

Malfunction Abatement Plan

(MAP)

for

Belle River Mills Compressor Station Natural Gas-Fired Combustion Turbines

**5440 Puttygut Road
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Appendices

- Appendix A: Blank Forms
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1 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, MDEQ 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 Belle River Mills Compressor Station’s three natural gas-fired turbines.

2 Description of System

Belle River Mills Compressor Station’s equipment currently includes one natural gas-fired 15,000 horsepower combustion turbine (Turbine #1) which has been in operation since 2007. The turbine is responsible for generating line pressure to assist the transmission of natural gas into and out of the gas storage field as well as to and from the pipeline transmission system in southeastern Michigan. The turbine is equipped with a low NOx combustor for NOx emission controls. It exhausts directly to the atmosphere through a rectangular exhaust duct.

There is a planned installation of two additional natural gas-fired turbines in 2016. Turbine #2 will be a 10,000 horsepower unit. Turbine #3 will be a 5,000 horsepower unit. Both of the new units are designed for low NOx emissions.

3 Preventive Maintenance Program

3.1 Responsible Personnel

The Station Manager is responsible for ensuring that Belle River Mills Compressor Station operates in compliance with all environmental and safety requirements and regulations. The Station Manager delegates day to day responsibilities for gas compressor station operations and maintenance to the Station Supervisor.

The Station Supervisor is responsible for overseeing the inspection, maintenance, and repair of the turbines and is responsible for all operations at the plant, as well as on call 24/7 to the operators (i.e. nights and weekends) when plant management is not on site.

Critical phone numbers are:

Station Manager (Transmission & Storage Operations)	(313) 256-6476
Station Supervisor	(313) 256-5821
Control Room	(313) 256-6980

3.2 Maintenance Inspections

Maintenance for the turbines is contracted with the turbine manufacturer. The preventative maintenance inspections are completed semi-annually. The turbine manufacturer is also contracted to handle any abnormalities or malfunctions in the turbine operation.

3.2.1 Semi-annual inspection (tasks may change based on turbine condition and operation)

1. Visually inspect all package gages and indicators, verify proper operation.
2. Check condition of T5 thermocouple harnesses. Check integrity of support grommets.
3. Remove and inspect igniter torch housing for cracks, excessive erosion; inspect discharge tube for chafing wear. Remove and inspect igniter cable. Inspect igniter plug for erosion for proper gap. Replace customer-supplied plug as necessary.
4. Check batteries for proper voltages, cell electrolyte levels, and perform an 8-hour equalizing battery charge. (High Rate)
5. Test and calibrate backup over speed devices
6. Verify K values of High T5 and T7 alarms and shutdown devices.
7. Assist customer with testing and calibration, as necessary all safety, warning, and package shutdown devices. (fr required-semi annually)
8. External visual inspection of intake and exhaust systems for damage, leaks and debris.
9. Inspect bleed valve and IGV's for full-open and full-close signals.
10. Check and calibrate IGV (Inlet Guide Vane) activation system.
11. Check oil cooler system for cleanliness and proper operation.
12. Record lube oil filter differential pressures, Inspect and replace lubricating oil filter elements, as necessary.
13. Inspect and test pre/post lube oil pump and backup lube oil pump.
14. Inspect starter clutch to ensure lock-up in one direction and free rotation in the other.
15. Assist customer in exchanging compressor bundle.

3.2.2 Annual Inspection (tasks may change based on turbine condition and operation)

1. Perform all tasks required in the semi-annual maintenance/inspection.
2. Assist in checking and calibrating switches, transmitters and shutdown devices.
3. Test and calibrate, as necessary, all safety, warning, and shutdown devices.
4. Replace customer-supplied lithium battery in processor (PLC). Adhere to supplier recommendations.
5. Check PT to Compressor alignment; realign as necessary. (If Vibration data dictates alignment check is necessary).
6. Inspect accessory drive through inspection covers and borescope, as applicable.
7. Perform borescope inspection of the Gas Producer.
8. Coordinate cleaning of entire package following maintenance inspection
9. Perform detergent wash of the Gas Turbine with detergent and DI water supplied by customer
10. Start and run turbine. Note any discrepancies and make any on-site adjustments or repairs to ensure normal performance and operation.
11. Using Testo record emissions levels (Tune Gas Producer as required).
12. Sample lube oil sump, ship to Analysts, Inc for laboratory analysis.
13. Assist in exchanging compressor bundle

4 **Monitoring Requirements**

Daily inspections of the system include an inspection of the control panel to check for failed or alarm conditions. The system is equipped with the following alarms:

1. Fuel system temperature and pressure
2. System Vibration
3. Shaft bearing temperature

4. Solonox system monitoring
5. Lube system temperature and level
6. Compressor seals flow
7. System startup terminated before sequence completed

5 Corrective Action Procedures

Precautionary measures to minimize excess emissions from the turbines will be implemented when they are experiencing a malfunction. These precautionary measures may include the following:

- If the malfunction results in turbine shutdown, determine the cause of the malfunction using the Control Panel or the Operators Manual located in the Control Room to diagnose the malfunction and identify the appropriate corrective action.
- If the malfunction does not result in turbine shutdown, determine the cause of the malfunction. If there is a potential for excess emissions, call the Environmental Contact for the Compressor Station to determine if the turbine should be shutdown for environmental purposes.
- Notify the appropriate responsible personnel at the facility of the malfunction so manufacturer/service representative may be contacted as necessary.

All malfunctions must be fully documented by completion of the Startup, Shutdown, & Malfunction (“SSM”) Event Form contained in **Appendix A**. If prompted by the Event Form, operator must also complete the SSM Report Form (**Appendix A**) and notify the DTE Environmental Contact.

**APPENDIX A
BLANK FORMS**

STARTUP, SHUTDOWN, AND MALFUNCTION EVENT FORM

To be completed for each SSM Event and retained for a period of five (5) years

Completed By: _____

Completion Date: _____

Location and Unit _____

Type of Event: check appropriate box

Startup

Shutdown

Malfunction, describe: _____

Time/Duration of Event:

Date & Start Time of Event: _____

Date & End Time of Event: _____

Duration of Event: _____

Actions Taken to Minimize Event:

Were steps taken to immediately correct malfunction?

Yes

No*

Were steps taken to minimize emissions from event?

Yes

No*

Were monitoring and control systems in operation?

Yes

No*

Were actions taken consistent with the SSM Plan / MAP?

Yes

No*

(If no, complete the SSM Report Form)

Please describe actions taken during SSM event and all reasons for answering **No** below:

Evaluation of Malfunction Event:

Did SSM Plan / MAP provide adequate procedures to address event?

Yes

No*

If **No**, provide recommendations for revision of SSM Plan / MAP in the spaces provided below.

If **No**, was an evaluation of the root cause of the malfunction made?

Yes

No*

If **Yes**, describe results of evaluation in space provided below.

If **No**, provide reasons for not performing evaluation in space provided below:

* IF YOU ANSWERED NO TO ANY OF THESE QUESTIONS, NOTIFY DTE ENVIRONMENTAL CONTACT IMMEDIATELY.

STARTUP, SHUTDOWN, AND MALFUNCTION REPORT

To be completed if SSM Event is inconsistent with or not addressed by SSM Plan or MAP

Facility Name: _____

Facility Address: _____

Reason for Using This Form (Choose one)

- Actions taken during SSM event were inconsistent with SSM Plan and/or MAP
 SSM event is not addressed in SSM Plan or MAP

Device: check appropriate box

- Engine
 Catalyst
 Temperature CPMS
 Pressure Drop CPMS
 Other - describe: _____

Date & Start Time of Event: _____

Date & End Time of Event: _____

Duration of Event: _____

Describe cause of SSM event:

Describe corrective actions taken during SSM event:

Describe reasons for taking these corrective actions during SSM event:

Were any units shutdown due to SSM event? Yes No

Name: _____

Title: _____

GIVE COMPLETED FORM TO DTE ENVIRONMENTAL CONTACT WITHIN 12 HOURS OF SSM EVENT

**APPENDIX B
COMPLETED FORMS**