field test data.
Temperature sensor calibration	Absolute temperature measures by the sensor within ± 1.5% of the reference sensor.	Prior to initial use and before each test thereafter.	Recalibrate: sensor may not be used until specification is met.
Barometer calibration	Absolute pressure measured by the instrument within ± 10 mmHg of reading with a mercury barometer.	Prior to initial use and before each test thereafter.	Recalibrate: instrument may not be used until specification is met.
Pre-test leak check	≤ 4% of target sampling rate	Prior to sampling	Sampling shall not commence until the leak check is passed.

Table 5.1
Summary of RM 30B Sampling QA/QC Requirements

QA/QC test or specification	Acceptance criteria	Frequency	Consequences if not met
Post-test leak check	≤ 4% of average sampling rate	After sampling	Sample invalidated.
Test run total sample volume	Within ± 20% of the total volume sampled during the field recovery test.	Each individual sample	Sample invalidated.
Sorbent trap section 2 breakthrough	≤ 10% of section 1 Hg mass for Hg concentrations > 1 µg/dscm; ≤ 20% of section 1 Hg mass for Hg concentrations > 0.5 µg/dscm and ≤ 1 µg/dscm; ≤ 50% of section 1 Hg mass for Hg concentrations > 0.1 µg/dscm and ≤ 0.5 µg/dscm; no criteria for Hg concentrations ≤ 0.1 µg/dscm	Every sample	Sample invalidated.
Paired sorbent trap agreement	≤ 10% Relative Deviation mass for Hg concentrations > 1 µg/dscm; ≤ 20% or ≤ 0.2 µg/dscm absolute difference for Hg concentrations ≤ 1 µg/dscm.	Every run	Run invalidated.
Field recovery	Average recovery between 85% and 115% for Hg.	Average from a minimum three spiked sorbent traps.	Field sample runs not validated without successful field recovery test.

5.1 Unit 1 Field Test Issues

During Run 1 of Unit 1 which was conducted from November 1 to November 7, 2016, the data logger clock did not account for the time change due to daylight savings which occurred November 6, at 02:00. The data logger clock was updated to EST after Run 1 had completed and before Run 2 began at 13:20. The console field data report shows Run 1 ended at 11:38 AM however, the unit CEMS data logger clock was not corrected to EST until the scheduled maintenance outage after the completion of Run 3. Therefore, a one hour (+60 minutes) time difference is apparent between the sampling equipment data logger and the CEMS data logger for Runs 2 and 3.

The Hg LEE test for Unit 1 was paused at the completion of Run 3 on November 23, for purposes of a scheduled boiler maintenance outage. LEE testing resumed with Run 4 on December 6, after Unit 2 returned to service at the completion of an overlapping scheduled maintenance outage.

5.2 Unit 2 Field Test Issues

During Run 1 of Unit 2 which was conducted from November 1 to November 7, 2016, the data logger clock did not account for the time change due to daylight savings which occurred November

6, at 02:00. The data logger clock was updated to EST after Run 1 had completed and before Run 2 began at 12:50 PM. The console field data report shows Run 1 ended at 12:20 AM however, the unit CEMS data logger clock was not corrected to EST until the scheduled maintenance outage after the completion of Run 3. Therefore, a one hour (+60 minutes) time difference is apparent between the sampling equipment data logger and the CEMS data logger for Runs 2 and 3.

Also during Run 1, Unit 2 unexpectedly tripped offline on November 2. Due to the abrupt nature of the outage, RCTS was unable to pause the test run and sampling was conducted while the unit was not operating (there were a total of 28 hours when the boiler was offline, plus several hours associated with shutdown and startup). The samples from this run were invalidated, and an additional run was performed. Upon the analysis of the samples of Run 1for Unit 2, the Hg loading on Section 1 of both sorbent traps exceeded the 1,000 ng span of the analyzers calibration curve. The analyzer was challenged with a 1,500 ng standard which encompassed the Hg loading observed, and the recovery of the standard was within the ±10% requirement of the standards value.

Upon the analysis of the samples from Run 2 for Unit 2, collected from November 7 to November 15, the Hg loading on Section 1 of both sorbent traps once again exceeded the 1,000 ng span of the analyzer calibration curve. The analyzer was challenged with a 1,500 ng standard and successfully recovered the standard within ±10% demonstrating that the analyzer maintained a linear response at this concentration beyond the initial curve. After completing the analysis for all samples of Run 2, the calibration curve of the analyzer was successfully extended to 2,000 ng.

While removing the B Train sorbent trap (OL288967) from the probe tip at the completion of Run 3 for Unit 2, collected from November 15 to November 23, the glass casing of the sorbent trap was damaged directly following the glass wool plug which retains the downstream end of the Section 2 carbon bed. Mr. Jeremy Howe of the MDEQ was present at the time and witnessed the recovery of the traps, including the damage of this specific trap. Both Mr. Howe and RCTS agreed that there was no loss of glass wool or carbon granules as a result of the broken casing which would compromise the sample media and affect the results of the sample analysis. Subsequently, the sorbent trap was sent to the laboratory for analysis as a valid sample. A photograph of the damaged sorbent trap is included in Attachment 3 of this report.

Upon analysis of the samples from Run 3 for Unit 2, the Hg loading on Section 1 of both sorbent traps exceeded the 2,000 ng span of the calibration curve of the analyzer. As a result of this analysis, the analyzer was challenged with a 3,000 ng calibration standard which would encompass the Hg loading observed on Section 1 of the traps. The recovery of the 3,000 ng standard utilizing the current calibration curve could not meet the necessary QA criteria of ±10% of the standards value. The samples from this run were invalidated and an additional run was performed. A new calibration curve was successfully established for the analyzer, extending the span of the instrument to 5,000 ng.

After completing analysis of the samples from Runs 1-3 for Unit 2, the average spike recovery could not satisfy the 85-115% Field Recovery Test requirement. It is believed that this was due to the relatively low spike levels based upon past test events (50 and 100 ng) in contrast to the much higher than anticipated Hg loadings detected. The remaining QA requirements of RM 30B were satisfied on these samples (sample volume, paired trap agreement, breakthrough), so the failed spike recoveries were not indicative of an analysis error. RCTS then introduced 1,000 ng spikes for use on Unit 2 from Runs 4 through 7. The 1,000 ng spikes were a more appropriate spike level for the Hg loading based upon the results of Runs 1-3.

The Hg LEE test for Unit 2 was paused at the completion of Run 3 on November 23, for a scheduled boiler maintenance outage. LEE testing resumed with Run 4 on December 6, after Unit 2 returned to service at the completion of the outage. In efforts to decrease the amount of Hg loading on the sorbent traps, the sampling rate was decreased by 10% from the 500 cubic centimeters per minute (ccm) used in Runs 1-3, to 450 ccm, used in Runs 4-7.

During Run 5 on Unit 2, conducted from December 12 to December 20, a latch failed on one of the two enclosure doors on the stack platform where the sampling console and associated equipment were operating. The door was blown open by strong winds, and coupled with the extremely cold winter temperatures experienced during this run, the moisture removal equipment froze and effectively plugged the sample lines, preventing sampling at a constant rate and resulting in an unacceptable total sample volume for the run. The samples from this run were invalidated and an additional test run was conducted.

During Run 7 on Unit 2, conducted from December 27, 2016 to January 6, 2017, the sampling equipment was paused twice by RCTS and a brief loss of power to the sampling apparatus was observed (approximately 8 minutes in duration). The first pause was initiated December 27 at 11:46 AM, six minutes after the run had begun, to investigate the stack gas thermocouple which was indicating higher than typical flue temperatures. The probe was removed from the stack and the thermocouple was challenged against a NIST traceable thermometer in an ice-water bath. The stack gas thermocouple responded appropriately and no problems were identified with the sampling equipment. The probe was re-inserted into the stack and the run was resumed after the stack gas temperature reading had stabilized, approximately 13 minutes after the run had been paused. Operators at Filer City reported that the higher stack gas temperatures observed at the start of the run coincided with the process of switching atomizers which causes a brief increase in flue gas temperature.

The second pause of Run 7 was initiated January 3, at 12:56 AM due to a 1-day outage on Unit 2 scheduled to begin that evening. RCTS paused the test run prior to the unit shut down, removed the sample probe from the stack, and sealed the sorbent traps still installed in the probe. Testing for Run 7 resumed January 5 at 11:02 AM after the unit had returned to full load, utilizing the same sorbent

traps. RCTS noticed at this time that the knockout jars in the moisture condenser were beginning to freeze, similar to the events experienced during Run 5. A ceramic space heater was then brought to the enclosure where the sampling equipment was operating to prevent freezing for the remainder of the run. With the additional electrical load of the space heater, the circuit that was servicing the sampling equipment was overloaded and the breaker tripped causing a loss of power to the sample train. After approximately 8 minutes, the power was restored and sampling was resumed. The average sampling rate for this run, as well as the total sample volume, maintained the ±20% tolerance of RM 30B despite the momentary loss of power.

Due to the issues cited above, three additional runs were performed on Unit 2 for a total of seven runs in order to obtain 30 boiler operating days of valid sample data. Runs 1, 3 and 5 were invalidated and therefore not included in the emissions calculations for Hg LEE status. The data and results of these runs were included in this report to demonstrate the continuous sampling throughout this test. Runs 2, 4, 6 and 7 were used for calculating emissions of Unit 2 with Runs 4, 6 and 7 comprising the successful Field Recovery Test.

6.0 CERTIFICATION

I hereby certify that the statements and information in this test report and supporting enclosures are true, accurate, and complete, and that the test program was performed in accordance with test methods specified in this report.

Brian C. Pape, QSTI
Senior Engineering Technical Analyst Lead
Laboratory Services – Regulatory Compliance Testing Section

Report prepared by:

Gregg A. Koteskey, QI
Engineering Technical Analyst
Laboratory Services – Regulatory Compliance Testing Section

Report reviewed by:

Jason M. Prentice
Senior Engineer III
Environmental Services – Air Quality Section

FIGURES

FIGURE 1

TES FILER CITY UNIT 1 & 2 TEST PORT ELEVATION

IN-STACK TEST PORT LOCATION
(elevation looking east)

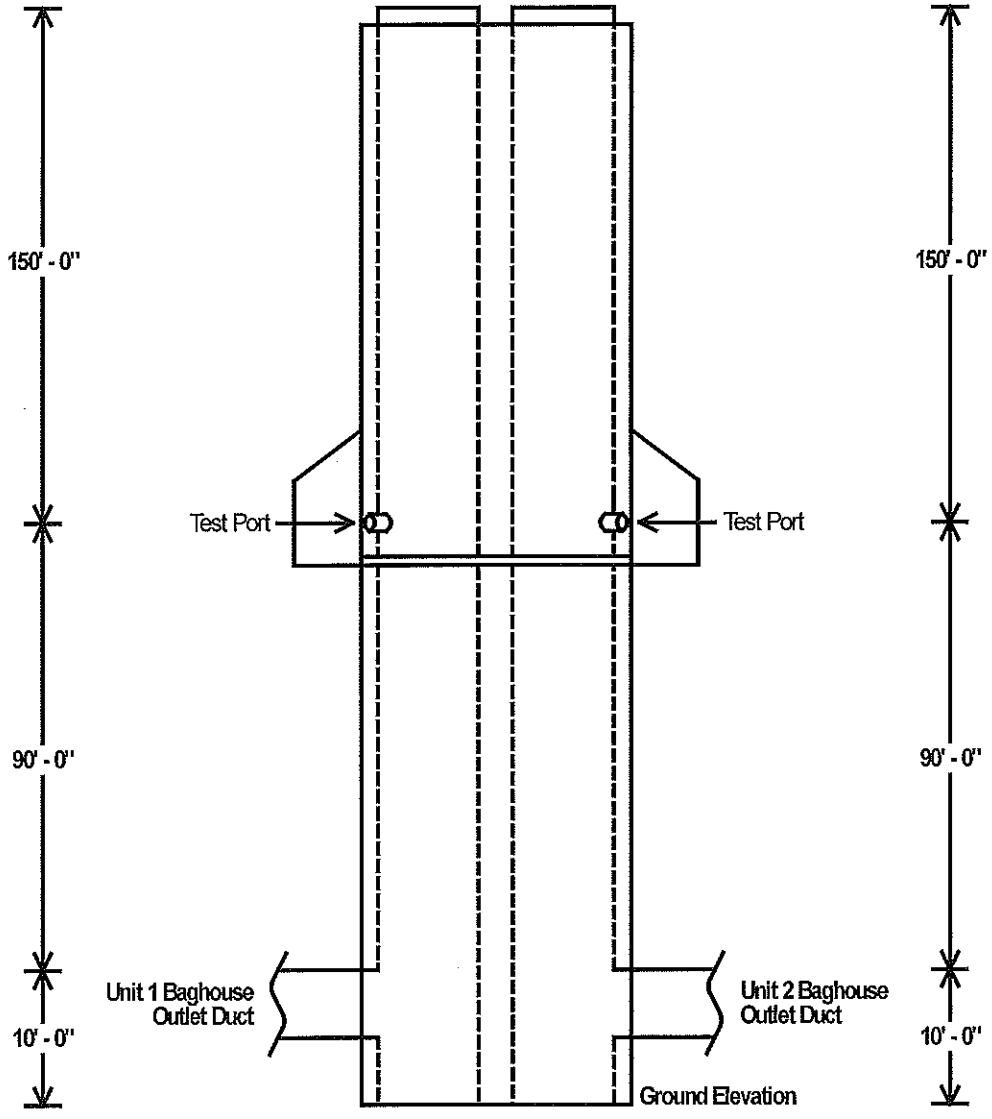

FIGURE 2

Method 30B Mercury Sample Apparatus