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**ENGINEERED FUEL PELLETS TRIAL  
AMENDMENT TO THE  
PREVENTIVE MAINTENANCE  
AND  
MALFUNCTION ABATEMENT PLAN**



**L'ANSE WARDEN ELECTRIC COMPANY, LLC.**  
157 South Main Street  
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**Revised October 2017**

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## **SECTION 1**

### **INTRODUCTION**

#### **1.1 BACKGROUND**

The L'Anse Warden Electric Company, LLC. (LWEC) Facility ("the Facility") is located in L'Anse, Baraga County, Michigan. The Facility was previously a coal, oil, and gas-fired steam generating station and has been converted to burn biomass. In addition to the production of electrical energy the facility provides thermal energy to the adjacent CertainTeed Corporation (CertainTeed) facility.

The boiler is designed to burn a variety of fuels including wood chips, tire derived fuel (TDF), wood fines and bark, ground creosote-treated railroad ties and other creosote-treated wood derived fuel (CDF), and natural gas.

The Facility operates under the State of Michigan Renewable Operating Permit (ROP) Number MI-ROP-B4260, which was transferred to LWEC effective 5 July 2007. Construction activities were authorized under Permit to Install (PTI) 168-07, issued on 29 October 2007 and subsequent permit modifications.

PTI 53-17, issued on 18 August 2017 allows for a 180 calendar day trial use of engineered fuel pellets (pellets) as part of LWEC's fuel stream. This amendment to LWEC's Preventive Maintenance and Malfunction Abatement Plan (PM/MAP) is to incorporate the following items related to the EUSORBENT Emission Unit which is the dry sorbent injection (DSI) system used to control acid gas emissions while combusting engineered fuel pellets:

- Preventative maintenance procedures.
- Monitoring of operating variables.
- Corrective procedures that will be implemented in the event of a malfunction or failure of the DSI system.

## **SECTION 2**

### **AFFECTED UNITS**

The following Emission Units are included in the Plan Amendment:

- EUSORBENT – Dry sorbent injection system used to control acid gas emissions while combusting engineered fuel pellets.

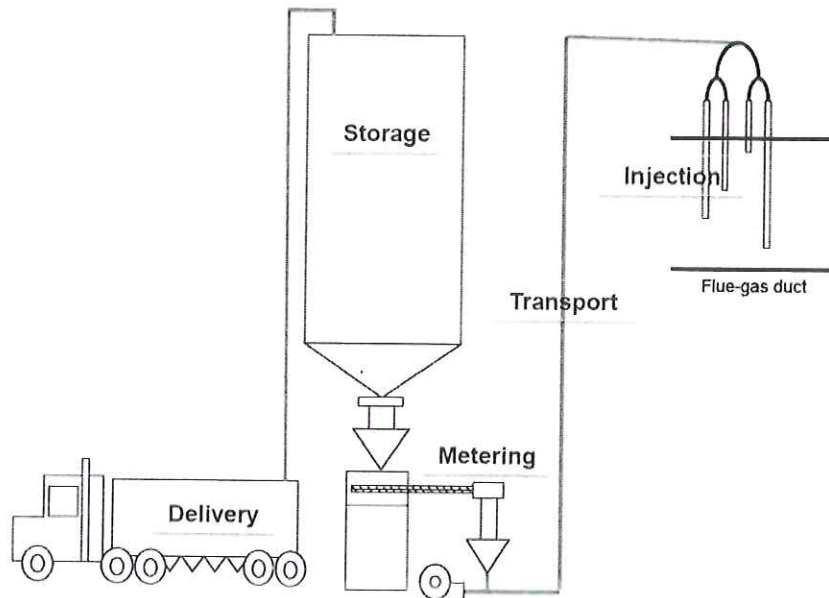
All other aspects of LWEC's PM/MAP remain in effect. This amendment relates solely to the DSI system during the trial period.

#### **2.1 DSI SYSTEM**

##### **2.1.1 Process Description**

LWEC will be installing additional add on emission control technology in the form of a DSI system for the pellet test burn to further reduce sulfur dioxide (SO<sub>2</sub>) and hydrogen chloride (HCl) emissions. DSI consists of the direct injection of an alkaline reagent material into the flue gas before the particulate matter (PM) control equipment. The DSI system may use calcium hydroxide or other alkaline material as a reagent to reduce acid gases that result from chlorine present in the fuel.

**Graphic 1**  
**Overview of a DSI System**

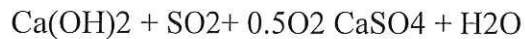


**Graphic 1** identifies a typical DSI control technology injection system as it would be applied to a boiler's exhaust gas system. It indicates that LWEC will likely require use of fans and (for longer-term use) a storage silo to receive, store, mix, and transfer the calcium hydroxide (or other reagent) to the proposed DSI. Initially during the trial period, a smaller scale super sack delivery system will be used which consists of a bulk bag unloader and reagent injection system instead of the silo system to facilitate trial use of more than one reagent during optimization of the process. The system also includes a control skid to operate and monitor the delivery system.

The performance of this system depends on:

- Flue gas characteristics, such as composition, temperature, and humidity.
- Reagent used as sorbent.
- Dispersion of the sorbent through the flue gas and location of the injection.

The chemistry associated with DSI technology is relatively straight forward and well understood. For example, calcium hydroxide is a common reagent used in DSI and is being considered for use at LWEC. Calcium hydroxide ( $\text{Ca}(\text{OH})_2$ ) facilitates the following chemical reactions to reduce acid gas emissions depending on which acid gases are present:



Accordingly, the primary reaction products of calcium based DSI are calcium sulfate, calcium chloride, and calcium fluoride for these scenarios. The relative volume of the reaction products is a function of relative initial acid gas concentrations and the capture efficiency for each pollutant. Note that there are other less critical reaction products resulting from interaction with other flue gas constituents, such as CO<sub>2</sub>; however, the primary reaction products are those associated with the acid gases present.

Other reagents such as Trona, sodium bicarbonate, and other industry recognized acceptable reagent may also be utilized to reduce HCl and other acid gases in the flue gas.

The DSI system will deliver sorbent material into the flue gas exhaust duct prior to the electrostatic precipitator (ESP). Cartridge or baghouse fabric filter dust collectors will be used to control emissions from handling the reagent. The DSI system will be operated in such a way as to prevent the emission of particulate matter as required by the air permit.

### **2.1.2 Preventive Maintenance**

The Facility will perform routine preventive and corrective maintenance on the DSI system. As a temporary system, problems will be noted and a recommended spare parts inventory list will be developed in an effort to avoid preventable shut-downs when the permanent system is installed. Maintenance will be performed and scheduled as required or as needed. Refer to **Table 2-12**.

<b>TABLE 2-12 EUSORBENT Preventative Maintenance Program</b>		
<b>EUSORBENT: DSI System</b>		
<b>Item/Condition to be Inspected</b>	<b>Frequency of Inspection or Repair</b>	<b>Recordkeeping Method</b>
Storage and injection equipment	Daily visual, as recommended by the system vendor, repaired as necessary	Daily Operating Log, Outage Work List or Report
Controls	Daily visual, as recommended by the system vendor, repaired as necessary	Daily Operating Log, Outage Work List or Report

Problem identification will be done by the power plant operator, assistant plant operators, plant maintenance staff, plant supervisors, or others supporting the trial process. Problems will be identified locally or by information presented in the control system by process readings or alarm functions. Refer to **Table 2-13** for operating variables that are monitored.

<b>TABLE 2-13 EUSORBENT Operating Variables</b>		
<b>Source: EUSORBENT – DSI System</b>		
<b>Operating Variable</b>	<b>Normal Operating Range</b>	<b>Monitoring Method</b>
Reagent Use	Reagent used at various target rates during the trial.	Control system and depletion of reagent from the super sacks or silo.

The staff or others assisting with the trial will identify problems and submit to the Operations/Maintenance Supervisor(s) for correction, at which point the Operations/Maintenance Supervisor(s) will assign the repair to the maintenance staff. Refer to **Table 2-14** for corrective procedures for malfunctions of the DSI system.



<b>TABLE 2-14</b>	
<b>EUSORBENT Corrective Procedures</b>	
<b>Source: EUSORBENT – DSI System</b>	
<b>Malfunction or Failure</b>	<b>Corrective Procedure</b>
Plugging of the reagent delivery system	If there is a problem with plugging, troubleshoot and identify the problem location, and remove the plug of reagent. If the problem can be corrected while operating more quickly than a normal shut-down/start-up procedure for feeding engineered fuel pellets, the repairs will be made while operating. Interim measures will be taken if necessary to possibly feed reagent via alternate means, stop the feed of pellets, or feed pellets at a rate that has been demonstrated through testing to not exceed permitted emissions limits for HCl. In no case will the feed of pellets continue for more than one hour after identification of a plug in the delivery system unless testing has shown the feed rate does not result in an exceedance of the permitted HCl emissions limit.
Mechanical or controls failure of the DSI system	If there is a mechanical or controls failure, troubleshoot and repair the problem. If the problem can be corrected while operating more quickly than a normal shut-down/start-up procedure for feeding engineered fuel pellets, the repairs will be made while operating. Interim measures will be taken if necessary to possibly feed reagent via alternate means while repairs are completed, stop the feed of pellets, or feed pellets at a rate that has been demonstrated through testing to not exceed permitted emissions limits for HCl. In no case will the feed of pellets continue for more than one hour after identification of a reagent feeding failure unless testing has shown the feed rate does not result in an exceedance of the permitted HCl emissions limit.

Upon completion of maintenance activities, the Operations/Maintenance Supervisor(s) will file an electronic and/or hard copy of the completed activities. Any changes beyond manufacturer specifications will be reported to the Plant Manager to update the plan and make notifications.

### **2.1.3 Record Keeping**

The temporary PTI requires continuous monitoring of the sorbent injection as well as operating the system in a satisfactory manner. Records showing pellet fuel consumption and sorbent injection rate will be kept on a daily basis. The Facility will maintain electronic and/or hard copy records of maintenance activities for the DSI system during the trial testing period.

Logkeeping of equipment operation will be made and kept by the operations staff, the logs will be completed daily, and reviewed by plant management for accuracy and proper operation. The log will note equipment problems found and corrective actions taken. Any operations that result in exceeding of the limitations set forth in this plan will be identified and reported as required by the plan.

If at any time the PM/MAP fails to address or inadequately addresses an event that meets the characteristics of a malfunction, the permittee shall amend the PM/MAP within 45 days after such an event occurs.

**RECORD RETENTION AND REPORTING REQUIREMENTS**

**SECTION 3**

**RECORD RETENTION AND REPORTING REQUIREMENTS**

PM/MAP records for the temporary DSI system will be kept at the Facility, in a satisfactory manner, for a period of at least five years. PM/MAP records will be made available to the Michigan Department of Environmental Quality (MDEQ) Air Quality Division (AQD) upon request.

LWEC will provide notice of abnormal conditions, start-up, shut down, or malfunctions that result in the following conditions:

- Emissions of hazardous or toxic air pollutants which continue for more than one hour in excess of any applicable standard or limitation, or
- Emissions of any air contaminant continuing for more than two hours in excess of an applicable standard or limitation.

Notice will be provided to the MDEQ AQD, Upper Peninsula District Supervisor, 1504 West Washington Street, Marquette, Michigan 49855, telephone 906.228.4853 not later than two business days after discovery of the abnormal condition or malfunction. Notice will be made via telephone, electronic, or oral communications.

Written reports, if required, will be filed with the Department within 10 days after the abnormal condition or malfunction is corrected, or within 30 days of discovery of the abnormal condition or malfunction, whichever is first.

The written reports will include:

- The time and date, the probable causes or reasons for, and the duration of the abnormal conditions, start-up, shutdown, or malfunction.

**RECORD RETENTION AND REPORTING REQUIREMENTS**

- An identification of the source, process or process equipment which experienced abnormal conditions, or which malfunctioned and other affected process or process equipment that have emissions in excess of an applicable requirement, including a description of the type and, where known or where it is reasonably possible to estimate, the quantity or magnitude of emissions in excess of applicable requirements.
- Information describing the measures taken and air pollution control practices followed to minimize emissions.
- For abnormal conditions and malfunctions, the report shall also include a summary of the actions taken to correct and to prevent a reoccurrence of an abnormal condition or a malfunction and the time taken to correct the malfunction.
- Certification by a responsible official of the truth, accuracy and completeness of the written report.

A sample malfunction notification report is included in **Appendix B** of LWEC's PM/MAP.