Compliance Assurance Monitoring (CAM) Plan
TES Filer City Station EUBOILER01 and EUBOILER02

I. BACKGROUND

Emission Unit

Description: Two Foster Wheeler nominal 384 million Btu/hour coal, wood, tire-derived-fuel (TDF) and natural gas fired boilers. Although the boilers are allowed to fire petroleum coke and construction/demolition waste, such fuels have not been fired in the past few years or longer and are not anticipated in the future. The boilers are of a spreader-stoker design. Each boiler is equipped with a lime spray dryer (or dry scrubber) to control sulfur dioxide and acid gas emissions and a baghouse to control particulate matter.

Identification: EUBOILER01
EUBOILER02

Facility: TES Filer City Station
700 Mee Street
Filer City, Michigan 49634

Applicable Regulation, Emission Limit, Monitoring Requirements

Renewable Operating Permit No: MI-ROP-N1685-2015b

Emission Limits:

Particulate Matter ------ 0.03 lbs per MM Btu heat input. Basis: R 336.2810, 40 CFR 60.42Da(a)

11.5 lbs per hour. Basis: R 336.2810

Monitoring Requirements:

Particulate Matter ------ Compliance with the particulate matter emission limits is verified by conducting periodic stack testing to demonstrate compliance with the lb/mm Btu emission limit and establish PM emission factors. These emission factors are then used in conjunction with monitored heat input to calculate lbs/hr emissions and demonstrate compliance.

Visible emissions (i.e., opacity) are used as a surrogate for ensuring ongoing compliance with the particulate matter emission limit. Opacity monitoring is conducted using a certified Continuous Opacity Monitoring System (COMS).

Control Technology (PM)

Each boiler has an individual pulse jet fabric filter to control particulate emissions from the boiler, and a lime slurry spray dryer absorber (used for flue gas desulfurization), or SDA, that follows each boiler. While the boilers exhaust through a common stack after passing through their individual control systems, each boiler exhaust is separated by individual stack flues. According to US EPA's AP-42 emissions factor document, the control efficiencies of baghouses range between 80% and 99.9% by weight.

At the rated capacity of the boilers, the typical exhaust flow rates and controlled PM emission rates are as follows (based upon 2018 stack test data): EUBOILER01 = Flow Rate ≈ 142,000 actual cubic feet per minute (acfm); Controlled PM Emission Rate ≈ 0.0041 lb/mmBtu and 0.25 to 5.68 lbs/hour; EUBOILER02 = Flow Rate ≈ 145,600 actual cubic feet per minute (acfm); Controlled PM Emission Rate ≈ 0.0027 lb/mmBtu and 0.41 to 1.79 lbs/hour.

CAM Applicability (PM and SO_2)

The pollutant specific emission limits potentially subject to CAM include those for particulate matter (PM) and sulfur dioxide, as compliance with these emission limits relies upon the use of control devices and potential uncontrolled emissions of these pollutants are greater than 100 tons per year, as described below.

The potential pre-control PM and SO_2 emission rates from each of the boilers has been estimated based upon the use of the EPA's AP-42 document. Table 1.1-4 indicates that a coal-fired spreader stoker boiler, without any particulate matter controls, would emit PM at a rate of 66 lbs/ton of coal fired. Assuming that the boilers exclusively fire coal with a heating value of 12,000 Btu/lb, the preceding emission factor yields a potential particulate matter emission rate of 1,056 lbs/hr per boiler at each boiler's nominal rate heat input rate of 384 mmBtu/hr. Assuming the boilers operate continuously (i.e. 8,760 hrs/yr) at rated capacity, the potential pre-control PM emission rate is approximately 4,625 tons per year for each boiler. Similarly, Table 1.1-3 suggests an SO_2 emission factor (lb/ton) of 38*S (where S is the percent sulfur in the coal) for bituminous coal-fired spreader-stoker boilers. The ROP limits the sulfur content of the coal to 3% by weight, and this equates to a potential uncontrolled SO_2 emission rate of 1,824 lbs/hr per boiler at an assumed coal heating value of 12,000 Btu/lb, or 7,989 tons/yr per boiler based on continuous operation at rated capacity. Thus, potential pre-control PM and SO_2 emissions are well above the major source threshold of 100 tons per year.

It should be noted that the boilers are subject to the Cross State Air Pollution Rule (CSAPR) and related monitoring requirements in 40 CFR Part 75 for SO_2, NO_x, diluent and flow. As such, the facility has installed and operates Continuous Emissions Monitoring Systems (CEMS) for the preceding parameters, and the ROP specifies use of these CEMS in relation to demonstrating compliance with the various SO_2 emission limits. Therefore, the SO_2 emission limits are exempt from the CAM requirements pursuant to 40 CFR 64.2(b)(1)(vi).

Lastly, the boilers are also subject to 40 CFR Part 63, Subpart UUUUU – National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-fired Electric Utility Steam Generating Units, also known as the Mercury and Air Toxics (MATS) rule. Under MATS, each unit is complying with a PM emission limit of 0.030 lb/mmBtu and an SO_2 emission limit of 0.20 lb/mmBtu. These PM and SO_2 emission limits reflect emission limitations or standards proposed by the Administrator after November 15, 1990 pursuant to Section 112 of the Clean Air Act. Therefore, these emission limits are exempt from the CAM requirements pursuant to 40 CFR 64.2(b)(1)(i).

In regards to potential post-control PM emission rates, the ROP limits the PM emission rate to no more than 0.03 lb/mm Btu heat input and 11.50 lbs/hr. Therefore, the potential post-control PM emission rate from each boiler (50.4 tons/year assuming continuous operation at rated capacity) is less than the major source threshold of 100 tons per year, and neither boiler is defined as a "Large" pollutant specific emission unit.

II. MONITORING APPROACH

The key elements of the monitoring approach for PM are presented in Table 1. Opacity, as measured by the existing Continuous Opacity Monitoring System (COMS), will be used as the performance indicator for demonstrating compliance with the PM mass emission limit.

Table 1 - Proposed Monitoring Approach

	COMS Opacity
A. Indicator	Opacity of the baghouse exhaust gases – monitored by COMS located in the baghouse exhaust (i.e., each individual unit stack flue).
B. Indicator Range	An opacity indicator range of less than or equal to 7%, based upon on a 1-hour block average, has been selected. An excursion is defined as two (2) or more consecutive 1-hour block periods during which the COMS measured opacity exceeds 7%. Excursions trigger an inspection, corrective actions (if warranted), and CAM reporting requirements.

III. PERFORMANCE CRITERIA

Each boiler is subject to 40 CFR 60, Subpart Da – Standards of Performance for Electric Utility Steam Generating Units. Therefore, a COMS has been installed for each boiler as required in §60.49Da(a). The performance criteria for the COMS are summarized in Table 2.

Table 2 - Performance Criteria

	Visible Emissions (Opacity)
A. Data Representativeness	The COMS has been installed downstream of the baghouse exhaust in accordance with the requirements of Performance Specification 1 (PS-1) of 40 CFR 60, Appendix B.
B. Verification of Operational Status	Proper operation of the COMS was verified through the initial performance evaluation conducted in accordance with PS-1 of 40 CFR 60, Appendix B.
C. QA/QC Practices and Criteria	QA/QC practices are based upon the requirements of 40 CFR Part 60, Appendix F, Procedure 3 – Quality Assurance Requirements for Continuous Opacity Monitoring Systems at Stationary Sources. The practices include daily zero and upscale drift and status indicator checks, quarterly optical alignment, calibration error and zero compensation checks and annual zero alignment.
D. Monitoring Frequency	The opacity of the baghouse exhaust gases will be monitored on a continuous basis (i.e. one data point will be collected every 10 seconds).
E. Data Collection Procedures	The data acquisition and handling system (DAHS) has been set up to retain all 6-minute average opacity data, and the DAHS also retains hourly average opacity data. This data will be maintained for a period of at least five (5) years.
F. Averaging Period	The 10-second opacity values will be used to calculate 6-minute averages. The 6-minute averages will then be used to calculate the hourly block average opacity values.

IV. JUSTIFICATION

Rationale for Selection of Performance Indicator

Visible emission was selected as a performance indicator because it is indicative of good operation and maintenance of a baghouse. When a baghouse is operating properly, there will be minimal opacity. Any increase in visible emissions indicates reduced performance of a particular control device and will initiate implementation of the Maintenance Management Plan. Therefore, the presence of visible emissions is used as a performance indicator.

Rationale for Selection of Indicator Range

The selected indicator range is two (2) or more consecutive 1-hour block periods during which the average opacity is in excess of 7%. Historic stack testing demonstrated a greater than 10% compliance margin with the short term PM emission limits (0.03 lb/mmBtu and 11.5 lbs/hr) at opacity levels that are 5% and less.

The averaging period (two consecutive 1-hour block averages) has been selected in order to prevent temporary process fluctuations from triggering reportable CAM excursions. Furthermore, the associated PM emission limits are based upon the average of three test runs, with each run between 1 and 2 hours in duration (i.e. results of three 1-hour or 2-hour average US EPA Method 5 type stack tests), and a shorter averaging period would therefore not be representative of the associated particulate matter emission limits.

Performance Test Data

Starting in late 2015, the facility began conducting particulate matter testing on a quarterly basis under the MATS rule (previously, the facility had been performing PM tests once per ROP term). The emissions testing consisted of MATS Method 5 testing from two sampling ports for each stack flue, with each test including three 2-hour test runs. The tests were conducted with the boilers operating at 90% of the full load capacity or greater while firing a representative mixture of coal, wood, TDF and/or natural gas. Results of this testing is summarized below in Table 3.

Table 3 – Historic PM Test Results and Concurrent Opacity Data

Test Date(s)	Unit 1 Test Results			Unit 2 Test Results		
	lb/mmBtu	lbs/hr	Opacity (%)	lb/mmBtu	lbs/hr	Opacity (%)
October 20-21, 2015	0.0007	0.28	1.3	0.0013	0.51	1.7
March 7-9, 2016	0.0084	3.56	1.4	0.0046	1.97	2.0
May 9-11, 2016	0.0039	1.53	1.7	0.0016	0.72	2.2
July 26-28, 2016	0.0216	7.81	3.6	0.0223	8.27	3.8
October 3-5, 2016	0.0049	1.70	1.8	0.0030	1.11	1.8
March 6-7, 2017	0.0023	0.91	1.8	0.0077	3.25	2.4
May 15-17, 2017	0.0033	1.23	1.6	0.0045	1.73	1.7
July 24-26, 2017	0.0019	0.68	2.0	0.0005	0.19	2.0
November 28-30, 2017	0.0027	1.06	2.3	0.0019	0.78	2.4
March 5-7, 2018	0.0141	5.68	2.4	0.0035	1.47	1.7
May 7-9, 2018	0.0010	0.42	2.2	0.0010	0.41	0.3

Test Date(s)	Unit 1 Test Results			Unit 2 Test Results		
	lb/mmBtu	lbs/hr	Opacity (%)	lb/mmBtu	lbs/hr	Opacity (%)
July 30 – August 1, 2018	0.0008	0.33	0.9	0.0017	0.70	0.9
November 12-14, 2018	0.0006	0.25	1.6	0.0045	1.79	1.6
February 26-27, 2019	0.0007	0.26	1.2	0.0113	4.49	1.6
April 29-30, 2019	0.0010	0.38	1.5	0.0009	0.35	0.9
July 29-31, 2019	0.0005	0.20	1.0	0.0042	1.85	0.6

As shown in Table 3, over three years of quarterly stack testing has consistently demonstrated compliance with the PM lb/mmBtu and lbs/hr emission limits. While the maximum observed opacity during such testing was approximately 4%, the compliance margins during said testing was between 35% and 47%, depending upon the emission unit and specific emission limit. Thus, setting the excursion level at 7% opacity is reasonable in terms of ensuring that the opacity is high enough such that it would actually equate to an exceedance of the PM emission limits.

Note that each of Units 1 and 2 are also subject to opacity limits of 10%, based upon a 6-minute average. As such, opacity levels above the 6-minute average limit are investigated, with the plant taking appropriate corrective actions. Thus, a CAM excursion based on 1-hour average opacity exceeding 7% for two or more consecutive hours is not the sole determinant for when an investigation and corrective actions are triggered in relation to the baghouse controls.

Additional particulate matter testing will be conducted as required by the Renewable Operating Permit (i.e., at least once every five years). Further, PM stack tests will be conducted every three years under MATS, as Units 1 and 2 have demonstrated Low Emitting EGU (LEE) eligibility. If any MATS testing shows an average PM emission rate that is greater than 0.015 lb/mmBtu, then three years of quarterly PM testing must once again be conducted in order to reestablish LEE status and the once per every three year PM test schedule.