

January 4, 2023

Mr. Nathanael Gentle, Environmental Quality Analyst
Michigan Department of Environment, Great Lakes, and Energy – Air Quality Division
Bay City District Office
401 Ketchum Street, Suite B
Bay City, MI 48708

Also via e-mail at gentlen@michigan.gov

**Re: Consumers Energy Company's Muskegon River Compressor Station (N2901)
Response to Violation Notice, Dated December 15, 2022**

Dear Mr. Gentle:

Consumers Energy Company (CE) is providing this written response to the Michigan Department of Environment, Great Lakes, and Energy-Air Quality Division (EGLE-AQD) Violation Notice, dated December 15, 2022, in reference to an incident involving EUTURBINE2-2 located at CE's Muskegon River Compressor Station in Marion, Michigan.

Cited Violation:

Process Description – Initial performance test for formaldehyde emission rates from EUTURBINE2-2

Rule/Permit Condition Violated – PTI No. 16-21A, FGMACTYYYY, Special Condition V.1

EGLE-AQD Comments – An initial performance test for formaldehyde emission rates was required no later than September 5, 2022. The initial performance test was completed on October 6, 2022.

CE Response:

Background

Consumers Energy Company owns and operates a natural gas compressor station at 8613 Pine Road, Marion, (Clare County), Michigan known as the Muskegon River Compressor Station (MRCS). MRCS is used to maintain pressure of natural gas to move it in and out of underground natural gas storage reservoirs and along the pipeline system. MRCS meets the criteria of a major stationary source under the federal Clean Air Act and operates in accordance with the requirements of Michigan's Renewable Operating Permit (ROP) MI-ROP-N2901-2020 and Permit to Install (PTI) 16-21A. The PTI was issued for the installation of a lean, pre-mix natural gas-fired Solar Taurus 70 turbine, rated at 11,419 hp (EUTURBINE2-2). The turbine is equipped with dry, low-NO_x (SoLoNO_x) combustion control. EUTURBINE2-2 was installed to

replace the functionality of retired equipment and increase reliability of the station during the winter withdrawal season. The winter withdrawal season typically runs from December – March; however, this varies each year depending on the weather/customer demand. As a result, this engine does not typically operate from March to December of a calendar year.

EUTURBINE2-2 is subject to 40 CFR Part 60, Subpart KKKK and, as of March 9, 2022, 40 CFR Part 63, Subpart YYYY. Engineering, procurement, construction and commissioning is a multi-year process. Construction of EUTURBINE2-2 began in 2021 and initial startup (first fire) occurred on February 9, 2022. Commissioning of the unit was partially completed in February and March 2022; however, commissioning could not be completed prior to the end of withdrawal season which concluded on March 16, 2022. EUTURBINE2-2 was shut down at that time, with very little run time. Commissioning was scheduled to recommence during the 2022-2023 winter withdrawal season beginning in December 2022.

Between March and June 2022, CE worked with Solar, industry partners and emission testing contractors to prepare the required monitoring petition, which, pursuant to §63.6120(e), *must be approved or disapproved prior to conducting the initial performance test*, and schedule the initial performance test. We submitted our parameter monitoring petition to EPA on June 10, 2022. Based on several factors, including: (1) the unit is brand new and there was no identified risk associated with meeting emission limits, (2) Solar/testing contractor availability, (3) comply with the September 5, 2022 test deadline, and (4) allowing time for EPA to review the required parameter monitoring petition, the initial performance test was scheduled for the week of August 29, 2022.

Please note that EUTURBINE2-2 did not operate between March 16, 2022 and August 30, 2022 and was only brought on-line to conduct this testing. The turbine had operated for less than one month at this juncture. CE attempted to operate the centrifugal compressor supported by EUTURBINE2-2 in an abnormal operating condition¹ (AOC) using a closed-loop configuration, as natural gas field conditions and customer demand do not currently support typical operation during the summer months. CE had a representative from Solar, the turbine manufacturer, onsite to assist with the AOC and to help troubleshoot, if necessary.

Prior to conducting the performance test, formaldehyde and methane concentrations were observed to be higher than expected. To investigate, carbon monoxide (CO), nitrogen oxide (NO_x) and diluent (oxygen, or O₂, and carbon dioxide, or CO₂) concentrations were measured and reviewed.² Solar began troubleshooting efforts to determine the cause of the elevated formaldehyde and methane concentrations. This included reviewing operating parameters and adjusting the air/fuel ratio. However, the formaldehyde and methane concentrations remained at high levels. Therefore, the unit was shut down and the initial compliance demonstration was not completed, as scheduled. CE formally sought a testing extension from EPA on September 2, 2022. EPA only formally denied the request in writing on December 6, 2022.

CE continued discussions with Solar on potential causes, and its theory was that, since the unit was only able to accumulate ≈200 operating hours prior to the end of the winter withdrawal

¹ Under this abnormal operating condition, the turbine can only operate for a limited amount of time before having to be shut down to minimize pressure in order to prevent equipment failure or safety hazards.

² Please note that NO_x, CO and diluent concentrations were as expected, with NO_x and CO in compliance with applicable limits.

season, the packing grease/oils within the exhaust duct/stack were still in the process of burning off, which was generating hydrocarbon emissions (including formaldehyde and methane) downstream from the turbine exhaust. According to Solar, a feasible burn-in period would be ≥500 hours. This is supported by the concept that the NO_x, CO and diluent were within expected ranges, and methane was observed to be higher than CO. According to Solar, elevated methane should coincide with elevated CO, and this was not observed. Further, various onsite personnel reported an unusual odor near the base of the EUTURBINE2-2 exhaust stack and in the vicinity of the stack test ports, with the odor described as burning plastic, paint, or oil.

Troubleshooting/Testing

Troubleshooting for EUTURBINE2-2 continued in September 2022, including continuing discussions with Solar and additional engineering resources (i.e., Burns & McDonnell and WorleyParsons). Activities included:

- Internal inspection - On September 7, 2022, CE and Solar personnel performed an internal visual inspection of the exhaust duct for possible oils/grease or other foreign materials that could be generating additional hydrocarbon emissions downstream from the turbine exhaust. The exhaust duct was clean and free of debris.
 - Nothing abnormal was identified inside of the exhaust duct. However, inspection of the burned insulation jacket for the exhaust duct drain valve revealed moisture and debris which was believed to be the cause of the odor identified in the exhaust stack and stack test ports. The valve had been left in the open position, and it should be closed when the turbine is in operation.
- Installed additional test port closer to the exhaust outlet nozzle of the turbine to help eliminate potential sources of contamination.
- Continuing to research material used in duct manufacturing (materials, SDS) to determine whether this could be the cause of the elevated formaldehyde.
- Weekly meetings with Solar, Burns & McDonnell and Worley Parsons to discuss ongoing activities and additional problem solving.
- Schedule/coordinate additional run time on unit per recommendation from turbine OEM (Solar). Please note that the turbine had to be operated in the AOC, using a closed-loop configuration.

Approximately 40 hours of additional run time was conducted during the week of October 3, 2022. As noted above, Solar thought we would need to get ~ 500 operating hours to properly break the unit in. The 40 hours of additional run time was the start to try to achieve this, and the plan was to test along the way to see if we could see a decrease in formaldehyde as operating hours increased. In our case, we saw a substantial decrease after an additional 40 hours. Emission testing was completed on October 6, 2022.

Summary of Test Results

Parameter	Units of Measure	Result	Emission Limit
Formaldehyde (CH ₂ O)	ppmvd @ 15% O ₂	39	≤91

The results verified compliance with the formaldehyde emission limit. We believe the root cause of the failure to successfully complete this stack testing event by the required deadline

was a lack of run time of the turbine within the 180-day period due to the seasonal need. In retrospect, our only solution to have achieved this compliance deadline would have been to run the turbine when it is not needed, combusting fuel and generating emissions unnecessarily or to not first fire the unit with only minimal operating days left in the compression season and avoid having seasonal, non-operating time eat away the 180-day testing period. CE is working with its internal stakeholders and external contractors to ensure a similar situation does not occur again at MRCS or other CE owned and operated compressor stations when similar work is scheduled.

Consumers Energy takes great pride in being a strong, ethical corporate citizen and environmental steward in the communities it serves. This incident was isolated in nature and no emission limits were exceeded. If you have any questions, or would like additional information, please contact me or Amy Kapuga at Amy.Kapuga@cmsenergy.com or 517-788-2201.

Sincerely,

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Avelock Robinson
Consumers Energy Company
Director, Gas Compression Operations

cc: Ms. Jenine Camilleri, Enforcement Unit Supervisor, EGLE, PO Box 30260, Lansing, MI 48909-7760
Mr. Scott Sinkwitts, Corporate Counsel, CE
Ms. Janet Simon, Mgr. Compression
Mr. Jared Martin, Executive Director of Gas Asset Management, CE
Mr. Edmund Willoughby, Direct of Gas Compression Engineering, CE
Ms. Amy Kapuga, Senior Engineer – CE Air Quality
Mr. James Walker, Senior Engineer Lead – CE Air Quality
Mr. James Roush, Director of Environmental Regulation and Strategy, CE