WASTE MANAGEMENT OF MICHIGAN, INC.

VENICE PARK RECYCLING AND DISPOSAL FACILITY (N5910)
LENNON, MICHIGAN

PREVENTATIVE MAINTENANCE / MALFUNCTION ABATEMENT PLAN

Description of the Equipment

Waste Management operates two internal combustion engines for combusting treated landfill gas to produce electricity. The engines are CAT G3516 LE internal combustion engines and are identified as Emission Units EUWMENGINE1 and EUWMENGINE2 in Renewable Operating Permit No. MI-ROP-N5910-2015. Both engines are equipped with automatic air to fuel ratio controllers (AFRC).

Equipment Inspection

Table 1 provides the Engine Plant items or conditions that are inspected and the normal operating range (where applicable), the frequency of the inspections, and the procedures followed to aid in the prevention of a malfunction.

Table 1
List of Engine Plant Prevention / Detection Items

Item or Conditions to Be Inspected and Normal Operating Range	Frequency of Inspection /Monitoring	Procedures to be Followed to Aid in the Prevention of Malfunctions
Engine Air Cleaner Element	Based on Engine Performance	Replace
Engine Oil	1000 hours	Change
Engine Oil Level	Weekly	Check engine oil level (Auto fill)
Engine Hours	Weekly	Record
Engine Oil Temperature	Weekly	Record
Oil Filter Differential Pressure	Weekly	Record
Fuel Metering Valve	Based on Engine Performance	Check @ 6,000 hours
Throttle Control Valve (760-785 KW)	Based on Engine Performance	Check
Cooling System Coolant Level	Weekly	Coolant level alarm/sight glass

Item or Conditions to Be Inspected and Normal Operating Range	Frequency of Inspection /Monitoring	Procedures to be Followed to Aid in the Prevention of Malfunctions
Cooling System Coolant Temperature (232-260 degrees F)	Weekly	Record
Cooling System Coolant Pressure (10-18-psi)	Weekly	Record
Fumes Disposal Filter (Crankcase Vent) (<0.5" water column)	Every 6 months of service	Change Filter
Generator Load (800-820 KW)	Weekly	Record
Voltage and Frequency	Weekly	Record
Walk-Around Inspection	Weekly	Conduct Walk-Around Inspection
Battery Electrolyte Level (equalize monthly)	Every 6 months of service	Check battery electrolyte level
Engine Oil Sample	Weekly	Obtain engine oil sample
Belts (Radiator)	Every 12 months	Inspect/Adjust/Replace
Engine Crankcase Breather	Based on Engine Performance	Clean as needed
Engine Oil Filter	1000 hours	Change engine oil filter as needed
Engine Valve Lash and Bridge	Every 1,600 hours	Adjust as needed
Radiator	Based on Engine Performance	Clean/wash as needed
Valve Stem Projection	Based on Engine Performance	Measure/Record-random inspection after baseline
Water Pump	Based on Engine Performance	Inspect
Bearing (Ball)	Based on Engine Performance	Lubricate
Compressor Bypass	Based on Engine Performance	Check
Generator	Based on Engine Performance	Inspect
Ignition System Spark Plugs	1000 hours	Inspect/Replace
Crankcase Blow-by (<0.5" water column)	Performance based	Measure
Turbocharger	Every 6,000 hours of service	Inspect
Overhaul	Based on Engine Performance, 1 time per year	Top End Overhaul
Overhaul	Between 40,000 and 50,000 hours of service	In-Frame Overhaul

Item or Conditions to Be Inspected and Normal Operating Range	Frequency of Inspection /Monitoring	Procedures to be Followed to Aid in the Prevention of Malfunctions
Overhaul	Between 80,000 and 90,000 hours of service	Major Overhaul
Engine Control Panel		
Amps	Daily	Check/Record
Kilowatts (800 -825 kwh)	Daily	Check/Record
Volts	Daily	Check/Record
Hertz	Daily	Check/Record
Power Factor	Daily	Check/Record
Energy Meter	Daily	Check/Record
Utility Panel		
Amps	Daily	Daily Readings/Record
Volts	Daily	Daily Readings/Record
Kilowatts	Daily	Daily Readings/Record
Energy Meter	Daily	Daily Readings/Record
Engine Room		
Manifold Air Temperature	Weekly	Check/Record
Engine Exhaust Temperature (800-1000 degrees F)	Weekly	Check
Manifold Pressure	Weekly	Check
Intake Air Temperature	Weekly	Check/Record
Day Tank Level	Weekly	Check

Corrective Procedures

A number of unexpected events can result in an engine shutdown/malfunction, such as power interruptions, excessive engine detonation and vibration, high levels of oxygen in the landfill gas, engine or component failures, and acts of nature. These conditions will trigger an automatic shutdown of the engine, gas compressor or whole plant. An alarm and panel light will be activated, and the Plant Manager will be notified automatically through an autodialer that there is an issue that requires attention. The Plant Manager is required to respond to the alert and troubleshoot and correct the cause of the unexpected shutdown. In the event of a lengthy shutdown, landfill gas that would normally be combusted by the engine will be diverted to the standby utility flare located adjacent to the plant.

The operation of the AFRC is controlled by setting a number of variables based on engine load. Once these variables are set, the air to fuel ratio control will automatically adjust to maintain a consistent load on the engine. The variables that are set include

manifold air temperature, manifold air pressure, and kilowatt output of the engine. A handheld controller with internal diagnostics is used on a regular basis to identify any fault codes that may exist. If fault codes are indicated, immediate steps are taken to resolve the situation creating the fault.

Replacement Parts

To facilitate quick replacement, the spare or replacement parts necessary for proper engine operation and routine maintenance will be located on site at each generation facility (specialty parts will be ordered as needed). Inventory may vary from time to time, however, the major replacement parts that shall be maintained in inventory will include cylinder heads, pistons, and sleeves, bearings, and turbochargers.

Supervisory Personnel

The supervisory personnel responsible for overseeing the inspection, maintenance, and repair of the control equipment are:

Rich Kunze (primary)
Operations Manager
Waste Management Renewable Energy
231-220-4585

Tony Lindner (secondary)
Venice Park Plant Manager
Waste Management Renewable Energy
810-621-9118

Records Retention

Records shall be kept on file and retained as described in the permit. These records will be located in the gas plant office.

Plan Updates

Any updates to the Preventative Maintenance/Malfunction Abatement Plan shall be submitted to the MDEQ Air Quality Division District Supervisor for written approval as required by the permit.