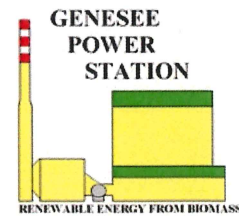


G5310 North Dort Highway
Flint, Michigan 48505
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Genesee Power Station



Preventative Maintenance and Malfunction Abatement Plan (PM/MAP)

In partial fulfillment of the requirements of the Renewable Operating Permit and its future revisions issued by the Michigan Department of Environment, Great Lakes and Energy (EGLE), Air Quality Division

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1. Scope

This written plan applies to Genesee Power Station LP (GPS), its employees, and hired contractors. This plan covers air pollution control and monitoring equipment at its electric generating facility located at G5310 North Dort Highway, Flint, Michigan.

2. Purpose

This written plan describes the practices used to operate, inspect, and maintain the pollution control and pollution monitoring equipment in such a way as to prevent equipment failures leading to excessive air pollutant emissions. This plan further describes in general terms the actions to be taken should an equipment malfunction occur. This plan fulfills the requirement of Renewable Operating Permit (also referred to as an air use permit) special condition C.EU-BOILER.III.3 which cites Rule 911 of the Michigan Air Pollution Control Rules (R336.1911).

The MAP serves to provide the following information as required by Rule 911(2):

- a) A complete preventative maintenance program, including identification of supervisory personnel responsible for overseeing the inspection, maintenance, and repair of air-cleaning devices, a description of the items or conditions that shall be inspected, the frequency of the inspections or repairs, and an identification of the major replacement parts that shall be maintained in inventory for quick replacement.
- b) An identification of the source and air-cleaning device operating variables that shall be monitored to detect a malfunction or failure, the normal operating range of these variables, and a description of the method of monitoring or surveillance procedures.
- c) A description of the corrective procedures or operational changes that shall be taken in the event of a malfunction or failure to achieve compliance with the applicable emission limits.

3. Definitions

- **Bottom Ash** – the heavier pieces of ash left over after combustion that tends to tumble off the inclined floor of the boiler combustion chamber when the floor (commonly referred to as the boiler grate) is shaken.
- **Continuous Emission Monitoring System (CEMS)** – the electronic measuring devices that detect and record several chemical components of the flue gas from the boiler. The components that are detected are oxides of nitrogen (NO_x), carbon monoxide (CO), and sulfur dioxide (SO₂). Particulates are measured as a percent opacity of the flue gas.
- **Electrostatic Precipitator (ESP)** – a device that removes fine, airborne particulate from the flue gas from a boiler furnace when exhaust gas is forced through it by means of an induced draft (ID)

fan. The particulate in the exhaust gas are attracted by electrically charged plates and then collected when the plates are mechanically shaken by heavy weights called rappers.

- **Fly Ash** – the lighter weight ash that exits the boiler furnace with the flue gas. This lighter ash is collected by the mechanical dust collector by means of centrifugal force and the ESP by means of an electromagnetic charged array of plates that the ash-laden flue gas is forced through.
- **Mechanical Dust Collector (MDC)** – a device and technique of collecting the heavier particles of fly ash by causing the exhaust gas stream to spiral quickly through multi-clone tubes much like water running down a drain. The centrifugal force exerted on the fly ash particles will pull them out from the exhaust gas stream and they will tumble down one of a bank of conical chutes to a collecting conveyor.
- **Selective Non-Catalytic Reduction (SNCR) System** – a device that reduces the emission of NO_x generated in the boiler furnace by injecting heated, atomized urea in the combustion chamber at temperatures over 1,500°F. The ammonium ions in the urea break down approximate half of the NO_x in the combustion chamber into nitrogen gas and water vapor.

4. Plan

4.1. Operating Philosophy

The operating philosophy which permeates the activities at GPS is that the generating plant is expected to remain available at all times for dispatch at a production level desired by the company's customer. Events occur from time-to-time which may threaten to interrupt that availability. Unless one of the following criteria is met, in descending order of importance, the generating plant will remain in operation.

- A. The safety of employees, contractors, visitors to the site, or the public at large is threatened.
- B. An emission of a permitted pollutant will exceed the permitted limit as described in the facility's air use permit.
- C. Equipment will fail or cause further, more serious equipment failures, and cause greater periods of unavailability.

This operating philosophy is the basis of the Malfunction Abatement Plan at GPS. If the safety of employees and others is not threatened and the emissions or discharges to the environment are not a possibility, equipment shall be inspected, serviced, and even replaced while the plant is still generating electricity.

4.2. Process Overview

GPS' electric generating facility uses predominantly biomass to fuel its spreader stoker boiler. The boiler has a capacity to consume 523 MMBtu/hour and produce 345,000 lb steam/hour. The steam generated is used to generate up to 35 MW/hour. To assist in the start up of the boiler and during times when the combustion of biomass is difficult GPS may burn natural gas. Boiler operators manage day to day operations and monitor both boiler and control equipment parameters through a Human Machine Interface (HMI) with the Distributed Control System (DCS).

Byproduct from the electric generation process has solid and airborne components. The waste airborne component contains NO_x, CO, SO₂, VOC, trace metallic particles, and particulate. Figure 1 presents the devices used and processes followed to minimize the release of these pollutants.

Pollutant	Control Strategy
NO _x	<p>SNCR system using urea injection. Urea shall be injected at a rate necessary to maintain compliance with the ROP NO_x emission limits.</p> <p>Efficiently operating the steam boiler to minimize the formation of NO_x in the combustion chamber (optimizing in concert with CO emissions).</p>
CO	Efficiently operating the steam boiler to maximize the complete combustion of the cellulose to carbon dioxide
SO ₂	Manage fuel according to the Fuel Procurement and Monitoring Plan
VOC	Strictly control the quality of the cellulose based fuel. Manage fuel according to the Fuel Procurement and Monitoring Plan.
Particulate	<p>MDC – captures the bulk of the heavier ash particles in the exhaust stream prior to entering the ESP</p> <p>ESP – operate the ESP in a manner that minimizes particulate emissions through maintaining the unit according to OEM recommendations.</p>

Figure 1: Pollutant Control Strategy

With the exception of VOCs the pollutants listed in Figure 1 are measured by a continuous emissions monitoring system (CEMS), and particulate opacity is measured with a continuous opacity monitor (COM). The CEMS is a network of extractive gas sampling probe, sample conditioner, three gas analyzers and one opacity monitor, and a data acquisition and handling system (DAHS). The CEMS and COM provides real time feedback to the operators through the DAHS as to the emissions of the generating unit and can be used to analyze and predict emission trends. The DAHS software interface, called "StackVision", an ESC, Inc. tool, has programmed alarm set-points for each monitored pollutant that alert operators when emissions are approaching permit limits to allow them to proactively take measures to ensure compliance.

4.3. Preventive Maintenance

GPS utilizes an electronic Maintenance Management Program (MMP) to schedule preventative maintenance activities. Daily rounds and/or inspections verifying proper operations may be documented on hard copy or within the MMP. Many meters and gauges are inspected at a frequency established to ensure the air cleaning machinery is operating correctly. Figure 2 provides an overview of those inspections and acceptable operation. If any anomalies are found during the inspections, appropriate steps are taken to bring the devices back into proper working order according to GPS' operating philosophy.

<i>Item to be inspected</i>	<i>Frequency</i>	<i>Normal Operating Range / Optimal Condition</i>	<i>Documentation</i>
BOILER			
Distribution Air Fan And Bearings	Daily	<160°F	Plant Operator Daily Rounds Log
Hydrograte Stoker Vibration System		Grease 2x daily	
Forced Draft Fan And Bearings		<160°F	
Overfire Air Fan And Bearings		<160°F	
Induced Draft Fan And Bearings		Cooling H ₂ O <120°F	
Fuel Feed Conveyor Belts Tracking And Tension		Satisfactory	
Disk Screen "Daisies" and Bearings	Satisfactory		
Reclaimer Drag Chain and Drive Chain	Satisfactory		
Gas Burner Valve Operations	Quarterly	Satisfactory	MMP PM
Fuel Feed System Gear Box Lubrication Level	Daily	Satisfactory	Plant Operator Daily Rounds Log
Distribution Air Fan	Semi-annual during outage	Inspections/ Calibrations to ensure within OEM specifications	Outage Maintenance Work Orders
Hydrograte, Boiler Water Walls, Superheater, Economizer, Air Heaters, Refractory			
Forced Draft Fan			
Overfire Air Fan			
Induced Air Fan			
Gas Burners			
Soot Blowers Monitor operation and steam supply pressure	Weekly	190PSI G All soot-blowers operational	MMP PM
SNCR			
Urea Storage Tank and Piping System	Daily	Visual check for leaks	Plant Operator Daily Rounds Log
Circulation module		° 90°F - °F 130°F and 20 - 40 psig	
Metering module		Satisfactory	
Distribution module's flow meters and balancing valves		Satisfactory	
Air pressure and cooling air to injectors		Satisfactory	
Service water supply to the metering module		>45 psig	

Item to be inspected	Frequency	Normal Operating Range / Optimal Condition	Documentation
Injectors	Semi-annual during outage	Inspections/ ensure within OEM specifications	MMP PM
Circulation pumps			
Circulation heater			
Metering pumps			
Mixing pumps			
MDC			
Integrity of seals on the access doors	Daily	Check for leaks	Plant Operator Daily Rounds Log
Operation of ash removal systems to ensure collected material is not amassing in hoppers		Temperature indicators of proper ash flow	
Multi-clone collector tubes for wear	Semi-annual during outage	Inspection	MMP PM
ESP			
Readings of the instruments in the ESP control panel (3 separate fields)	Daily	Spark/min <60SP Amperage <2 AMPS	Plant Operator Daily Rounds Log
Rappers to see that they are operating properly		No fault light indicators	
Level of insulating fluid in the xformer set tank		"N"ormal	
Operation of the ICVS fans and heaters		Satisfactory	
Ash hopper heaters		Satisfactory	
Signal lights		Satisfactory	
Remove dust and foreign matter from electrical equipment	Semi- annual during outage		MMP PM
Clean insulators in the high voltage insulator compartments	Semi-annual during outage		Outage MMP PM
Electrodes and collection surfaces as well as inspection of housing for holes and wear		Inspection	
Disassemble the electric rappers and inspect the high voltage system rapper shaft ceramic material for deterioration or cracking		NO electrical tracing evidence	
CEMS			
Instrument Air Pressure	Daily	80 psig	StackVision

Item to be inspected	Frequency	Normal Operating Range / Optimal Condition	Documentation
Calibration Air Regulator		38 PSIG	Plant Operator Daily Rounds Log
PermaPure Dryer Regulator		20 psig	
		N/A	
		N/A	
Sample Flow		~ lpm 6.0 LPM	
Oxygen Flow		~1 lpm	
Sample Pressure Through NOx Analyzer		<220 torr	
Sample Line Temperature		>0°F 275°F	
CEM Room HVAC		75°F ± 5°F	
Peristaltic Pump Running		Satisfactory	
Calibration Gas Tanks Pressure		>200 psig Replace tank	

Figure 2: Inspection List

4.4. Spare Parts

Major replacement parts are kept in case a critical piece of equipment on any of the air cleaning systems breaks down. A listing of this spare part inventory can be compiled by the GPS Materials Technician based on a wide variety of criteria. A physical inventory of these critical replacement parts is periodically conducted by the I/E Technician.

5. Corrective Action

GPS monitors boiler exhaust emissions with certified continuous emission monitoring systems (CEMS). Monitoring data from the pollutant analyzers is transmitted into a data acquisition and handling system (DAHS) which has coded alarm set points for when an emission limit is being approached as well as for when an emission limit is exceeded. Operators are required to take steps to minimize emissions according to site standard operating procedure, SOP-01, in the event of an emission alarm and or boiler/control equipment malfunction. Responses and corrective actions are to be properly coded within the DAHS as well. If maintenance is required as part of a corrective action, a work order shall be created in the maintenance management system.

6. Recordkeeping and Reporting Requirements

GPS will maintain this MAP onsite at the GPS facility. Records will be maintained for a period of at least five (5) years.

GPS will maintain the following records related to the MAP:

- Records of maintenance events, including the date and time of occurrence
- Records of actions taken during periods of malfunction to minimize emissions including corrective actions to restore malfunctioning equipment to its normal or usual manner of operation;
- Records of the occurrence and duration of each malfunction or abnormal operating condition
- Records explaining the reasoning of continuance of boiler operation if the boiler cannot be shutdown safely during a malfunction or abnormal operating condition.

In the event that there is an exceedance of an applicable emission standard in the current permit as a result of a malfunction or abnormal condition, the *EH&S Coordinator* will provide notice and submit a written report to the AQD District Office, as required by R 336.1912, as described below.

If there is evidence of an air contaminant above a permitted emission limit for more than two (2) consecutive hours, notice and a written report will be provided to the AQD.

- Prompt notice will be provided to the AQD District Office by reasonable means, such as electronic, by telephone, or oral communication as soon as possible, but not later than two (2) business days after the abnormal condition or malfunction is discovered.
- GPS will submit a written report within 10 days after correction of the abnormal condition or malfunction, or within 30 days of the abnormal condition or malfunction being discovered.

Written reports will contain the following information:

- Time and date, duration, and probable cause of the abnormal condition or malfunction
- Identification of the boiler or control equipment that experienced the abnormal condition or malfunction, and, where it is known or reasonably possible to estimate, the magnitude of emission in excess of the permitted emission limits.
- Description of measures taken and air pollution control practices followed to minimize emissions.

- Summary of actions taken to correct and prevent the recurrence of the abnormal condition or malfunction and the time taken to correct the malfunction.

7. Responsibilities

7.1. Plant Manager

- Oversee the inspection, maintenance, and repair programs of the air-cleaning devices and approval of non-routine repairs.

7.2. EH&S Coordinator

- Maintain this written plan and communicate all changes to appropriate regulatory agencies.

7.3. Operation Manager & Maintenance Manager

- Oversee the regular inspection and maintenance of the air cleaning devices.

7.4. Plant Operator

- Conducts the regular inspections of the air cleaning devices.

7.5. Maintenance Technician and I&E Technician

- Perform the regular maintenance of the air cleaning devices.
- Recommend non-routine repairs to the air-cleaning devices.

7.6. Materials Technician

- Maintain the inventory of major replacement parts for the air cleaning devices.

8. Related Documentation

1. Air Use Permit [MI-ROP-N3570-2018](#).

9. Procedure Revision History

If at any time the PM/MAP fails to address or inadequately addresses an event that meets the characteristics of a malfunction, GPS shall amend the PM/MAP within 45 days after such an event occurs. A current copy of the MAP will be maintained electronically or onsite at GPS.

This procedure is reviewed by the EH&S Coordinator and updated as needed. Updates are given on Figure 3 below.

Revision No.	Date	Revision Description
0	4/1/1999	Initial release.
1	3/9/2011	Completely rewritten and reformatted for clarity.
2	5/15/2013	Rewritten and reformatted for clarity, responsibility change and Annual Review
2	5/08/2014	Annual Review by Mitchell R. Hefner
3	4/23/2015	Updates to procedures, Annual Review
3	4/20/2016	Annual Review by Mitchell R. Hefner
3	4/05/2017	Annual Review by Mitchell R. Hefner
4	4/30/2019	Update with 2018 permit ID. Changed frequency of review of plan to "as needed". K. Cunningham
5	12/20/19	Added clarity on control equipment operations, updated new DAHS server, HMI, and MMP references, and Annual Review with new Environmental Lead (Roxanna Woodard). K. Cunningham
6	06/14/22	Updates to maintenance table and added new General Manager

Figure 3: Procedure Revisions

10. Procedure Approval

Latest Revision Prepared By: Roxanna Woodard	Date: 6/14/2022
Approved By: Tom Andreski	Date: 6/14/2022

End