



**SUMPTER POWER PLANT  
STARTUP, SHUTDOWN, AND MALFUNCTION ABATEMENT PLAN**

**PREPARED FOR:  
WOLVERINE POWER COOPERATIVE  
SUMPTER TOWNSHIP, MICHIGAN**

**JUNE 7, 2010  
UPDATED JULY 2015**

# TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
2.0	DEFINING STARTUP, SHUTDOWN, AND MALFUNCTIONS.....	2
3.0	EMISSION CONTROL DEVICE.....	2
4.0	SOURCE DESCRIPTION .....	2
5.0	RESPONSIBLE PERSONNEL.....	3
6.0	PREVENTATIVE MAINTENANCE PROGRAM, OPERATIONAL VARIABLES, AND CORRECTIVE PROCEDURES .....	3
6.1	Items Inspected and Operational Variables .....	3
6.2	Operation and Maintenance Schedule .....	4
6.3	Corrective Action .....	4
6.4	Preventative Maintenance Records.....	5
7.0	MAJOR PARTS KEPT ONSITE FOR QUICK REPLACEMENT.....	5
8.0	STARTUP AND SHUTDOWN.....	5

## LIST OF TABLES

Table 1	Source Description .....	2
Table 2	Responsible Personnel.....	3
Table 3	Inspection Table and Operational Variables .....	4

## LIST OF ABBREVIATIONS/ACRONYMS

CEMS	continuous emission monitors
cfm	cubic feet per minute
CO	carbon monoxide
CT	combustion turbines
DAS	Data Acquisition System
MAP	Malfunction Abatement Plan
MW	megawatt
N/A	not applicable
NO <sub>x</sub>	nitrogen oxides
O <sub>2</sub>	oxygen
PM	particulate matter
ppm	parts per million
ROP	Renewable Operating Permit
VE	visible emission

## 1.0 INTRODUCTION

This startup, shutdown, and MAP has been prepared to comply with the Wolverine Power Cooperative Sumpter Power Plant (Wolverine Power) ROP No. MI-ROP-M4854-2014, specifically, FG-Turbines Conditions III.1 and VI.9. The purpose of this document is to describe actions that will be taken at this facility: (1) to prevent excess emissions during startups, shutdowns, and malfunctions via scheduled maintenance; (2) identify any issues which could cause imminent malfunction; and (3) in the event of any sudden malfunction of equipment, as required by the ROP. To describe the steps to be taken to prevent excess emissions via scheduled maintenance of the equipment, this Plan is arranged in accordance with Michigan Air Pollution Control Rule 911.

Rule 911 states:

- (1) Upon request of the department, a person responsible for the operation of a source of an air contaminant shall prepare a malfunction abatement plan to prevent, detect, and correct malfunctions or equipment failures resulting in emissions exceeding any applicable emission limitation.
- (2) A malfunction abatement plan required by subrule (1) of this rule shall be in writing and shall, at a minimum, specify all of the following:
  - (a) A complete preventative maintenance program, including identification of the 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) A malfunction abatement plan required by subrule (1) of this rule shall be submitted to the department and shall be subject to review and approval by the department. If, in the opinion of the commission, the plan does not adequately carry out the objectives as set forth in subrules (1) and (2) of this rule, then the department may disapprove the plan, state its reasons for disapproval, and order the preparation of an amended plan within the time period specified in the order. If, within the time period specified in the order, an amended plan is submitted which, in the opinion of the department, fails to meet the objective, then the department, on its own initiative, may amend the plan to cause it to meet the objective.
- (4) Within 180 days after the department approves a malfunction abatement plan, a person responsible for the preparation of a malfunction abatement plan shall implement the malfunction abatement plan required by subrule (1) of this rule.

## 2.0 DEFINING STARTUP, SHUTDOWN, AND MALFUNCTIONS

The definitions for startup and shutdown are as follows:

**Startup** means the setting in operation of an affected source, or portion of an affected source, for any purpose.

**Shutdown** means the cessation of operation of an affected source, or portion of an affected source, for any purpose

Rule 113(a) defines a malfunction as:

Malfunction means any sudden, infrequent and not reasonably preventable failure of a source, process, process equipment, or air pollution control equipment to operate in a normal or usual manner. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.

A true malfunction must have a reasonable potential to cause an exceedance in emissions or operating parameter. Following is a list of malfunction events covered by this Plan.

- Failure of emission control system components, e.g., monitoring equipment and/or data acquisition equipment.
- Sudden and unavoidable failure of control or process equipment, not due to poor operation or maintenance.

## 3.0 EMISSION CONTROL DEVICE

Wolverine Power utilizes four natural gas-fired CTs, which inherently have low emissions; therefore, no air cleaning devices are employed. Each CT is equipped with technology called Dry Low NO<sub>x</sub> Burners to minimize NO<sub>x</sub> emissions, which is part of the integral design of each CT. Dry Low NO<sub>x</sub> Burner technology prevents the formation of NO<sub>x</sub>, as opposed to capturing and destroying NO<sub>x</sub> after its formation.

For the purpose of the preventative maintenance requirement in Rule 911(2)(a), Wolverine Power will perform normal and routine maintenance activities on the CTs to ensure their proper and reliable operation. Air emissions will be minimized by proper operation of the CTs.

## 4.0 SOURCE DESCRIPTION

Wolverine Power operates four natural gas-fired General Electric PG7121 (EA) simple cycle CTs, each with a nominal 83 MW electrical output, and each equipped with Dry Low NO<sub>x</sub> Burners.

**Table 1 – Source Description**

Startup, Shutdown, and Malfunction Abatement Plan  
Wolverine Power Sumpter Power Plant

Emission Source	Control Equipment	Emissions Controlled
FG-Turbines	4 Dry Low NO <sub>x</sub> Burners	NO <sub>x</sub>

## 5.0 RESPONSIBLE PERSONNEL

Primary responsibility for the operation, maintenance, and repair of the facility rests with the Chief Operator. The Chief Operator will direct plant personnel to perform repairs. Should the need arise, outside contractors may be brought in to complete repairs. The responsible personnel for this Startup, Shutdown, and MAP are listed in Table 2.

**Table 2 – Responsible Personnel**

Startup, Shutdown and Malfunction Abatement Plan  
Wolverine Power Cooperative Sumpter Power Plant

Position	Responsibility
Chief Operator	Overall operations and maintenance; responsible for overseeing the inspection, maintenance, and repair of the CTs.
Operations and Maintenance	Corrective actions, malfunction response, and routine inspections. Preventative maintenance inspections and repairs.
VP of Environmental Strategy	Company-wide environmental monitoring and oversight.
Outside Contractors	Calibration, repairs, and maintenance of emission control instrumentation.

## 6.0 PREVENTATIVE MAINTENANCE PROGRAM, OPERATIONAL VARIABLES, AND CORRECTIVE PROCEDURES

Preventative maintenance will include scheduled equipment inspections, replacement of parts in accordance with manufacturer recommendations and schedule, and maintaining an inventory of critical spare parts. To ensure normal operation of the CTs, some inspections of the plant equipment that would be done at least on a daily basis when the plant is in operation, are made when the operator performs his rounds. The inspections made during the operator's rounds include checks made to the plant control systems and checks for any physical problems, such as oil leaks or any disrepair. Normal lubrication of equipment is also performed. The plant employs CEMs for NO<sub>x</sub> to demonstrate compliance with the plant's NO<sub>x</sub> emission limits. Daily calibrations and other routine maintenance of these monitors are performed in accordance with the plant's Quality Assurance Procedures Monitoring Plan, as required by 40 CFR Part 75.

When necessary, contracts will be issued to outside vendors to conduct maintenance, repairs, and calibration for the NO<sub>x</sub> CEMS, which includes exhaust gas O<sub>2</sub> monitoring.

### 6.1 ITEMS INSPECTED AND OPERATIONAL VARIABLES

As the Dry Low NO<sub>x</sub> burners are integral to the CT design, the only things that are monitored beside the electric generating unit parameters and fuel flow are the NO<sub>x</sub> and O<sub>2</sub> emissions. Table 3 provides general information regarding 1) frequency of inspection, 2) normal operating ranges and monitoring of operational variables, and 3) corrective procedures for the air cleaning devices at Wolverine Power.

**Table No. 3 – Inspection Table and Operational Variables**

Startup, Shutdown, and Malfunction Abatement Plan  
Wolverine Power Sumpter Power Plant

Observation	Method of Observation	Normal Operating Range	Frequency of Observation	Comments
Fuel Flow	DAS	N/A	Continuous – measurements made at equally spaced intervals, not to exceed 15 minutes. Electronic DAS.	Parameters viewed by the plant operators on the control system operating video monitors and on the video monitors for the CEMs system.
NO <sub>x</sub>		6 – 9 ppm		
O <sub>2</sub>		14.9 – 15.2%		

DAS Data Acquisition System

N/A not applicable

ppm parts per million

## 6.2 OPERATION AND MAINTENANCE SCHEDULE

Operation and Maintenance of the CEMs is performed and recorded in accordance with the plant's Quality Assurance Procedures Monitoring Plan as required by 40 CFR Part 75. The inspections made during the operator's rounds, including checks made to the plant control systems and checks of the CT systems for any physical problems such as oil leaks or any disrepair, are conducted as part of the operator's daily routine. These daily inspections are not recorded. If a significant issue is identified during routine inspection, which causes or may cause excess emissions during plant operations, the operator will keep a log of that inspection and the corrective action taken.

## 6.3 CORRECTIVE ACTION

If a malfunction occurs which causes or may cause excess emissions during plant operations, the equipment causing the possible excess emission will be evaluated as soon as practicable in accordance with safe operating procedures to determine the proper procedure to correct the issue or to determine that the malfunction will not cause excess emissions.

The corrective procedures or operational changes used to ensure compliance with the emission limits involves careful monitoring of the CEM systems. If the unit has any difficulty during operation, such as mechanical or control system failure that results in high emissions, the first step will be to validate the data in an expeditious manner and determine the cause of the deficiency. Repairs or operational changes will be quickly assessed with the unit on-line for the purpose of minimizing emissions. Every reasonable and practical effort will be made to bring a malfunctioning unit back into compliance; however, if these efforts are unsuccessful or continued operation is dangerous either to equipment or personnel, the unit will be shut down and the problem corrected. If possible, the unit may be restarted during the calendar day and brought to normal operating loads to average in the lower emission of higher load operation along with the high emissions during start-up period to avoid any exceedances of the emission limits contained in the permit.

## **6.4 PREVENTATIVE MAINTENANCE RECORDS**

The following records will be maintained:

- Inspection records will include the date, findings, and corrective actions taken or repairs made, if necessary.
- All significant, unscheduled maintenance activities performed on the CTs. Records will include the date, findings, and corrective actions taken, or repairs made, if necessary.

## **7.0 MAJOR PARTS KEPT ONSITE FOR QUICK REPLACEMENT**

The principal replacement parts, to ensure the continued and reliable operation of the CTs, are primarily control system electronic cards. These control cards are usually kept onsite. Spare parts and materials for the CEM systems are also kept onsite. These would primarily include extra calibration gases and spare control circuit boards.

## **8.0 STARTUP AND SHUTDOWN**

Startup and shutdown will be performed in accordance with the equipment manufacturer's operating instructions. Following the Equipment Manual during periods of startup and shutdown ensures that safety and good air pollution control practices will be implemented.

Startup and shutdown of the turbines typically takes less than half an hour, and the CO limit in the ROP includes periods of startup and shutdown, which is due to implementing manufacturer's recommended startup and shutdown procedures. At all times during startup and shutdown events, the turbines will be operated in a manner consistent with safety and good air pollution control practices for minimizing emissions. Furthermore, following the turbine manufacturer's recommended procedures during startup and shutdown events ensure that the turbines will not need to be maintained more frequently and will protect the investment Wolverine Power has made into the turbines at the Sumpter Power Plant.

Wolverine Power is committed to equipment care and personnel safety during all phases of turbine operation.