

Startup, Shutdown, & Malfunction Plan (SSMP)

for

Gas-Fired Reciprocating Internal Combustion Engines and Oxidation Catalysts

located at

Belle River Mills Natural Gas Compressor Station (SRN# B6478)

**5440 Puttygut Road
China Township, MI 48054**

January 13, 2020

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Form A-1: Startup, Shutdown and Malfunction Event Form

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1 Plan Overview

A Startup, Shutdown, and Malfunction Plan (“SSMP”) is required by the Renewal Operating Permit (“ROP”) for the Belle River Mills Compressor Station (the “Station”), SRN# B6478, for the site’s two natural gas-fired reciprocating internal combustion engines that are used for the refrigeration plant and the associated oxidation catalyst systems. The SSMP shall be referred to as the “Plan”. The Plan addresses the required SSMP elements as specified by 40 CFR 63 Subpart ZZZZ, excluding the general SSMP requirements of 40 CFR 63 Subpart A which are not applicable to the Station pursuant to Table 8 of Subpart ZZZZ.

The purpose of this Plan is to describe the specific procedures to be followed should a problem or malfunction occur during the start-up, operation, and shutdown of the affected equipment. The Plan will ensure the equipment is operated in a manner consistent with safety and good air pollution control practices to minimize air pollution emissions at all times and ensure that malfunctions are corrected as soon as practicable in order to minimize emissions. The Plan is also used to describe the documentation, notification, and reporting requirements when an SSMP event occurs.

A copy of the current Plan is available at the Station (either a hard copy or in ‘Smart Sheets’ and is also stored electronically in Environmental Management & Resources’ (EM&R’s) SharePoint. Prior versions of the Plan must be maintained for a period of five years and are available in SharePoint. A copy of the Plan must be made available to Environment, Great Lakes, and Energy (“EGLE”) upon request.

The Station Manager, or their designee, is responsible for assuring that the most recent copy of the Plan is made available to personnel involved with the site’s operation and engine maintenance. This includes ensuring that the necessary employees are aware and trained in the procedures and requirements contained in the Plan. They are also responsible to assure that appropriate actions are taken as identified in the Plan and initiating necessary corrective actions to address any procedural failures.

2 Supervisory Personnel

Primary Contact (designee): Thomas Anderson, Belle River Mills Station Manager
Secondary Contact: Susan King, Supervisor, Transmission Operations

3 Equipment

The Plan covers the Belle River Mills site’s two natural gas fired reciprocating internal combustion engines and the associated oxidation catalyst systems. Specifically, the equipment includes:

- Two 1,480 hp, 4-stroke lean-burn (“4SLB”) engines equipped with oxidation catalyst;
- Differential pressure instrumentation to measure the pressure drop across each catalyst;
- A Continuous Parameter Monitoring system (“CPMS”) for measuring the inlet temperature to each oxidation catalyst, consisting of a thermocouple for each catalyst and a common data acquisition system (CPMS-T).

4 Equipment Inspection and Frequency

Routine monitoring, inspection and maintenance routines are performed as follows:

- Engines – Operating rounds are performed during each shift that the engines are in operation to check for leaks and look for any unusual operating conditions. The oil is checked periodically to detect maintenance problems that might be developing. Routine engine maintenance is performed at manufacturer recommended intervals and typically covers bearings, powerheads, combustion, etc. The engines are equipped by the manufacturer with controls that automatically shut down the engine if it should operate outside its normal operating ranges or otherwise malfunction.
- Catalyst – Pressure differential across the catalyst and the catalyst inlet temperature are monitored continuously when the associated engine is operating (see **Table 1** for actionable ranges). The catalyst is replaced based on manufacturer’s recommendations or if the catalyst was determined to be a factor in a stack test failure.
- Catalyst Inlet Thermocouple – Accuracy of the thermocouple for each catalyst inlet is checked once each calendar year and, if necessary, the thermocouple is replaced. Thermocouple accuracy must be within 1% of measured value or 2.8°C (5°F), whichever is higher.

Miscellaneous instrumentation components are maintained in stock at the site. Engine and catalyst replacement parts are not kept in site inventory but are readily available from the manufacturer or other suppliers.

5 Events Covered by the Plan

The Plan will be implemented whenever an abnormal event occurs. An abnormal event for the purposes of the Plan is any startup of an engine that does not follow the automated or manual procedures, does not reach or maintain acceptable catalyst conditions, and any malfunction of the equipment covered by this Plan as identified in **Table 1**.

Table 1 lists the potential events and the actions to be taken. All events, except catalyst replacement, must be fully documented by completion of the Startup, Shutdown and Malfunction Event or Report form in **Appendix A**. The Event form (A-1) is completed when the actions outlined in the Plan are successfully followed. The Report form (A-2) is completed when the actions outlined in the Plan are not successfully followed or the abnormal event that occurred is not identified in **Table 1**. The operators must complete the applicable form and notify the personnel identified on the form of the occurrence of the event within the time noted at the bottom of the form.

6 Plan Requirements and Revisions

The Plan requirements are listed below for actions that are consistent with the Plan, actions that are inconsistent with the Plan, and events that are not covered by the Plan. Documentation for each abnormal event should be completed using the appropriate form(s) in **Appendix A** and after completion saved in **Appendix B**.

Revisions to the Plan are required if the process operations or procedures change, an event occurs that is not in the Plan, the procedures do not minimize emissions during an event, or the procedures do not correct malfunctions as quickly as practical.

Copies of all Plan revisions and completed forms and checklists must be maintained for a period of five years.

6.1 Abnormal Event Identified in the Plan Occurs and Actions taken are Consistent with the Plan

Operators use the Event Form (A-1) to:

- Record time, date, and duration of the event
- Record a description of the event (if a malfunction)
- Record corrective actions taken during the event

DTE Environmental Representative

- Assess whether any ROP operating limits were exceeded during the event. If operating limits were exceeded, verify the written description of the actions taken on the event form are complete and accurate, attach a note listing which operating limits were exceeded, and include the reasoning as to why the actions taken during the event resulted in minimizing emissions.
- The completed Abnormal Event Form shall be stored in **Appendix B** and included in the next ROP certification, as applicable

6.2 Abnormal Event Identified in the Plan Occurs and Actions taken are Inconsistent with the Plan

Operators use the Report Form (A-2) to:

- Record time, date, and duration of the event
- Record the cause of the event
- Record corrective actions taken during the event
- Record the reason for taking the described actions during the event
- Record why the Plan was not followed
- Submit the Report to the DTE Environmental Representative within 24 hours of the event.
Note: Timing is important because the report must be reviewed and verified before reporting to EGLE within a two-day limit.

DTE Environmental representative

- Assess whether any ROP operating limits were exceeded during the event. If operating limits were exceeded, verify the written description of the actions taken on the event form are complete and accurate, attach a note listing which operating limits were exceeded, and include the reasoning as to why the actions taken during the event resulted in minimizing emissions.
- Review the Report and report it to the AQD district supervisor at the applicable EGLE district office via phone or fax report within two days of the event.
- Submit a written report to the AQD district supervisor within seven days of the event – The report must include: the actions taken during the event, a description of the event, a description of all excess emissions and/or parameter monitoring exceedances that are

believed to have occurred, name, title, and signature of owner/operator or other responsible official who is certifying accuracy of the Reports.

- Review the Plan procedures to determine if the Plan should be revised. If revisions to the Plan are required, the revisions must be completed within 45 days of the malfunction event.
- The completed Abnormal Report Form shall be stored in **Appendix B** and included in the next ROP certification, as applicable

6.3 Abnormal Event Occurs that is Not Covered by the Plan

Operators use the Report Form (A-2) to:

- Record time, date, and duration of the event
- Record the cause of the event
- Record corrective actions taken during the event
- Record the reason for taking the described actions during the event
- Record why the Plan was not followed
- Submit Report to the DTE Environmental Representative within 24 hours of the event. **Note:** Timing is important because the report must be reviewed and verified before reporting to EGLE within a two-day limit.

DTE Environmental Representative

- Review the Report and report it to the AQD district supervisor at the applicable EGLE district office via phone or fax within two days of the event.
- Revise the Plan within forty-five days after the abnormal event to include the abnormal event.
- The completed Abnormal Report Form shall be stored in **Appendix B** and included in the next ROP certification, as applicable

6.4 Plan Revisions

- There is no time requirement on Plan revisions unless the revision is required due to an event that occurred and was not in the original Plan or an event that occurred and the current procedure was inadequate. Revisions for inadequate or omitted procedures must be completed within 45 days.
- If the Plan is revised, it will not take effect until after a written notice describing the revision is provided to the applicable EGLE district office. At a minimum, revisions of the Plan must be reported in the next Report, which is submitted with the next ROP Compliance Certification Report. Revisions to the Plan are not considered revisions to the Title V permit.

**Table 1
Startup, Shutdown and Malfunctions Events**

BELLE RIVER MILLS COMPRESSOR STATION

	Abnormal Event	Response
Waukesha Engines (EUENGINE1-2)		
<p>START-UP: Successful start-up operation is considered the following: Engine startup is initiated, and the catalyst attains satisfactory operating temperature within thirty (30) minutes or less. Satisfactory operating temperature is between 450°F and 950°F.</p>	<p>Abnormal Start-Up Event includes the following:</p> <ul style="list-style-type: none"> • Engine stops before obtaining full operation and does not follow a successful shutdown procedure, or • Engine operates for more than 30 minutes without reaching satisfactory catalyst inlet operating between 450°F and 950°F. 	<ul style="list-style-type: none"> • Shut down engine and determine cause of problem • Notify Environmental Representative of potential problem • Operator documents the event using the applicable Startup, Shutdown and Malfunction Event or Report form in Appendix A if the shutdown took more than 30 minutes or if the engine operated for more than 30 minutes without reaching satisfactory catalyst inlet operating temperature.
<p>SHUTDOWN: Successful shutdown operation is considered the following: Engine shutdown is initiated, and engine stops within 30 minutes or less.</p>	<p>Abnormal Shutdown Event includes the following:</p> <ul style="list-style-type: none"> • Engine does not respond to shut down procedure, or • Engine operates for more than 30 minutes after engine shutdown procedure has been initiated. 	<ul style="list-style-type: none"> • Cutoff gas to engine and determine cause of problem • Notify Environmental Representative of potential problem within 12 hours • Operator documents the event using the applicable Startup, Shutdown and Malfunction Event or Report form in Appendix A if the shutdown took more than 30 minutes.
<p>MALFUNCTION: A malfunction is an abnormal operating condition that was not initiated through processes and is outside of the Operator's control.</p> <p>Note: Automatic control responses to malfunctions that occur as designed by the manufacturer are not abnormal events for environmental purposes unless excess emissions occur as a result.</p>	<ul style="list-style-type: none"> • Control Room alarm for engine shutdown sounds and automatic shutdown does not occur, or • fire, lightening, weather, and other Acts of God causes engine to operate outside the normal operating ranges and the engine does not automatically shut down. 	<ul style="list-style-type: none"> • If the malfunction does not result in engine 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 there is a potential for excess emissions, immediately call the Environmental Representative to determine if the engine should be shut down for environmental purposes. • Operator documents the event using the applicable Startup, Shutdown and Malfunction Event or Report form in Appendix A if the shutdown took more than 30 minutes.

**Table 1
Startup, Shutdown and Malfunctions Events**

BELLE RIVER MILLS COMPRESSOR STATION

	Abnormal Event	Response																														
Catalyst System																																
<p>Catalyst Installation and Removal: Although this is not an abnormal event, it is included in this table to document all catalyst change-outs.</p>	<p>Catalyst change-out is required based on manufacturer's guidelines or if determined to be a factor in a stack test failure.</p>	<ul style="list-style-type: none"> Follow the catalyst change-out procedure Call Environment Representative and let them know the catalyst has been changed so they can arrange to have a performance test conducted within the required 180 days. 																														
<p>Pressure Drop Outside Operating Range Note: This does not include catalyst pressure drop during normal startup and shut down of the engine (first 30 minutes after startup).</p> <p>After reaching normal operating levels, pressure drop across the catalyst must be within allowable pressure drop range established during the performance test. (Permit allows a maximum variation of ± 2 in H₂O from the test value.)</p> <p>Lower Limits: The average pressure drops determined during the performance test and the low pressure drop limits are:</p> <table border="1"> <thead> <tr> <th>Unit</th> <th>Test Value</th> <th>Lower permit limit</th> <th>Alarm</th> <th>Automatic shutdown</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2.0 in H₂O</td> <td>0.0 in H₂O</td> <td>0.4 in H₂O</td> <td>0.1 in H₂O</td> </tr> <tr> <td>2</td> <td>2.0 in H₂O</td> <td>0.0 in H₂O</td> <td>0.4 in H₂O</td> <td>0.1 in H₂O</td> </tr> </tbody> </table> <p>Upper Limits: The average pressure drops determined during the performance test and the high pressure drop limits are:</p> <table border="1"> <thead> <tr> <th>Unit</th> <th>Test Value</th> <th>Upper permit limit</th> <th>Alarm</th> <th>Automatic shutdown</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2.0 in H₂O</td> <td>4.0 in H₂O</td> <td>3.2 in H₂O</td> <td>3.5 in H₂O</td> </tr> <tr> <td>2</td> <td>2.0 in H₂O</td> <td>4.0 in H₂O</td> <td>3.2 in H₂O</td> <td>3.5 in H₂O</td> </tr> </tbody> </table>	Unit	Test Value	Lower permit limit	Alarm	Automatic shutdown	1	2.0 in H ₂ O	0.0 in H ₂ O	0.4 in H ₂ O	0.1 in H ₂ O	2	2.0 in H ₂ O	0.0 in H ₂ O	0.4 in H ₂ O	0.1 in H ₂ O	Unit	Test Value	Upper permit limit	Alarm	Automatic shutdown	1	2.0 in H ₂ O	4.0 in H ₂ O	3.2 in H ₂ O	3.5 in H ₂ O	2	2.0 in H ₂ O	4.0 in H ₂ O	3.2 in H ₂ O	3.5 in H ₂ O	<p>Pressure drop across the catalyst is not within allowable upper and lower permit limits established during the performance test and the associated engine is not shutting down successfully.</p>	<ul style="list-style-type: none"> Operator tries to shut down the engine in a successful manner (within 30 minutes of start of event) Notify Environmental Representative of potential problem within 12 hours Operator documents the event using the applicable Startup, Shutdown and Malfunction Event or Report form in Appendix A if the shutdown took more than 30 minutes.
Unit	Test Value	Lower permit limit	Alarm	Automatic shutdown																												
1	2.0 in H ₂ O	0.0 in H ₂ O	0.4 in H ₂ O	0.1 in H ₂ O																												
2	2.0 in H ₂ O	0.0 in H ₂ O	0.4 in H ₂ O	0.1 in H ₂ O																												
Unit	Test Value	Upper permit limit	Alarm	Automatic shutdown																												
1	2.0 in H ₂ O	4.0 in H ₂ O	3.2 in H ₂ O	3.5 in H ₂ O																												
2	2.0 in H ₂ O	4.0 in H ₂ O	3.2 in H ₂ O	3.5 in H ₂ O																												

**Table 1
Startup, Shutdown and Malfunctions Events**

BELLE RIVER MILLS COMPRESSOR STATION

	Abnormal Event	Response
Catalyst System (continued)		
<p>Temperature Outside Operating Range Note: This does not include catalyst temperature during normal startup and shut down of the engine (first 30 minutes after startup).</p> <p>The lower temperature limit in the Permit is 450°F. System is set to alarm at 700°F and automatically shut down at 650°F.</p> <p>The upper temperature limit in the Permit is 1350°F. System is set to alarm at 900°F and automatically shut down at 950°F.</p>	<ul style="list-style-type: none"> Temperature of the inlet gas to the catalyst is outside the operating temperature range (650°F-950°F) and the associated engine is not shutting down successfully. 	<ul style="list-style-type: none"> Operator tries to shut down the engine in a successful manner (within 30 minutes of start of event) Notify Environmental Representative of potential problem within 12 hours. Operator documents the event using the applicable Startup, Shutdown and Malfunction Event or Report form in Appendix A if the shutdown took more than 30 minutes.
<p>Malfunction: A malfunction is an abnormal operating condition that was not initiated through processes and is outside of the Operator's control</p> <p>Note: Automatic control responses to malfunctions that occur as designed by the manufacturer are not abnormal events for environmental purposes unless excess emissions occur as a result.</p>	<ul style="list-style-type: none"> Control Room alarm for engine shutdown will sounds and automatic shutdown does not occur, or fire, lightening, weather, and other Acts of God causes engine to operate outside the normal operating ranges and the engine does not automatically shut down. 	<ul style="list-style-type: none"> If the malfunction does not result in engine 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 there is a potential for excess emissions, immediately call the Environmental Representative to determine if the engine should be shut down for environmental purposes. Operator documents the event using the applicable Startup, Shutdown and Malfunction Event or Report form in Appendix A if the shutdown took more than 30 minutes.

APPENDIX A BLANK FORMS

- **Form A-1:** Startup, Shutdown and Malfunction Event Form is completed when the actions outlined in the Plan are successfully followed.
- **Form A-2:** Startup, Shutdown and Malfunction Report Form is completed when the actions outlined in the Plan are not successfully followed or the abnormal event that occurred is not identified in **Table 1**.

Form A-1

STARTUP, SHUTDOWN, AND MALFUNCTION EVENT FORM

To be completed for each Event that followed the actions noted in the Plan

Must be retained for a minimum period of five (5) years

Completed by _____

Completion Date _____

Facility Name: _____

Facility Address: _____

Type of event (circle one)
Startup Shutdown Malfunction (describe) _____

Time/Duration of Event: _____

Start Date & Time of Event: _____

End Date & Time of Event: _____

Duration of Event: _____

Were steps were taken to immediately correct event? (circle one) Yes No

Were steps were taken to minimize emissions from event? (circle one) Yes No

Were monitoring and control systems in operation during event? (circle one) Yes No

Were actions taken consistent with Plan? (circle one) Yes No

If No, describe corrective actions taken during event and complete SSM Report Form:

Did Plan provide adequate procedures to address event? (circle one) Yes No

If NO, provide recommendations for revision to Plan

Was an evaluation of root cause of event made? (circle one) Yes No

If yes, results of evaluation

If NO, reason for not performing evaluation

*** IF YOU ANSWERED NO TO ANY OF THE QUESTIONS ON THIS FORM,
NOTIFY DTE ENVIRONMENTAL CONTACT IMMEDIATELY.**

Form A-2

STARTUP, SHUTDOWN, AND MALFUNCTION REPORT FORM

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

Must be retained for a minimum period of five (5) years

Facility Name: _____

Facility Address: _____

Reason for using this form (circle one)

- Actions taken during event were inconsistent with Plan
- Event is not addressed in Plan

Affected Equipment: (circle one)

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

Start Date & Time of Event: _____

End Date & Time of Event: _____

Duration of Event: _____

Describe cause of event: _____

Describe corrective actions taken during event: _____

Describe reasons for taking these corrective actions during event: _____

Were any units shutdown due to event? (circle one) Yes No

Name: _____

Title: _____

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

APPENDIX B
COMPLETED FORMS

(forms to be kept a minimum of 5 years from date of completion)