

DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
ACTIVITY REPORT: On-site Inspection

P079674219

FACILITY: Upper Michigan Energy Resources -A.J. Mihm G.S.		SRN / ID: P0796
LOCATION: 16017 Sarya Road, PELKIE		DISTRICT: Marquette
CITY: PELKIE		COUNTY: BARAGA
CONTACT: Justin Kowalski , Senior Environmental Consultant		ACTIVITY DATE: 10/18/2024
STAFF: Jarod Maggio	COMPLIANCE STATUS: Compliance	SOURCE CLASS: MAJOR
SUBJECT: On-site inspection as part of a full compliance evaluation.		
RESOLVED COMPLAINTS:		

REGULATORY AUTHORITY

Under the Authority of Section 5526 of Part 55 of NREPA, the Department of Environment, Great Lakes, and Energy may upon the presentation of their card, and stating the authority and purpose of the investigation, enter and inspect any property at reasonable times for the purpose of investigating either an actual or suspected source of air pollution or ascertaining compliance or noncompliance with NREPA, Rules promulgated thereunder, and the federal Clean Air Act.

FACILITY DESCRIPTION

The A.J. Mihm Generating Station is an electrical generation station that is owned and operated by the Upper Michigan Energy Resources Corporation (UMERC). UMERC is a subsidiary of WEC Energy Group that provides electrical power to approximately 42,000 customers of Michigan's Upper Peninsula.

The A.J. Mihm Generating Station is located at 16017 Sarya Road, Pelkie, Michigan, a rural area in Baraga County that is currently in attainment for all criteria pollutants. Construction of the facility began in 2017 under Permit to Install (PTI) No. 34-17, and initial operation of the generating units occurred in March 2019. The most recent update to the PTI, was approved on January 18, 2022 and is PTI 34-17C.

All major functions of the A.J. Mihm Generating Station are monitored and controlled remotely by operators from Green Bay and Milwaukee, Wisconsin. The facility utilizes total remote start, stop, and load functionality on the reciprocating internal combustion engine (RICE) units. On-site personnel provide maintenance and support activities, along with continuously monitoring and reporting engine operating parameters.

PROCESS DESCRIPTION

The A.J. Mihm Generating Station generates electrical power through the operation of three (3) Wärtsilä 18V50SG natural gas-fired, 4-stroke, spark ignition lean burn, RICE units that are shaft coupled to electric generators. Each engine is rated at 25,828 HP and provides 19,260 KW of gross electrical output. The RICE units fire only pipeline quality natural gas with a fuel consumption rate of up to 152 MMBtu/hr at full load. The engines are housed inside the reciprocating engine hall designed with a 50-decibel sound limit. The exhaust systems are routed outside of the building with silencers, air quality control systems, and stacks. Each of the three RICE units at the A.J. Mihm Generating Station has its own 65-foot stack.

The RICE units at A.J. Mihm Generating Station are equipped with selective catalytic reduction (SCR) for NO_x control, and oxidation catalysts for CO, VOC, and HAP control. An SCR system reduces NO_x into N₂ and H₂O. The SCR at A.J. Mihm Generating Station is equipped with a 20,000 gallon urea storage tank, feeding unit, dosing unit, reactor with catalyst, along with a NO_x monitor and SCR control system. The reducing agent, urea, is injected downstream of the engine and upstream of the reactor to mix with flue gas before entering the reactor containing the catalyst. Inside the reactor, the urea selectively reacts with NO_x in the presence of the catalyst and oxygen within a specific temperature range. The SCR system includes an automated process control that automatically adjusts the amount of urea injected into the flue gas stream. The oxidation catalyst is also fitted into the same housing as the SCR. In a catalytic oxidation system, CO and VOCs in the flue gas are oxidized as they pass over the catalyst. During periods of startup and shutdown, however, the exhaust gas temperatures are too low for the SCR and oxidation catalyst to function as designed. As a result, CO, NO_x, and VOC emissions may be elevated during periods of startup and shutdown as compared to normal operation. Each RICE unit at A.J. Mihm Generating Station is limited to 1,095 startup and shutdown events a year.

Additional emission units at the source include a 1,470 HP natural gas-fired emergency RICE, a 0.83 MMBtu/hr natural gas-fired conditioning heater, space heaters, and storage tanks. The emergency engine will be used as back-up utility power in the event of a power outage at the facility. The emergency engine has an operational limit of 500 hours per year based on a 12- month rolling time period. The conditioning heater will be used to raise the temperature of the natural gas for proper operation of the RICE units. The emergency engine and natural gas conditioning heater are permitted under PTI No. 34-17C.

EMISSIONS

Pollutants emitted from the combustion process of natural gas-fired RICE units include nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOCs), and particulate matter (PM). Sulfur oxides emissions are very low since sulfur compounds are removed from natural gas at processing plants. The formation of nitrogen oxides is related to the combustion temperature in the engine cylinder, and CO and VOC emissions are primarily a result of incomplete combustion. PM emissions can include trace amounts of metals and condensable, semi-volatile organics which result from incomplete combustion, volatilized lubricating oil, and engine wear. Emissions vary according to the air-to-fuel ratio, ignition timing, torque, speed, ambient temperature, humidity, and other factors.

EMISSIONS REPORTING

The facility is required to report its annual emissions to MiEnviro. The following table lists the source total emissions for the reporting year 2023:

POLLUTANT	EMISSIONS (TPY)
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CO	29.78
NOx	22.39
PM10, PRIMARY	4.69
PM2.5, PRIMARY	4.69
SO2	0.60
VOC	14.20
Formaldehyde	4.46

REGULATORY ANALYSIS

The A.J. Mihm Generating Station is subject to Permit to Install (PTI) No. 34-17C and MI-ROP-P0796-2020. The facility is considered major for hazardous air pollutants (HAPs). EURICE1, EURICE2, EURICE3, and EUEMERGEN are subject to NSPS Subpart JJJJ and MACT ZZZZ. EUHEATER1 is subject to MACT DDDDD.

COMPLIANCE HISTORY

The facility was last inspected in March of 2023 and found to be in compliance with all applicable air quality rules and federal regulations at that time. No violation notices have been issued since the last inspection date.

INSPECTION

A targeted inspection was scheduled for 10/15/2024 at the A.J. Mihm Generating Station to determine compliance with MI-ROP-P0796-2020 and PTI No. 34-17C. The contact for the facility is Justin Kowalski, Senior Environmental Consultant for UMER. The on-site contact for the facility is Ed Warren.

EUEMERGEN

This emission unit (EU) is a CAT G3512 natural gas-fired emergency engine rated at 1000 eKW. The purpose of this EU is to provide power during emergency power outages.

SC I, V.1, VI.1-2: The EU is an EPA certified engine that meets the emission limits in SC I.

SC II.1: The engine only fires natural gas. Piped natural gas into the unit was observed on-site.

SC III.1-7, IV.1-2: The engine is operated in a certified manner and is only used for emergency purposes or for maintenance and readiness testing. Records provided showed a total of 12.4 hours of use in 2023, and 10.2 hours of use for the 12-month rolling basis up to October 2024. During the inspection, an hour meter was seen through the control screen and listed 87.0 hours of total use. The nameplate of the engine states CAT G3512 with a rated power output of 1000 eKW and engine displacement of 3173 in³. Records provided show preventative maintenance is done monthly.

SC VI.1: Record of Certification was provided (Certificate Number JCPXB51.8CZL-001).

SC VI.2: Records indicate that monthly testing is performed.

SC VII.1-2: EUEMERGEN has not been contractually obligated to be available for more than 15 hours per calendar year for the purposes specified in 40 CFR 60.4243 (d)(3)(i). The permittee submitted a notification specifying the engine will be operated in a certified manner.

SC VIII.1: SVEMERGEN is vertical and appeared to be 20 feet above the ground. Diameter appeared to be no more than 12 inches.

SC IX.1-2: EUEMERGEN appears to be in compliance with all provisions of NSPS Subpart JJJJ and MACT ZZZZ.

EUHEATER1

This EU is a 0.83 MMBtu/hr natural gas-fired conditioning heater used to raise the temperature of the natural gas for proper operation of the RICE units. The natural gas undergoes adiabatic cooling when the pressure is dropped coming from the natural gas transmission lines. This equipment is maintained by SEMCO.

SC II.1, III.1, IV.1: Piped natural gas was observed into EUHEATER1. EUHEATER1 appeared to be well maintained and operating in a satisfactory manner. No visible emissions were observed from the two stacks above the heater.

SC VI.1-3: The facility maintains the manufacturer specification sheet on file. The ETI Indirect Gas Fired Water Bath Heater has a listed nominal heat input capacity of 0.75 MMBtu/hr. The heater is inspected and maintained by SEMCO and has a contractual operation agreement with UMERG. Records were provided showing the heater was inspected/maintained on 9/24/24.

SC VII.1: SVHEATER1 is vertical and appeared to be 20 feet above the ground. Diameter appeared to be no more than 10 inches.

SC IX.1: Per 40 CFR Part 63, Subpart DDDDD a 5-year compliance report was submitted to cover the period from 10/16/2018 through 12/31/2023.

FGENGINES

This flexible group consists of three (3) Wärtsilä 18V50SG natural gas-fired, 4-stroke, spark ignition lean burn, RICE units that are shaft coupled to electric generators. Each engine is rated at 25,828 HP and provides 19,260 KW of gross electrical output. The RICE units fire only pipeline quality natural gas with a fuel consumption rate of up to 152 MMBtu/hr at full load. These engines are each equipped with SCR and oxidation catalysts. Each engine emits out its own vertical stack.

SC I, V: The three engines underwent MACT JJJJ performance testing in May 2024 for compliance with the NO_x, CO, & VOC emission limits set forth in SC V.2. The three engines passed all emission limits. See table below:

Source	Date	Average Engine Load	Pollutant	Permit Limit @ 15% O ₂	Test Result @15% O ₂
EURICE1	5/29/2024	18,943 kW	NO _x	82 ppmvd	2.7 ppmvd
EURICE1	5/29/2024	18,943 kW	CO	270 ppmvd	8.1 ppmvd
EURICE1	5/29/2024	18,943 kW	VOC	60 ppmvd	0.7 ppmvd
EURICE2	5/30/2024	18,861 kW	NO _x	82 ppmvd	4.6 ppmvd
EURICE2	5/30/2024	18,861 kW	CO	270 ppmvd	9.1 ppmvd
EURICE2	5/30/2024	18,861 kW	VOC	60 ppmvd	1.7 ppmvd
EURICE3	5/30/2024	18,888 kW	NO _x	82 ppmvd	3.2 ppmvd
EURICE3	5/30/2024	18,888 kW	CO	270 ppmvd	7.4 ppmvd
EURICE3	5/30/2024	18,888 kW	VOC	60 ppmvd	1.9 ppmvd

The next performance test required by MACT JJJJ requirements outlined in SC V.2 would be 5/30/2029.

Previously, compliance with NO_x, CO, VOC, PM 10 and PM_{2.5} outline in SCV.1 for MACT JJJJ were submitted in May 2023. Three engines pass all emission limits. EURICE2 was used as a representative unit for compliance with Total Particulate Matter (TPM). See table below:

Source	Date	Average Engine Load	Pollutant	Permit Limit	Test Result
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EURICE1	5/23/2023	18,480 kW	NOx	3.0 pph	1.85 pph
EURICE1	5/23/2023	18,480 kW	CO	5.5 pph	3.03 pph
EURICE1	5/23/2023	18,480 kW	VOC	5.5 pph	1.54 pph
EURICE2	5/24/2023	18,893 kW	NOx	3.0 pph	2.86 pph
EURICE2	5/24/2023	18,893 kW	CO	5.5 pph	3.85 pph
EURICE2	5/24/2023	18,893 kW	VOC	5.5 pph	0.49 pph
EURICE2	5/24/2023	18,893 kW	TPM	3.72 pph	0.442 pph
EURICE3	5/23/2023	18,906 kW	NOx	3.0 pph	1.83 pph
EURICE3	5/23/2023	18,906 kW	CO	5.5 pph	3.46 pph
EURICE3	5/23/2023	18,906 kW	VOC	5.5 pph	2.48 pph

The next performance test required by MACT JJJJ requirements outlined in SC V.1 would be 5/24/2028.

SC II.1: Piped natural gas was observed as the only fuel for FGEngines.

SC III.1-6, VI.3-6: UMERc maintains a malfunction abatement plan for EURICE1, EURICE2, and EURICE3. The MAP provides the equipment operating parameters, ranges, and frequency, along with a list of inspection items, frequency of maintenance, major parts replacement list, and responsible personnel. The four monitoring parameters for FGEngines representative of air quality performance are SCR inlet temperature, urea injection rate, SCR pressure drop, and oxidation catalyst pressure drop. The normal operating ranges for these parameters in the MAP are 600 -780 F for SCR inlet temperature, 4-10 gallons/hour for urea injection rate, 0.20-0.65 psi for SCR pressure drop, and 0.05-0.35 psi for oxidation catalyst pressure drop. During the inspection, EURICE3 was down for 30,000 hour scheduled maintenance and only two of the three engines were operating (EURICE1 and EURICE2), and were reporting the following performance parameters through the DEMAXX control software on 10/15/2024:

Engine	1	2	3

Time	10:20 AM	10:26 AM	N/A
Power Output (KW)	16.3 MW	12.0 MW	N/A
Fuel usage (lb/hr)	4,586	4,515	N/A
Outlet NOx (ppm)	6.0 Wet weight	8.0 Wet Weight	N/A
Urea (gal/hr)	2	3.8	N/A
Reactor Inlet Temp (F)	748	761	N/A
Ox Cat dp (psi)	0.1	0.09	N/A
SCR dp (psi)	0.25	0.17	N/A

At the time of the inspection, EURICE1 and EURICE 2 engines were operating and appeared to be running properly. In the records review it was noted that urea rate seemed to be out of compliance based on the MAP normal operating conditions of 4-10 gal/hr. Additional hourly data and a phone conversation with Mr. Kowalski was requested. In the phone conversation from 12/10/2024, Mr. Kowalski noted that the normal operating conditions are for stack testing at maximum load and that there is a calculation based on the engine load, and pre and post SCR NOx measurements to ensure proper dosing. Additionally, there are alarms in place to notify when improper dosing is happening. We recommended that the MAP be updated to reflect normal operating conditions per SC 3.1, and to include ranges during low, medium and high operating conditions, as well as add explanation on the calculation and alarms in place. Mr. Kowalski agree to update the MAP within two months for the ROP renewal. No malfunctioning equipment was observed, and all duct work appeared in good shape with no leaks.

FGENGINES are limited to 1,095 startup and shutdown events per 12-month rolling time period for each engine. The facility is required to keep records of the 12-month rolling startup and shutdown events for each engine in FGENGINES. For the period 10/23 through 9/24, the 12- month rolling total stays between 325-400 startup and shutdown events.

FGENGINES were purchased as non-certified EPA engines. For non-certified engines, the facility is required to conduct performance tests, create a maintenance plan, and keep records of conducted maintenance performed. The maintenance plan is included in the MAP. Records were provided on all three engines for calendar years 2023 through September 2024. Maintenance conducted throughout the year occurred on both the engines and the SCR/oxidation catalyst system. A gas

component analysis report was provided from a sample collected on 06/07/2023 and on 04/06/2024. The reports state the weight percent of total sulfur in the gas is 0.0006.

Records were provided of the monthly fuel consumption and gross energy output from FGENGINEs. For the period 10/23 through 09/24, the average monthly fuel consumption per engine was 1,847,298 lbs, 2,033,007 lbs, and 2,345,350 lbs of natural gas, respectively, across the three engines and the average monthly gross energy output per engine was 5,221 MW, 5,624 MW, and 6,590 MW, respectively.

SC VII.5-6: A notification on the completion of installation of FGENGINEs was submitted on February 26, 2019. The notification also lists the manner of operation, which is non-certified per 40 CFR Part 60, Subpart JJJJ for all three engines.

SC VII.1-3: All three stacks for FGENGINEs appeared to be 65' in height. The diameter appeared to be no more than 63 inches in diameter. No visible emissions were observed.

FGENGMACT4Z

Flexible group for MACT ZZZZ requirements on EURICE1, EURICE2, and EURICE3.

SC 1: Compliance testing for CO or formaldehyde emission limits last occurred on 05/30/2024. All three engines were tested for formaldehyde for the MACT ZZZZ requirements and were well below the 14 ppmvd @ 15% O₂ formaldehyde limit. See summary table:

Source	Date	Average Engine Load	Pollutant	Permit Limit @ 15% O ₂	Test Result @15% O ₂
EURICE1	5/29/2024	18,943 kW	Formaldehyde	14 ppmvd	0.7 ppmvd
EURICE2	5/30/2024	18,861 kW	Formaldehyde	14 ppmvd	1.2 ppmvd
EURICE3	5/30/2024	18,888 kW	Formaldehyde	14 ppmvd	0.9 ppmvd

During the test, the average pressure drop across the oxidation catalyst for all three engines were 0.13 PSI. The facility has conducted two consecutive passing tests and is now only required to test annually for compliance with the CO or formaldehyde limit set forth by MACT ZZZZ standard, therefore the next MACT ZZZZ reporting requirement will be by 5/30/2025.

SC III, 1-5: The facility operates with a site-specific monitoring plan that provides normal operating ranges for performance parameters. All three engines are equipped with oxidation catalysts and SCR(s) with urea injection. As provided above, at the time of the inspection the pressure drop across the oxidation catalyst for EURICE1 was reading 0.1 PSI and EURICE2 was reading 0.09 PSI. This shows compliance with the requirement to maintain the catalyst so that the pressure drop across the catalyst

does not change by more than 2 inches of water from when the pressure drop across the catalysts were measured during the last performance test. Also, the inlet temperature to the reactor for each engine was reading between 748 F - 761 F. This shows compliance with the requirement of maintaining the exhaust for the catalyst inlet temperature to be greater than or equal to 450 F and less than or equal to 1350 F.

SC VI, 1-5: The control software for the engines monitors the performance parameters, including the catalyst inlet temperature, live. At the time of the inspection, the inlet temperature to the reactor for EURICE1 was 748 F and EURICE2 was 761 F.

A notification on the completion of installation of FGENGINEs was submitted on February 26, 2019. The notification also lists the manner of operation, which is non-certified per 40 CFR Part 60, Subpart JJJJ for all three engines.

Records of malfunctions and maintenance performed on the air pollution control equipment is maintained on file. Preventative maintenance work on the SCR and oxidation system is documented multiple times throughout 2023 and 2024.

Review of excess emissions reports show UMERc has not had any periods during which the CMS was out-of-control. Example records of hourly average catalyst inlet temperature recordings were provided. The records provided show the catalyst inlet temperature being maintained between 450 F and 1350 F. The facility also maintains records of the raw data that provides the average exhaust gas SCR inlet temperature every five minutes along with the gross MW. Example records of the raw data were provided. The raw data records show during standby power generation, the catalyst inlet temperature is between 450 F and 1350 F. Thermocouple calibration checks were performed for each engine in September of 2023 and 2024. There have not been any recorded malfunctions, nor a need for adjustments or maintenance on the CMS.

Records were provided showing compliance with the pressure drop across the catalyst measured monthly and demonstrating the pressure drop across the catalyst was within the operating limitation established during the most recent performance test.

FGNEHSAP5D

This process heater is less than 5 MMbtu/hr and is subject to the Gas 1 Fuel subcategory requirements for new boilers/process heaters.

EUHEATER1 only burns natural gas and the facility keeps on record the most recent fuel analysis collected during the most recent stack test on 04/06/2024 shows the weight percent of sulfur being 0.0006. UMERc also submitted a notice on 10/30/2018 for the startup of EUHEATER1, as required in 40 CFR 63.7545(c).

FGTANKS

This flexible group consists of a 20,000 gallon urea tank, 4,000 gallon propylene glycol tank, 7,000 gallon lube oil tank, and a 7,000 used lube oil tank. The facility keeps records of all material deliveries to each tank, including the date and the amount of material delivered.

FGHEATERS

The space heaters at the facility only burn natural gas. UMERC maintains monthly records of the amount of natural gas burned. The facility also maintains the manufacturer documentation showing the maximum heat input for each space heater, water heater, and air handling units.

CONCLUSION

Semiannual and annual reporting requirements have been done by the facility in a timely manner. Requirements listed in each emission unit; EURICE1, EURICE2, and EURICE3 did not incur malfunctions, deviations or out-of-control CMS incidents during the current reporting period. Based on the full compliance evaluation (FCE) performed and the records reviewed, UMERC A.J. Mihm Generating Station is currently in compliance with MI-ROP-P0796-2020 and PTI No. 34-17C.



Image 1(NOx Analyzer) : Image of the NOx analyzer for Mihm EURICE 1



Image 2(Urea inlet) : Inlet for the urea fluid for EURICE 2

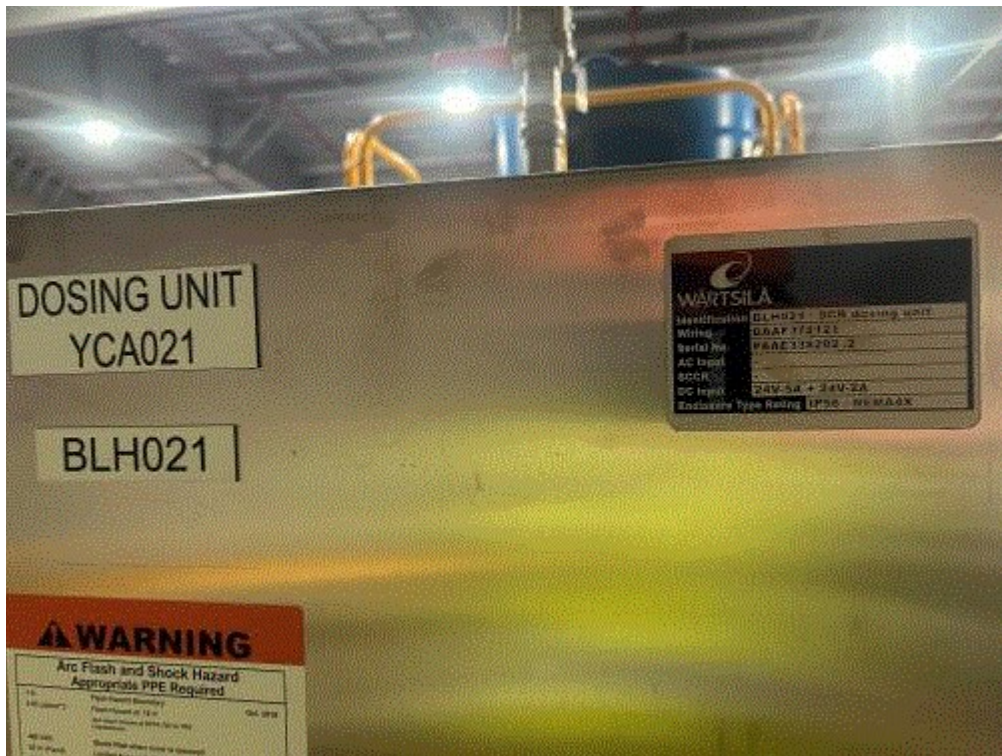


Image 3(Urea dosing unit) : Urea dosing unit for EURICE 2



Image 4(NOx sensor unit) : Pre reactor NOx sensor unit for EURICE2



Image 5(SRC stack) : Pre-SRC release stack



Image 6(SRC control unit) : SRC control unit and stacks



Image 7(Engine control) : EUMERGEN engine control screen showing total engine hours

[illegible]

Image 8(Nameplate) : EUMERGEN nameplate

NAME _____

DATE 12-10-24

SUPERVISOR _____