

State Registration Number
P0797

**RENEWABLE OPERATING PERMIT
STAFF REPORT**

ROP Number
MI-ROP-P0797-2020

**Upper Michigan Energy Resources Corporation
F.D. Kuester Generating Station**

State Registration Number (SRN): P0797

Located at

80 Eagle Mills Road, Negaunee, Marquette County, Michigan 49866

Permit Number: MI-ROP-P0797-2020

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:	F.D. Kuester Generating Station 80 Eagle Mills Road Negaunee, Michigan 49866
Source Registration Number (SRN):	P0797
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:	201900153
Responsible Official:	Paul Spicer, Senior Vice President Power Generation 920-433-1275
AQD Contact:	Sydney Bruestle, Environmental Quality Analyst 906-236-3995
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 F.D. Kuester Generating Station is an electric utility plant located at 800 Eagle Mills Road, Negaunee Township, Marquette County, Michigan. The facility 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. The F.D. Kuester 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, MI.

The F.D. Kuester Generating Station is in a rural area of Marquette County that is currently in attainment for all criteria pollutants. Construction of the facility began in 2017 under Permit to Install (PTI) No. 35-17, and operation of the generating units began in March 2019.

The F.D. Kuester Generating Station generates electrical power through the operation of seven (7) 25,828 HP natural gas-fueled, 4-stroke spark ignition lean burn, reciprocating internal combustion engines (RICE) that are each coupled to a 19,260-kW electric generator. The facility also operates a 1,000-kW natural gas-fueled emergency generator and one 1.23 MMBtu per hour natural gas-fueled natural gas conditioning heater. 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.

Pollutants emitted from the combustion process of the 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 NO_x 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 seven (7) RICE are equipped with air quality control systems including selective catalytic reduction (SCR) for NO_x control and oxidation catalyst systems for CO, VOC, and HAP control. The SCR system reduces NO_x into N₂ and H₂O. The SCR at F.D. Kuester Generating Station is equipped with a 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 F.D. Kuester Generating Station is limited to 1,095 startup and shutdown events a year. All seven engines exhaust out one common stack.

The following table does not list stationary source emission information, as the facility began operation March 2019 and will report to the Michigan Air Emissions Reporting System (MAERS) for the year **2019**, in March 2020. Therefore, Emissions Values for each pollutant listed show Not Applicable (NA).

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

Individual Hazardous Air Pollutants (HAPs) **	Tons per Year
Ammonia	NA
Acetaldehyde	NA
Acrolein	NA
Formaldehyde	NA
Methanol	NA
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 Marquette 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 carbon monoxide, nitrogen oxides, particulate matter, and volatile organic compounds exceeds 100 tons per year and 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. 35-17. TAC impacts were evaluated based on generic modeling that was performed for all seven 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. No TAC emission limits, or recordkeeping were added to the permit conditions.

EURICE1, EURICE2, EURICE3, EURICE4, EURICE5, EURICE6, EURICE7 and EUEMERGEN at the stationary source is 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, EURICE4, EURICE5, EURICE6, EURICE7 and EUEMERGEN at the stationary source is subject to the National Emission Standard for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines promulgated in 40 CFR Part 63, Subparts A and ZZZZ.

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."

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
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 NOx 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 NOx 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 NOx control and oxidation catalyst for CO and VOC control. The Rule 205 pound per hour emission limits for NOx 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 NOx 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

There were no processes listed in the ROP Application as exempt devices under Rule 212(4). Exempt devices are not subject to any process-specific emission limits or standards in any applicable requirement.

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 17, 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:	Sydney Bruestle, Environmental Quality Analyst 906-236-3995

Summary of Pertinent Comments

No pertinent comments were received during the 30-day public comment period.

Changes to the December 16, 2019 Draft ROP

No changes were made to the draft ROP.