

MALFUNCTION ABATEMENT PLAN (MAP)

for

Metro Energy, LLC

**Detroit Metro Airport, Building #821
Romulus, Michigan**

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1.0 BACKGROUND

The development of a Malfunction Abatement Plan (“MAP”) is required by Rule 911 (R. 336.1911) of the state of Michigan’s Air Pollution Control Rules. In Rule 911, EGLE states that all sources of air contaminants must prepare a MAP to prevent, detect, and correct malfunctions or failures resulting in excess emissions. The MAP is also used to describe the documentation and reporting requirements when a malfunction occurs. This MAP has been developed in accordance with Rule 911 for the Metro Energy, LLC (Metro) three natural gas-fired engines in FG001 (Emission Units EU001, EU002, and EU003).

2.0 DESCRIPTION OF SYSTEM

FG001 is three lean burn, natural gas-fired, spark ignition, reciprocating internal combustion engines, each rated at 48.3 MMBtu/hr and equipped with catalytic oxidation controls. These emission units are in the Midfield Terminal Energy Facility portion of the Wayne County Airport (ROP Source M4174).

These units each have a Süd-Chemie DO 6 oxidation catalyst for their control device. If the control device was not functioning properly, the potential emissions of carbon monoxide could exceed major source threshold level. The control efficiency may be as high as 87.9% according to the manufacturer of the catalyst. The manufacturer recommends that the temperature before the catalyst be higher than 300°C (572°F) and a maximum of 600°C (1112°F).

The catalyst bed for each engine is passive in nature. Because the exhaust gas from the engine is already at an elevated temperature, no additional heating of the exhaust gas is necessary for oxidation to occur. Because combustion in each engine cylinder is significantly fuel lean, oxygen is already present in the exhaust gas in quantities necessary to avoid requiring the introduction of additional air to the exhaust stream. Because the engines force the exhaust gas through the catalyst beds, an exhaust fan is not necessary.

3.0 PREVENTATIVE MAINTENANCE PROGRAM

3.1 Responsible Personnel

The Metro Plant Manager and General Manager are responsible for ensuring that Metro operates in compliance with all environmental and safety requirements and regulations. The Plant Manager is responsible for overseeing the inspection, maintenance, and repair of the engines and are responsible for all operations at the plant, as well as on call 24 hours a day, every day to the operators when plant management is not on site.

Critical phone numbers are:

General Manager (Dennis Stewart)

586-864-2974

Plant Manager (TBD)

TBD

Lead Engineer (Daniel Scheer)

586-201-8041

3.2 Inspections/Maintenance

The preventative maintenance inspections are completed at least annually. The engine manufacturer (Wartsila) can also be contracted to handle any abnormalities or malfunctions in the engine operation. All of the below activities are tracked and logged in Benchmate, Metro's computerized maintenance system.

Wartsila Engines:

- Daily check operation of pre-lube pumps.
- Rotate engine crankshafts twice a week.
- Weekly check coolant temperatures and check oil levels.
- Every 15 days operate generators, check and log operating values and check pressure drop indicators.
- Monthly re-grease pre-lubricating pump under running condition, check draining of air coolers, water cleaning of turbo compressor.
- Semi-Annually take coolant samples for analysis for each generator.
- Semi-Annually take oil sample for analysis on each engine and generator.
- Semi-Annual Infrared Scanning performed by third party.
- Semi -Annual Vibration Analysis performed by third party.
- Quarterly battery maintenance.
- Annual Third Party switchgear battery maintenance.
- Annually take oil sample for analysis on each engine and generator, functional test of safety system, clean starting air filters, Geislinger coupling oil change, centrifugal gas filter, leak check gas train, replace lube oil filters, replace gas filters, clean and check condition of extension, clean and check the pre-chamber no-return valves, clean the charge air coolers, check connectors and cables, check exhaust system for leaks, inspect starting motors, check function and calibrate waste gate valve and actuator, and clean pre-chamber nozzles.
- Annual utility failure test.
- Annual calibration of thermocouples.

Wartsila Start Air Compressors:

- Annual Oil Changes.
- Annual coupling inspection.
- Annual calibration of pressure switches.
- Semi-Annual Infrared Scanning performed by third party.
- Semi -Annual Vibration Analysis performed by third party.

Make-up Air Units for Wartsila Engines:

- Annual Inspection and grease bearings, as needed replace filters and drive belts.

Süd-Chemie DO 6 Oxidation catalysts:

- Regular checks of the catalyst must be carried out to look for damage to the catalysts or deposits on the catalysts. The inspection can be a visual inspection. If deposits or blockages are found, there are cleaning steps in the catalyst manual.

3.3 Replacement Parts

Specific replacement parts may be ordered directly from the manufacturer, but oil, filters, belts, and thermocouples are kept onsite. A replacement catalyst is not kept on hand at the facility. If the catalyst is suspected of being fouled or poisoned, a replacement Süd-Chemie DO 6 oxidation catalyst can be ordered from Clariant. Most parts can be shipped within 24 hours of ordering. A complete list of parts and catalog numbers is included in the equipment operating manuals.

4.0 MONITORING REQUIREMENTS

The Wartsila engines are exercised every fifteen days, and when the McNamara airport terminals or Westin Hotel need a backup source of electricity. When the engines are operating, the catalyst bed inlet temperature and outlet temperature are recorded in order to ensure that the catalyst bed is functioning. A temperature increase should always be seen between the inlet and the outlet; a typical increase is 5-10°F. When the temperature change is zero or temperature decreases between inlet and outlet, this is an indication that the catalyst is not functioning and the unit needs to be taken offline to investigate. The operator logs the following monitoring information on the Wartsila Catalytic Converter Log

1. Date of engine operation
2. Engine number operating
3. Load, MW
4. Catalyst Bed Inlet Temperature, °F
5. Catalyst Bed Outlet Temperature, °F
6. Name of Operator

5.0 CORRECTIVE ACTION PROCEDURES

If a malfunction or failure occurs and it cannot be corrected by an operator, then the affected portion of the facility shuts down until the malfunctioning equipment can be repaired or replaced.

6.0 Revision History

Date	Description
7/15/2019	New Malfunction Abatement Plan written