

State Registration Number
P0796

**RENEWABLE OPERATING PERMIT
STAFF REPORT**

ROP Number
MI-ROP-P0796-2020

**Upper Michigan Energy Resources Corporation
A.J. Mihm Generating Station**

State Registration Number (SRN): P0796

Located at

16017 Sarya Road, Pelkie, Baraga County, Michigan 49958

Permit Number: MI-ROP-P0796-2020

Staff Report Date: December 16, 2019

This Staff Report is published in accordance with Sections 5506 and 5511 of Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451). Specifically, Rule 214(1) of the administrative rules promulgated under Act 451, requires that the Michigan Department of Environment, Great Lakes, and Energy (EGLE), Air Quality Division (AQD), prepare a report that sets forth the factual basis for the terms and conditions of the Renewable Operating Permit (ROP).

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DECEMBER 16, 2019 - STAFF REPORT

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Purpose

Major stationary sources of air pollutants, and some non-major sources, are required to obtain and operate in compliance with an ROP pursuant to Title V of the federal Clean Air Act; and Michigan's Administrative Rules for Air Pollution Control promulgated under Section 5506(1) of Act 451. Sources subject to the ROP program are defined by criteria in Rule 211(1). The ROP is intended to simplify and clarify a stationary source's applicable requirements and compliance with them by consolidating all state and federal air quality requirements into one document.

This Staff Report, as required by Rule 214(1), sets forth the applicable requirements and factual basis for the draft ROP terms and conditions including citations of the underlying applicable requirements, an explanation of any equivalent requirements included in the draft ROP pursuant to Rule 212(5), and any determination made pursuant to Rule 213(6)(a)(ii) regarding requirements that are not applicable to the stationary source.

General Information

Stationary Source Mailing Address:	A.J. Mihm Generating Station 16017 Sarya Road Pelkie, Michigan 49958
Source Registration Number (SRN):	P0796
North American Industry Classification System (NAICS) Code:	221112
Number of Stationary Source Sections:	1
Is Application for a Renewal or Initial Issuance?	Initial Issuance
Application Number:	201900152
Responsible Official:	Paul Spicer, Senior Vice President Power Generation 920-433-1275
AQD Contact:	Michael Conklin, Environmental Engineer 906-202-0013
Date Application Received:	August 30, 2019
Date Application Was Administratively Complete:	August 30, 2019
Is Application Shield in Effect?	Yes
Date Public Comment Begins:	December 16, 2019
Deadline for Public Comment:	January 15, 2020

Source 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 customers of Michigan's Upper Peninsula. A.J. Mihm Generating Station is one of two new electrical generation stations that are a part of a long-term solution to the shutdown of the coal-fired Presque Isle Power Plant located in Marquette, Michigan.

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. 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.

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.

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.

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

natural gas undergoes adiabatic cooling when the pressure is dropped coming from the natural gas transmission lines. The emergency engine and natural gas conditioning heater are permitted under PTI No. 34-17.

The following table lists stationary source emission information as reported to the Michigan Air Emissions Reporting System (MAERS) for the year 2018. Since this is a new facility that began operating in 2019, no MAERS reports were submitted for 2018. The first report to MAERS is not due until March 15, 2020, for the 2019 reporting year.

TOTAL STATIONARY SOURCE EMISSIONS

Pollutant	Tons per Year
Carbon Monoxide (CO)	NA
Lead (Pb)	NA
Nitrogen Oxides (NO _x)	NA
Particulate Matter (PM)	NA
Sulfur Dioxide (SO ₂)	NA
Volatile Organic Compounds (VOCs)	NA

The following table lists Hazardous Air Pollutant emissions as calculated for the year 2018:

Individual Hazardous Air Pollutants (HAPs) **	Tons per Year
Total Hazardous Air Pollutants (HAPs)	NA

**As listed pursuant to Section 112(b) of the federal Clean Air Act.

See Parts C and D in the ROP for summary tables of all processes at the stationary source that are subject to process-specific emission limits or standards.

Regulatory Analysis

The following is a general description and history of the source. Any determinations of regulatory non-applicability for this source are explained below in the Non-Applicable Requirement part of the Staff Report and identified in Part E of the ROP.

The stationary source is in Baraga County, which is currently designated by the United States Environmental Protection Agency (USEPA) as attainment/unclassified for all criteria pollutants.

The stationary source is subject to Title 40 of the Code of Federal Regulations (CFR) Part 70, because the potential to emit of any single HAP regulated by Section 112 of the federal Clean Air Act, is equal to or more than 10 tons per year and/or the potential to emit of all HAPs combined is equal to or more than 25 tons per year.

No emission units at the stationary source are currently subject to the Prevention of Significant Deterioration regulations of Part 18, Prevention of Significant Deterioration of Air Quality of Act 451, because at the time of New Source Review permitting the potential to emit of each criteria pollutant was less than 250 tons per year.

The best available control technology (BACT), for the RICE units, was determined to be good combustion practices (GCP) and oxidation catalyst systems installed as post combustion control. The VOC emissions from each electric generating unit engine cannot exceed 5.5 lb/hr. The VOC BACT limit is more stringent than the NSPS standard to ensure the engines operate with oxidation catalysts and achieve a 100% load VOC emission rate of less than 22 ppmvd at 15% O₂. For the emergency engine, the use of good

combustion practices to comply with the VOC emissions standard under 40 CFR Part 60, Subpart JJJJ represents BACT.

Toxic air contaminants (TACs) were modeled for Rule 225 using AERMOD for PTI No. 34-17. TAC impacts were evaluated based on generic modeling that was performed for all three RICE units. Each RICE was modeled with an emission rate of 1 pound per hour with the maximum impact per averaging time. The maximum generic impacts were multiplied by pollutant specific emission rates to calculate individual pollutant impacts. All TAC pollutants were below associated ITSL and/or IRSL levels. The pollutant closest to its screening level was formaldehyde at 27%. No TAC emission limits or recordkeeping were added to the permit conditions.

EURICE1, EURICE2, EURICE3, and EUEMERGEN at the stationary source are subject to the Standards of Performance for Stationary Spark Ignition Internal Combustion Engines promulgated in 40 CFR Part 60, Subparts A and JJJJ.

EURICE1, EURICE2, EURICE3, and EUEMERGEN at the stationary source are subject to the National Emission Standard for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines promulgated in 40 CFR Part 63, Subparts A and ZZZZ. In accordance with 40 CFR 63.6600(c), emergency stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions are not required to comply with the emission limitations in Tables 1a, 2a, 2c, and 2d to subpart ZZZZ or operating limitations in Tables 1b and 2b to subpart ZZZZ. To be considered as an emergency stationary RICE under Subpart ZZZZ, EUEMERGEN must be operated in accordance with the operating requirements in 40 CFR 63.6640(f).

EUHEATER1 at the stationary source is subject to the National Emission Standard for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters promulgated in 40 CFR Part 63, Subparts A and DDDDD.

The monitoring conditions contained in the ROP are necessary to demonstrate compliance with all applicable requirements and are consistent with the "Procedure for Evaluating Periodic Monitoring Submittals."

EUEMERGEN and EUHEATER1 do not have emission limitations or standards that are subject to the federal Compliance Assurance Monitoring rule pursuant to 40 CFR Part 64, because the units do not have potential pre-control emissions over the major source thresholds.

The emission limitation or standard for CO at the stationary source with the underlying applicable requirements of 40 CFR Part 63, Subpart ZZZZ, for each engine in FGENGINES, is exempt from the federal Compliance Assurance Monitoring (CAM) regulation pursuant to 40 CFR 64.2(b)(1)(i) because 40 CFR Part 63, Subpart ZZZZ meets the CAM exemption for NSPS or MACT proposed after November 15, 1990, and contains monitoring requirements for oxidation catalysts .

The following Emission Units/Flexible Groups are subject to CAM:

Emission Unit/Flexible group ID	Pollutant/ Emission Limit	UAR(s)	Control Equipment	Emission Unit/Flexible Group for CAM
Each engine in FGENGINES	NOx / 3.0 pph	R 336.1205 (1)(a) & (3) 40 CFR 52.21(c) & (d)	SCR	FGENGINES
Each engine in FGENGINES	NOx / 1.0 g/HP-hr or 82 ppmvd at 15% O ₂	40 CFR 60.4233(e) Table 1 to 40 CFR Part 60, Subpart JJJJ	SCR	FGENGINES

Emission Unit/Flexible group ID	Pollutant/ Emission Limit	UAR(s)	Control Equipment	Emission Unit/Flexible Group for CAM
Each engine in FGENGINES	CO / 5.5 pph	R 336.1205 (1)(a) & (3) 40 CFR 52.21(c) & (d)	Oxidation Catalyst	FGENGINES
Each engine in FGENGINES	CO / 2.0 g/HP-hr or 270 ppmvd at 15% O ₂	40 CFR 60.4233(e) Table 1 to 40 CFR Part 60, Subpart JJJJ	Oxidation Catalyst	FGENGINES

The emission limits for NO_x and CO, for each in engine in FGENGINES, with the underlying applicable requirements of Rule 205 and 40 CFR Part 60, Subpart JJJJ, are subject to the federal Compliance Assurance Monitoring rule under 40 CFR Part 64. Each RICE unit has pre-control PTE emissions of NO_x and CO over 100 tpy. PTE uncontrolled emission rates were calculated using AP Chapter 3.2: *Natural Gas-fired Reciprocating Engines* emission factors for 4-stroke lean-burn engines (SCC 2-02-002-54), with a maximum heat input rate of 152.3 MMBtu/hr and operating at 8760 hr/yr. Emission rates were calculated using the equations below.

$$4.08 \frac{\text{lb NO}_x}{\text{MMBtu}} (\text{EF at } 90 - 105\% \text{ Load}) \times 152.3 \frac{\text{MMBtu}}{\text{Hr}} (\text{Max Heat Input}) \times 8760 \text{ Hr} \times \frac{1 \text{ ton}}{2000 \text{ lb}} = 2720 \text{ tpy}$$

$$0.847 \frac{\text{lb NO}_x}{\text{MMBtu}} (\text{EF at } < 90\% \text{ Load}) \times 152.3 \frac{\text{MMBtu}}{\text{Hr}} (\text{Max Heat Input}) \times 8760 \text{ Hr} \times \frac{1 \text{ ton}}{2000 \text{ lb}} = 565 \text{ tpy}$$

$$0.317 \frac{\text{lb CO}}{\text{MMBtu}} (\text{EF at } 90 - 105\% \text{ Load}) \times 152.3 \frac{\text{MMBtu}}{\text{Hr}} (\text{Max Heat Input}) \times 8760 \text{ Hr} \times \frac{1 \text{ ton}}{2000 \text{ lb}} = 211 \text{ tpy}$$

$$0.557 \frac{\text{lb CO}}{\text{MMBtu}} (\text{EF at } < 90\% \text{ Load}) \times 152.3 \frac{\text{MMBtu}}{\text{Hr}} (\text{Max Heat Input}) \times 8760 \text{ Hr} \times \frac{1 \text{ ton}}{2000 \text{ lb}} = 372 \text{ tpy}$$

All other criteria pollutant emission rates were below 100 tpy. Each RICE unit is equipped with SCR for NO_x control and oxidation catalyst for CO and VOC control. The Rule 205 pound per hour emission limits for NO_x and CO are more stringent than the NSPS Subpart JJJJ limits to ensure the engines are installed and operated with the SCR and oxidation catalyst systems. The NSPS Subpart JJJJ limits for NO_x and CO are non-exempt CAM limits since they do not have any monitoring requirements for catalytic oxidizers and SCRs. Since each engine is subject to 40 CFR Part 63, Subpart ZZZZ, and contains a CAM exempt emission limit for CO, the facility may use monitoring requirements from 40 CFR Part 63, Subpart ZZZZ to satisfy CAM monitoring requirements for the CO emission limits in FGENGINES. The source will need to specify that this is presumptively acceptable monitoring in the CAM Plan. With this being an initial ROP and controlled PTE emission rates less than 100 tpy, a CAM Plan is not due until the submittal of the renewal ROP application. Thus, no CAM conditions and control monitoring parameters are stated in this ROP.

Please refer to Parts B, C and D in the draft ROP for detailed regulatory citations for the stationary source. Part A contains regulatory citations for general conditions.

Source-Wide Permit to Install (PTI)

Rule 214a requires the issuance of a Source-Wide PTI within the ROP for conditions established pursuant to Rule 201. All terms and conditions that were initially established in a PTI are identified with a footnote designation in the integrated ROP/PTI document.

Streamlined/Subsumed Requirements

This ROP does not include any streamlined/subsumed requirements pursuant to Rules 213(2) and 213(6).

Non-applicable Requirements

Part E of the ROP lists requirements that are not applicable to this source as determined by the AQD, if any were proposed in the ROP Application. These determinations are incorporated into the permit shield provision set forth in Part A (General Conditions 26 through 29) of the ROP pursuant to Rule 213(6)(a)(ii).

Processes in Application Not Identified in Draft ROP

In the application, UMERC lists equipment that is considered exempt from the requirement to obtain a PTI. The A.J. Mihm Generating Station is considered a greenfield site and a new major source of hazardous air pollutant (HAP) emissions. Based on this information, the use of exemptions specified in R 336.1280 to R 336.1291 are not applicable for this source pursuant to R 336.1278(2). In addition, when the project underwent New Source Review for PTI No. 34-17, the project emissions were greater than significant levels, as defined in R 336.119. This also excludes the use of exemptions specified in R 336.1280 to R 336.1291 pursuant to R 336.1278(1)(b). Therefore, the equipment listed on the EU-001 form in the application is not considered exempt from the requirement to obtain a PTI. UMERC has proceeded to submit an application to amend PTI No. 34-17 to include equipment that the company was considering exempt.

Draft ROP Terms/Conditions Not Agreed to by Applicant

This draft ROP does not contain any terms and/or conditions that the AQD and the applicant did not agree upon pursuant to Rule 214(2).

Compliance Status

The AQD finds that the stationary source is expected to be in compliance with all applicable requirements as of the effective date of this ROP.

Action taken by EGLE, AQD

The AQD proposes to approve this ROP. A final decision on the ROP will not be made until the public and affected states have had an opportunity to comment on the AQD's proposed action and draft permit. In addition, the USEPA is allowed up to 45 days to review the draft ROP and related material. The AQD is not required to accept recommendations that are not based on applicable requirements. The delegated decision maker for the AQD is Ed Lancaster, Marquette District Supervisor. The final determination for ROP approval/disapproval will be based on the contents of the ROP Application, a judgment that the stationary source will be able to comply with applicable emission limits and other terms and conditions, and resolution of any objections by the USEPA.

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JANUARY 24, 2020 - STAFF REPORT ADDENDUM

Purpose

A Staff Report dated December 16, 2019, was developed to set forth the applicable requirements and factual basis for the draft Renewable Operating Permit (ROP) terms and conditions as required by Rule 214(1) of the administrative rules promulgated under Act 451. The purpose of this Staff Report Addendum is to summarize any significant comments received on the draft ROP during the 30-day public comment period as described in Rule 214(3). In addition, this addendum describes any changes to the draft ROP resulting from these pertinent comments.

General Information

Responsible Official:	Paul Spicer, Senior Vice President Power Generation 920-433-1275
AQD Contact:	Michael Conklin, Environmental Engineer 906-202-0013

Summary of Pertinent Comments

No pertinent comments were received during the 30-day public comment period. However, questions were submitted regarding applicable requirements for the facility, the ROP review process, and if the engines have been tested for compliance with the emission limits. Responses to these questions were addressed and there were no further questions or comments.

Changes to the December 16, 2019 Draft ROP

No changes were made to the draft ROP.