

MICHIGAN STATE UNIVERSITY

Mr. Daniel A. McGeen
Environmental Quality Analyst
Department of Environment, Great Lakes, and Energy
P.O. Box 30242,
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November 22, 2023

**RE: Response to Violation Notice, dated November 3, 2023
Michigan State University [SRN: K3249]
Permit to Install (PTI) No. 139-18 – EUSTMBOILER**

Mr. McGeen:

Michigan State University (MSU) is submitting this response to your violation notice, dated November 3, 2023 alleging non-compliance with certain monitoring and reporting conditions contained in Permit to Install (PTI) No. 139-18 for the “EUSTMBOILER” located at the T.B. Simon Power Plant at 354 Service Road in East Lansing, Ingham County, MI.

EGLE alleges a lack of compliance with the nitrogen oxides (NO_x) emission limit, Appendix A to PTI No. 139-18 and that the facility did not report downtime for EUSTMBOILER; however, MSU asserts that it met the NO_x emission limits and requirements of PTI No. 139-18 for EUSTMBOILER as described in this letter.

EUSTMBOILER is a natural gas-fired boiler, with capability to use ultra-low sulfur diesel as backup fuel, rated at 295.2 million British thermal units per hour (MMBtu/hr) to provide steam to the MSU campus. EUSTMBOILER is equipped with low-NO_x burners and flue gas recirculation (FGR) for control of NO_x emissions.

Background – EUSTMBOILER Commissioning

As described in our notification to Michigan Department of Environment, Great Lakes, and Energy (EGLE) dated October 31, 2022, MSU commenced trial operation of EUSTMBOILER (while firing natural gas) on October 24, 2022. MSU scheduled preliminary performance and emissions testing on November 29, 2022 through December 7, 2022.

MSU achieved full performance rate and tuning goals of 240,000 pound per hour (pph) steam flow for EUSTMBOILER on November 19, 2022; however, on December 1, 2022, EUSTMBOILER was unable to sustain full load due to higher than expected steam header pressures post superheater/pre-non return valves exceeding the relief valve setting of 140 pounds per square inch (psi).



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MSU was therefore required to shut down EUSTMBOILER for diagnostic testing, including the following ongoing shakedown investigations:

- 1) Review of steam model to verify pressure calculations, sizing and valve placement;
- 2) Review of steam piping design calculations; and
- 3) Verification of valve serial numbers, valve data sheets and design parameter, and consideration of piping design around the valves.

Vendor Confirmation Testing

Due to the high pressure limitation, MSU postponed commissioning and emissions testing on EUSTMBOILER, previously scheduled for November 29, 2022 through December 7, 2022 until the steam piping was able to sustain full load from EUSTMBOILER.

Upon completion of the shakedown and investigations, MSU retained Air Hygiene, Inc. to conduct preliminary performance and emissions testing for the purpose of confirming vendor contract guarantees for NO_x using U.S. Environmental Protection Agency (EPA) Method 7E methodology. The testing performed (January 17-18, 2023) demonstrated a NO_x pound per million British thermal units (lb/MMBtu) emission rate of 0.027 lb/MMBtu at base load and 0.030 lb/MMBtu at the minimum emissions compliance (MEC) load. The test results were well within the NO_x emission limit of 0.04 lb/MMBtu.



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CEMS and PEMS Monitoring

MSU's contractor, CMC Solutions, LLC, mobilized the temporary NO_x continuous emissions monitoring system (CEMS) to the site on February 8, 2023 and the CEMS was operational on March 6, 2023. CMC collected process and emissions data for Predictive Emissions Monitoring System (PEMS) model development from March 6 through 17, 2023 in accordance with the procedures in Performance Specification 16 (PS-16).

On March 24, 2023, MSU requested that U.S. EPA approve of use of the PEMS as an Alternative Test Method **in lieu of a CEMS** for estimating NO_x emissions to demonstrate compliance with 40 CFR Part 60 Subpart Db in accordance with guidance from Ms. Kim Garnett of U.S. EPA. On May 2, 2023, U.S. EPA approved the use of a PEMS on EUSTMBOILER to predict the NO_x emission rate as an alternative to utilizing a CEMS and to utilize the PEMS to conduct the initial 30-day performance test required by 40 CFR §60.46b(e)(1).

The PEMS was deployed (with the model developed using the temporary CEMS information) and operational by March 27, 2023 at 09:00.

Response to EGLE Violation Notice Citations

On November 3, 2023, EGLE issued a Violation Notice to MSU with three (3) principle parts:

Table 1. Violation Notice Alleged Citations (EUSTMBOILER)

Observed	Rule/Permit Condition Violated	Comments
Demonstration of compliance with NO _x emission limit	PTI 139-18, EUSTMBOILER Special Condition (SC) I.1	From October 24, 2022, through early February 2023, facility was unable to demonstrate compliance with NO _x limit of 0.04 lb/MMBtu, over a 30-day rolling average time period, when firing natural gas.
Operation of a CEMS	PTI 139-18, EUSTMBOILER SC IV.4, and VI.2	A CEMS was not present during the October 24, 2022 initial start-up of EUSTMBOILER, and was not operating until early February, 2023. Therefore, the requirements of Appendix A to the PTI were not met.
Tracking Downtime of the CEMS	PTI 139-18, EUSTMBOILER SC VII.3 and 40 CFR 60.7(c)(3)	MSU was not tracking downtime for the temporary CEMS or submitting downtime reports.

MSU is providing the requested response in the following sections.



Demonstration of NO_x Emissions Limit

EGLE alleges that MSU was unable to demonstrate compliance with the NO_x limit of 0.04 lb/MMBtu (when firing natural gas) over a 30-day rolling average time period from October 24, 2022 through early February 2023.

However, John Zink (the boiler vendor) provided MSU an emissions guarantee that EUSTMBOILER would meet the NO_x emission limit of 0.04 lb/MMBtu when firing natural gas as required by SC I.1 of PTI No. 139-18. To verify this guarantee, MSU conducted emissions performance testing on January 17-18, 2023. The results indicated NO_x emissions in the range of 0.027-0.03 lb/MMBtu at EUSTMBOILER that comply with the 0.04 lb/MMBtu emission limit by a margin of 25%. We believe the vendor guarantee and performance testing provide a demonstration of compliance during the early commissioning time period in question.

MSU installed and began operating the PEMS following certification procedures on March 27, 2023 at 09:00 to demonstrate ongoing compliance with the NO_x limit of 0.04 lb/MMBtu on a 30-day rolling average time period. Each 30-day rolling average NO_x emission rate has been less than 0.04 lb/MMBtu (with a maximum hourly NO_x rate of 0.028 lb/MMBtu between March 27, 2023 and November 6, 2023. The emission limit applies on a 30-day rolling average; however, this shows even the maximum hourly average is less than 0.04 lb/MMBtu.).

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Operation of a CEMS

EGLE alleges that a CEMS was not present during the October 24, 2022 initial start-up of EUSTMBOILER, and was not operating until February 2023. However, pursuant to 40 CFR §60.46b(e)(3) and SC VI.2, the requirement for NO_x CEMS applies **after** the initial performance test:

Following the date on which the initial performance test is completed or is required to be completed under § 60.8, whichever date comes first, the owner or operator of an affected facility that has a heat input capacity greater than 73 MW (250 MMBtu/hr) and that combusts natural gas, distillate oil, or residual oil having a nitrogen content of 0.30 weight percent or less shall determine compliance with the NO_x standards under § 60.44b on a continuous basis through the use of a 30-day rolling average emission rate. (emphasis added.)

The initial performance test required in accordance with 40 CFR §60.46b(e) was completed on March 28-30, 2023; therefore, continuous compliance with the NO_x emission standard using a CEMS or Alternative Monitoring System would be required following March 30, 2023, pursuant to 40 CFR §60.46b(e)(3). The PEMS was fully operational prior to March 30.

MSU followed the procedures required by 40 CFR §60.13 for the installation, evaluation and operation of the PEMS (i.e., continuous monitoring system). According to 40 CFR §60.48b(e) and §60.13(b), MSU is required to install and operate the PEMS prior to conducting performance testing. Specifically, 40 CFR §60.13(b) states:

(b) All continuous monitoring systems and monitoring devices shall be installed and operational prior to conducting performance tests under § 60.8.

According to 40 CFR §60.8(a), MSU was required to conduct performance testing 180 days after initial startup (in other words, prior to April 21, 2023). 40 CFR §60.8(a) states:

Except as specified in paragraphs (a)(1),(a)(2), (a)(3), and (a)(4) of this section, within 60 days after achieving the maximum production rate at which the affected facility will be operated, but not later than 180 days after initial startup of such facility, [...] the owner or operator of such facility shall conduct performance test(s) and furnish the Administrator a written report of the results of such performance test(s).

MSU performed performance testing on March 28-30, 2023, prior to the 180 day deadline. The PEMS was installed and operational prior to April 21, 2023, therefore, met the operating requirement specified by 40 CFR §60.13(b).

EGLE alleges that MSU was not in compliance with Appendix A to PTI No. 139-18. Appendix A requirements and the date that the requirement was met is identified in Table 2.



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Table 2. Appendix A, PTI No. 139-18 Requirements and Compliance Date

Appendix A, PTI No. 139-18 requirements	Requirement met/Date
1. Not less than 30 calendar days prior to commencement of initial start-up of a CEMS or alternative monitoring system (AMS) for compliance monitoring purposes, the permittee shall submit two copies of a Monitoring Plan to the AQD, for review and approval.	Submitted to EGLE on March 23, 2023
2. Not less than 30 calendar days prior to commencement of initial start-up of a CEMS/AMS for compliance monitoring purposes, the permittee shall submit two copies of a complete test plan for the CEMS/AMS to the AQD for approval.	Submitted on January 23, 2023. In the inspection report dated September 26, 2023, EGLE suggests that this test plan was late; however, this test occurred on March 28-30, 2023 (i.e., the test plan was submitted approximately 65 days before the PEMS was used for compliance).
3. The permittee shall complete the installation and testing of the CEMS/AMS before such system is used for compliance monitoring purposes.	Training of the PEMS took place March 6-17, 2023. RATA was completed March 28-30, 2023
4. Within 60 days of completion of testing, the permittee shall submit to the AQD two copies of the final report demonstrating the CEMS complies with the requirements of the corresponding Performance Specifications.	Submitted on April 28, 2023
5. The span value of the CEMS shall be 2.0 times the lowest emission standard or as specified in the federal regulations.	Requirement met by the PEMS. The PEMS is certified to meet PS-16.
6. The CEMS shall be installed, calibrated, maintained, and operated in accordance with the procedures set forth in 40 CFR 60.13 and the PS, listed in Appendix B to 40 CFR Part 60. If an AMS is installed in lieu of a CEMS, the AMS shall be installed, maintained, and operated in accordance with any requirements stipulated in EPA's approval of the AMS under 40 CFR Part 60, Subpart A.	MSU received approval from U.S. EPA on May 2, 2023 to use the PEMS in place of a CEMS to monitor operating conditions and predict NO _x emissions according to 40 CFR §60.48b and §60.46b(e)(1). The PEMS is certified and compliant with PS-16.
7. Each calendar quarter that the CEMS is used for compliance monitoring purposes, the permittee shall perform the Quality Assurance Procedures of the CEMS set forth in Appendix F of 40 CFR Part 60. As an alternative, the permittee may perform the Quality Assurance Procedures for CEMS set forth in Appendix B of 40 CFR Part 75 for the EUSTMBOILER. Within 30 days following the end of each 6-month period, the permittee shall submit the results to the AQD in the format of the data assessment report (Figure 1, Appendix F of 40 CFR Part 60).	RATA took place in Q1. Q2 and Q3 Relative Accuracy Audits were submitted on October 31, 2023. The results for Q3 and Q4 2023 are due January 30, 2024; therefore, the requirement remains met.
8. In accordance with 40 CFR 60.7(c) and (d), the permittee shall submit two copies of an excess emission report (EER) and summary report in an acceptable format to the AQD, within 30 days following the end of each 6-month period that the CEMS/AMS is used for compliance monitoring purposes.	January through June, 2023 data was submitted on July 28, 2023. The EER for the 6-month period of July through December 2023 is due January 30, 2024; therefore, the requirement remains met.

Tracking Downtime at the CEMS

EGLE alleges that MSU was not tracking downtime for the temporary CEMS or submitting downtime reports; however, the compliance monitoring system is the PEMS, not the temporary CEMS. The temporary CEMS is used to “train” the PEMS in accordance with PS-16 requirements. Downtime reports are not required for the CEMS, as the CEMS is solely used for training the PEMS. MSU submitted the EUSTMBOILER Excess Emission Report (EER) (identifying periods of monitor downtime) on July 28, 2023 for the time period of March 27 (the first unit operating hour for which the PEMS had completed its certification and was used for compliance in accordance with Performance Specification 16) through June 30, 2023.

MSU has demonstrated that the EUSTMBOILER meets the NO_x emission limit of 0.04 lb/MMBtu (when firing natural gas) as part of initial commissioning and subsequently on a 30-day rolling average following the initial compliance test. The PEMS was installed and operational prior to the 180-day deadline for the initial compliance evaluation as required by 40 CFR §60.13(b) and PTI No. 139-18.

If there are questions regarding this response, please contact me at (517) 355-3314 or Mr. Eric Marko, P.E. of NTH Consultants, Ltd. (NTH) at (616) 451-6244.

Sincerely,

Dan Bollman

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