Jackson Generating Station

FGLMDB1-6 and EUEADB7 Startup, Shutdown and Malfunction Abatement Plan (SSMAP)

Consumers Energy Company
Jackson Generating Station
2219 Chapin Street
Jackson, Michigan 49203
SRN: N6626
ORIS: 55270

Rev 7 – 11/7/2023

Jackson Generating Station (JGS)
Jackson, Michigan
Startup, Shutdown and Malfunction Abatement Plan to Minimize Downtime for the Continuous Emission Monitoring System

1. INTRODUCTION

The seven combined-cycle units are equipped with a dry extractive CEMS that monitors carbon monoxide (CO) and nitrogen oxides (NO_x) emissions, including oxygen (O_2) as the diluent gas. In addition, each combustion turbine and duct burner are equipped with natural gas fuel flow meters. These CEMS are the primary means of detecting a process or control device malfunction for the combined-cycle units, and as such, the plant strives to maintain a high availability for the CEMS equipment. The dry gas extractive system draws a sample through the sample probe located in the stack and down the sample line. The sample is routed to low-level gas analyzers for measurement.

The operation of the probe is controlled by the PLC in the analysis cabinet that enables monitoring and adjustment of the critical flow and pressure parameters and indicates operational modes such as sampling, calibration, back-purge and by-pass. The CEMS cabinet provides gauges and meters for calibration and back-purge flow, vacuum and diluent pressure. A diagnostic control center performs complete system diagnostics and provides access to all diagnostic data. The standard diagnostics package performs real time failure warnings, such as calibration drift, and provides a fail-safe startup of the CEMS. The electronic signals processed by the analyzer controller are sent by TCP/IP to the Data Acquisition and Handling System (DAHS) located in the Control Room.

The DAHS is the electronic component of the CEMS designed to interpret and convert individual output signals from the gas analyzers and other components of the CEMS to produce a continuous readout of the measured parameters in units required by the USEPA and Michigan Department of Environment, Great Lakes and Energy (EGLE). A shelter is provided to house the CEMS components.

Each CEMS and related components shall be capable of completing a minimum of one cycle of operation (sampling, analyzing and data recording) for each successive 15-minute interval. All CO concentration, natural gas fuel flow, CO mass emissions, CO emission rate in lb/mmBtu, O_2 concentration, NO_x concentration, and NO_x emission rate data shall be reduced to 1-hour averages. All of these averages shall be computed from four or more data points equally spaced over each 1-hour period, except for periods when calibration, quality assurance activities, maintenance or repairs pursuant to paragraph 75.21 of Subpart C, 40CFR75 and Appendix B of 40CFR75 are being performed. During these periods, a valid hour shall consist of at least two data points separated by a minimum of 15 minutes. Failure of the CEMS to acquire four valid data points, except for periods of calibration, quality assurance activities, maintenance or repair, shall result in loss of such data by means of the data acquisition and handling system (DAHS) for the missing hour in accordance with Missing Data Procedures.

2. PROCEDURES FOR STARTUP AND SHUTDOWN AND MALFUNCTION

The procedures for startup and shutdown are specified in the manuals provided by the CEM manufacturer (Teledyne Monitor Labs, Inc.), guidance documents prepared by various manufacturers of supporting or related systems, and Operation and Casualty documents prepared and organized by JGS for operating and maintaining the CEMS. The operations and maintenance staff follow the manufacturer's prescribed schedule for the preventive care and maintenance of the CEM system. Specific preventive care and maintenance activity procedures are outlined in Appendix A. In the event of various types of anomalies, audible and visual indicators are triggered to alert the operator of the situation. The operator will respond to the announced anomaly and take the necessary action to correct it. Also, maintenance staff are on-site or on call to quickly correct a malfunction, and replacement parts are available on-site. Table 1 of Appendix B lists critical CEMS spare parts which are maintained in inventory in order to expedite repairs and support routine maintenance.

3. CORRECTIVE PROCEDURES AND OPERATING SCENARIOS

Primary consideration will be given to the potential risk of negatively impacting human health and the environment. In situations where the risk of negatively impacting human health and the environment is high (e.g. plant mass emission limits will potentially be exceeded), plant management will consider operating constraints including a shutdown of the emission source.

<u>Start-up and Shutdown</u>
Control Room Operator will follow the Standard Operating Procedures (SOP) for all start-up and shutdown evolutions to minimize emissions.

<u>Daily Gas Turbine Emissions</u>
The Operations & Maintenance Manager or Production Supervisor, or in his/her absence, the Control Room Operator, will review the Teledyne RegPerfect Dashboard. This report contains all of the emission data for 12-month rolling averages/totals, 30-day averages, and 24-hour averages as called out in the ROP. Total Start-up/shutdown 12-month rolling totals can also be reviewed in the Daily Emission Reports.

<u>CEMS Calibration Failure</u>
Observation: Plant DCS displays "Calibration Failed".
Action: Plant Operator will troubleshoot the failed CEMS. Perform a manual calibration. If CEMS fails again notify management staff; see "<u>CEMS Malfunction Is Not Expeditiously Repairable" for possible additional actions</u>.
Note: No shutdown is required, data is being managed in the CEMS DAHS.

<u>CEMS Program Logic Controller (PLC) Failure</u>
Observation: Plant DCS and the CEMS DCS displays "PLC not running".
Action: Plant Operator will visually check to see if CEM PLC is operating. Control Room Operator will notify the Plant I&E Technician of status. Plant I&E Technician will repair CEM PLC.

Sample Cooler Failure

Observation: Plant DCS displays “Fault”.

Action: Plant Operator will troubleshoot the Sample Cooler on conditioning panel. Control Room Operator will notify the Plant I&E Technician of status. Plant I&E Technician will place the PLC in Out-of-Service and replace the Sample Cooler.

Note: Control Room Operator will ensure proper steam to fuel/power ratio is maintained.

Power Supply Failure on Sample Panel

Observation: Plant DCS displays “Fault”.

Action: Plant Operator will troubleshoot the Power Supply on conditioning panel. Control Room Operator will notify the Plant I&E Technician of status. Plant I&E Technician will place the PLC in Out-of-Service and replace the Power Supply.

Note: Control Room Operator will ensure proper steam to fuel/power ratio is maintained.

Peristaltic Pump Failure on Sample Panel

Observation: Plant DCS displays “Fault”.

Action: Plant Operator will troubleshoot the Peristaltic Pump on conditioning panel. Control Room Operator will notify the Plant I&E Technician of status. Plant I&E Technician will place the PLC in Out-of-Service and replace the Peristaltic Pump.

Note: Control Room Operator will ensure proper steam to fuel/power ratio is maintained.

CEMS Malfunction Is Not Expeditiously Repairable

Observation: Plant DCS displays “Calibration Failed” or another quality assurance test is failed and routine adjustments do not resolve the issue; CEMS readings are abnormal or clearly erroneous and the underlying problem cannot be diagnosed expeditiously; CEMS malfunction requires a part which is not stocked within inventory or requires that the instrument be shipped back to the vendor for repairs. Note that if a part fails that is not maintained in the spare parts inventory, the spare parts inventory shall be reviewed and updated as necessary.

Action: Plant Operator will notify management staff and arrange to install a temporary like-kind replacement analyzer as quickly as possible. A calibration error test shall be run as quickly as possible after any analyzer changeout; refer to Section 5.8 of the Continuous Emissions Monitoring System Quality Assurance/Quality Control Plan for additional required actions associated with use of a temporary like-kind replacement analyzer and reinstallation of the original analyzer that was removed.

4. MALFUNCTION/EXCEEDANCE NOTIFICATION PROCESS

When a malfunction or breakdown of emission control equipment or an exceedance of an emission limit has been discovered, the Senior Operations and Maintenance Manager, Operations and Maintenance Manager, Production Supervisor, and Supervisor of Maintenance & Outage are contacted. The notification will identify the piece of equipment that failed or emission limit that has been exceeded. If the emission control equipment or CEMS fail for more than two (2) hours, a follow-up notification will be made to the Senior Operations and Maintenance Manager, Operations and Maintenance Manager, Production Supervisor, Compliance Coordinator, Supervisor of Maintenance & Outage, and Environmental Quality & Sustainability (EQ&S). A written report detailing the event will be completed within two (2) business days. The written report identifies the emission source, the time and duration of the event, corrective and preventive actions taken, and actions taken to minimize emissions and, if possible, an estimate of the emissions during the event.

Once the equipment is back on-line, the Senior Operations and Maintenance Manager will facilitate completion of an Emission Control Equipment Breakdown Report with details of equipment where the fault occurred, duration of the breakdown, interim corrective actions, root cause of the fault, names and times that any maintenance personnel were contacted, and permanent corrective action. If applicable, the Senior Operations and Maintenance Manager or their delegate will notify EGLE as called out in the Renewable Operating Permit (ROP).

Jackson Generating Station (JGS), Jackson, Michigan
Startup, Shutdown, and Malfunction Abatement Plan to Minimize
Emissions for the LM6000 Combustion Turbines

1. INTRODUCTION

This is the startup, shutdown, and malfunction abatement plan for the LM6000 gas turbine engines in place at JGS. This plan will be updated as necessary in response to any malfunction which was not adequately addressed. There are six such turbines at the facility. This plan describes how emissions will be minimized during startups, shutdowns and malfunctions.

The LM6000 gas turbine (also called combustion turbine) burns natural gas fuel. The gas turbine output shaft is coupled to the shaft of an alternating current electric generator that is used to generate electric power. The design of LM6000 gas turbine is derived from the types of turbines used to power aircraft and thus the LM6000 is also called an aero-derivative gas turbine. The nature of this turbine design is to efficiently provide maximum power within minutes of startup and attain a steady-state operating condition.

The LM6000 gas turbine utilizes a lean premix combustion system designed to operate with natural gas fuel. The combustor configuration enables the combustor to operate in uniformly mixed, lean fuel to air ratio (premix mode) across the entire power range, to minimize emissions. The emissions of CO, NO_x, PM, SO_2, and VOC are a function of the design of the LM6000's combustion system or intrinsic to the nature of the natural gas fuel and the combustion air. Steam injection is employed as part of the design to further minimize the emission of NO_x by inhibiting the formation of NO_x. Very shortly after the gas turbine begins to initially combust natural gas, the steam injection system begins to operate.

Each LM6000 gas turbine is part of a combined-cycle system including a Heat Recovery Steam Generator (HRSG) and natural gas-fired duct burner. The duct burners are not equipped with any specific control technologies or other emissions-related parts which require routine preventative maintenance. At varying 1-3 year intervals, each combined-cycle unit undergoes an off-line and on-line boiler inspection, which includes the gas path where the duct burners are located, and any noted deficiencies are addressed in a timely manner. Annual Maintenance outages also provide an opportunity for inspection and correction of any deficiencies.

The continuous emission monitoring system (CEMS) records the monitored NO_x and CO emissions consistent with the renewable operating permit requirements. The emissions of NO_x and CO are monitored continuously when fuel is being combusted, including the periods when the gas turbine is started and shutdown.

2. PROCEDURES FOR STARTUP AND SHUTDOWN AND MALFUNCTION

The procedures for startup and shutdown are specified in the manuals provided by the turbine manufacturer (General Electric Company, or GE), guidance documents prepared by various manufacturers of supporting systems, and Operation and Casualty documents prepared and organized by JGS for the use of employees responsible for operating and maintaining the

LM6000 gas turbines and related duct burners. The operation and maintenance staff follow the manufacturer's prescribed schedule for the preventive care and maintenance of each LM6000. In the event of a malfunction of the steam injection system, audible indicators are triggered to alert the operator of the situation. The operator will take the necessary action to correct the malfunction. Also, maintenance staff are on site or on call to quickly correct a malfunction, and replacement parts are available on site. It is expected that by operating each LM6000 turbine and associated duct burner as designed, and following the appropriate procedures during startup shutdown and malfunction, the emissions will be minimized so as not to exceed the operating permit's emissions limits.

3. PREVENTATIVE MAINTENANCE

JGS maintains a Long-Term Service Agreement (LTSA) with GE for the LM6000 combustion turbines, including those aspects of the steam injection control technology which are integral to the combustion turbine. As part of the LTSA, GE conducts routine inspections based upon a combination of service hours and startup/shutdown cycles. In addition, the LTSA includes routine maintenance overhauls at set intervals, with the overhauls returning the equipment to OEM specifications.

Typically, the inspections occur about twice per year, but this timing is controlled by GE and the terms of the LTSA. Inspections include the use of borescopes to permit a detailed inspection of combustion turbine internal components, and certain exterior components are examined as well. The goal of these routine inspections is to identify degraded parts and other possible maintenance issues before they lead to actual malperformance or unit outages, and appropriate maintenance is conducted based on the results of each inspection. Under the LTSA, GE is responsible for maintaining spare parts in reasonable proximity to the plant in order to permit expeditious repairs. Lastly, GE has access to a data historian for the combustion turbines and can monitor the associated data to look for trends that indicate necessary maintenance or other possible issues such as a need for combustion tuning.

Certain aspects of the steam injection system fall outside the scope of the LTSA. As such, a specific preventive care and maintenance activity procedure is outlined in Appendix A. Also, Table 2 of Appendix B lists critical steam injection system spare parts (outside of the LTSA) which are maintained in inventory in order to expedite repairs and support routine maintenance.

4. CORRECTIVE PROCEDURES AND OPERATING SCENARIOS

Primary consideration will be given to the potential risk of negatively impacting human health and the environment. In situations where the risk of negatively impacting human health and the environment is high (e.g. plant mass emission limits will potentially be exceeded), plant management will consider operating constraints including a shutdown of the emission source.

4.1 Failure to inject steam during start-up

Observation: Unit failed to inject steam during start-up (This is detected by an alarm generated by the control equipment). The operator assesses his V1, V2, V3, V4, and V10 valve positions, steam injection temperatures, skin temperature and pressures. Startup conditions should have warmed up the first and second loops as witnessed by V1 admitting steam and V2 warming up first loop above steam saturation temperature and then V3 warming up second loop to operating pressure and temperature (i.e. approximately 620-650 psig and 520-550 deg F), thus allowing V4 to admit steam to the engine. Note: currently none of the steam injection valves have a feedback loop to the control system so the information the DCS is indicating (feedforward) is not always the exact position of the valve, but rather the intended position directed by the control system. The operator needs to use other indicators to verify proper operation including a witnessing of emissions levels dropping, increased flow on the steam injection meter, and alarms resetting. See section 4.2 Steam injection drops out during normal operations for normal emissions target parameters.

Action: Control Room Operator will disable and re-enable steam injection. If steam injection fails again, the Control Room Operator will notify Maintenance and Management staff.
Note: Unit must achieve steam injection mode in the first 2 hours of start-up or the unit must be shutdown. Operators need to be cognizant of the time the engine fired and keep verifying with their Startup checklist that steam has been admitted successfully. Once Steam Injection has been admitted to the engine, sufficient steam flow is displayed on meter, and the unit load is able to be increased, the DAHS will display that the unit is out of Startup. After this point, operators follow step 4.2 Steam Injection drops out during normal operations and are subject to a one-hour time limit.

4.2 Steam injection drops out during normal operations

Observation: NO_x reading higher than 25 ppm, DCS screen shows steam injection valve closed, load automatically reduced to less than 14 MW (i.e., turbine runback).
Action: Control Room Operator will disable and re-enable steam injection. If steam injection fails again the Control Room Operator will notify Maintenance and Management staff.
Note: Unit must achieve steam injection within 1 hour after dropping out or turbine will be shutdown. During normal operation V1 and V4 should be open with V4 regulating steam in approximately a normal range of 20,000 to 35,000 #/hr varying slightly with load demand while controlling NO_x within permit parameters. NO_x should generally be trending below 25 ppm and CO below 40 lb/hr. Values outside of this range warrants investigation to see if the unit is in startup/shutdown unintentionally or equipment issues have developed.

4.3 Improper level of steam injection

Observation: NO_x readings much lower than normal (approximately 16-18 ppm) or CO readings much higher than normal (above 40 lb/hr) or vice versa is an indicator of an imbalance between the steam injection rate and load. The turbine control scheme includes GE programmed tables of proper steam injection levels versus load, and NO_x monitoring data is used to slightly bias the table predicted injection rate values based upon actual performance. Control system communication errors, issues with related transmitters, valves displaying a position other than the actual position, etc. can lead to actual steam injection rates which deviate from the desired values at a given load.

Action: Control Room Operator will manually bias the steam injection rate to return emissions to normal levels and will notify Maintenance and Management staff, who will then initiate an investigation and corrective actions, as warranted.

Note: The unit may continue to operate while repairs are affected to the extent that compliance with the emission limits is not in jeopardy and the steam injection system remains in service.

Jackson Generating Station (JGS), Jackson, Michigan
Startup, Shutdown, and Malfunction Abatement Plan to Minimize
Emissions for the 7EA Combustion Turbine

1. INTRODUCTION

This is the startup, shutdown, and malfunction plan for the 7EA gas turbine engine in place at JGS. This plan will be updated as necessary in response to any malfunction which was not adequately addressed. There is one such turbine at the facility. This plan describes how emissions will be minimized during startups, shutdowns and malfunctions.

The 7EA unit is a single-shaft gas turbine designed for operation as a combined steam and gas turbine cycle. This gas turbine (also called a combustion turbine) burns only natural gas fuel. Combustion in the gas turbine is initiated by means of the electrical discharge from two igniter plugs. Hot gases generated from burning fuel in the combustion chambers are used to drive the turbine. The gas turbine output shaft is coupled to the shaft of an alternating current electric generator that is used to generate electric power.

The 7EA gas turbine utilizes General Electric's Dry Low NO_x (DLN_x) system to regulate the distribution of the natural gas fuel and the location of the flame in the staged, multi-nozzle combustors (combustion chambers) located around the gas turbine. The DLN_x system is designed to function without operator input. The fuel flow distribution to the combustion chamber fuel nozzles is controlled by the computer control system software (MARK VI) and is a function of the gas turbine firing temperature. The emissions of CO, NO_x, PM, SO_2, and VOC are a function of the design of the 7EA's combustion system or intrinsic to the nature of the natural gas fuel and the combustion air. The DLN_x system is employed as part of the design to further minimize the emission of NO_x by limiting the formation of thermal NO_x.

The 7EA gas turbine is part of a combined-cycle system including a HRSG and natural gas-fired duct burner. The duct burner is not equipped with any specific control technologies or other emissions-related parts which require preventative maintenance. At varying 1-3 year intervals, the 7EA combined-cycle unit undergoes a boiler inspection, which includes the gas path where the duct burners are located, and any noted deficiencies are addressed in a timely manner. Annual Maintenance outages also provide an opportunity for inspection and correction of any deficiencies.

The continuous emission monitoring system (CEMS) records the monitored NO_x and CO emissions consistent with the operating permit requirements. The emissions of NO_x and CO are monitored continuously, including the periods when the gas turbine is started and shutdown. The emission limitations listed in the ROP are generally maintained without operator intervention.

2. PROCEDURES FOR STARTUP AND SHUTDOWN AND MALFUNCTION

The procedures for startup and shutdown are specified in the manuals provided by the turbine manufacturer (General Electric Company), guidance documents prepared by various manufacturers of supporting systems, and Operation and Casualty documents prepared and organized by JGS for the use of employees responsible for operating and maintaining the 7EA gas turbine. The operation and maintenance staff follow the manufacturer's prescribed schedule for the preventive care and maintenance of the 7EA. In the event of various types of anomalies, audible and visual indicators are triggered to alert the operator of the situation. The Control Room Operator, or in some cases the automated digital control system, will respond to the malfunction. The Control Room Operator will take the necessary action to correct the malfunction. Also, maintenance staff is on-site or on call to quickly correct a malfunction, and replacement parts are available on-site. It is expected that by operating the 7EA turbine and duct burner within the design parameters and consistent with the ROP limit on startup and shutdown hours, and following the appropriate procedures during startup, shutdown, and malfunction, the emissions will be minimized so as not to exceed the ROP's emission limits.

3. PREVENTATIVE MAINTENANCE

JGS also maintains a LTSA with GE for the7EA combustion turbine, including the integral DLN_x system control system. As part of the LTSA, GE conducts routine inspections based upon a combination of service hours and startup/shutdown cycles. In addition, the LTSA includes routine maintenance overhauls at set intervals, with the overhauls returning the equipment to OEM specifications.

As described previously, the inspections typically occur about twice per year, but the exact timing is controlled by GE and the terms of the LTSA. Inspections include the use of borescopes to permit a detailed inspection of combustion turbine internal components, including the DLN_x system, and certain exterior components are examined as well. These routine inspections are designed to identify degraded parts and other possible maintenance issues before they lead to actual malperformance or unit outages, and appropriate maintenance is conducted based on the results of each inspection. Again, GE is responsible for maintaining spare parts in reasonable proximity to the plant in order to permit expeditious repairs. Lastly, GE has access to a data historian for the combustion turbine and can monitor the associated data to look for trends that indicate necessary maintenance or other possible issues such as a need for combustion tuning. Further, if tuning is required, GE can remotely tune the DLN_x system.

4. CORRECTIVE PROCEDURES AND OPERATING SCENARIOS

Primary consideration will be given to the potential risk of negatively impacting human health and the environment. In situations where the risk of negatively impacting human health and the environment is high (e.g. plant mass emission limits will potentially be exceeded), plant management will consider operating constraints including a shutdown of the emission source.

4.1 Failure to achieve pre-mix mode during start-up

Observation: Unit failed to achieve pre-mix mode during start-up.
Action: Control Room Operator will monitor emissions mode on 7EA while the system tries to transfer the emissions mode to Premix condition (as part of the automated control scheme). If turbine fails again to achieve pre-mix mode, the Control Room Operator will notify Maintenance and Management staff.

Note: Unit must achieve pre-mix mode in the first 2 hours of start-up or the unit must be shutdown.

4.2 Turbine drops out of pre-mix mode during normal operations

Observation: NO_x readings higher than 9 ppm at 15% O_2, DCS screen shows turbine is not in pre-mix mode and/or system alarm.

Action: Control Room Operator will watch the MARK VI system automatically try to re-establish Premix mode. If turbine fails again to achieve pre-mix mode, the Control Room Operator can try to manually establish the mode. If this cannot be achieved, Control Room Operator will notify Maintenance and Management staff. Logic has been installed to provide automatic high load Premix transfer to try to maintain premix emissions state which includes a runback feature minimizing emissions if the system fails to maintain the "Premix Steady State" condition for the emissions system. The runback feature minimizes emissions in the event the automatic transfer function is unsuccessful, and a low load is also another indicator beyond alarms and emissions to alert operator to abnormal conditions. The logic will automatically reduce load if the unit has deviated from the normal emissions mode after a set number of tries to automatically re-establish Premix mode.

Note: Unit must achieve pre-mix mode within 1 hour after dropping out of pre-mix mode or turbine will be shutdown.

4.3 Abnormal emissions

Observation: At steady state operation, NO_x readings much higher than normal (or vice versa) (above 9 ppm or below 4 ppm at 15% O_2) or CO readings much lower than normal (or vice versa) (below 4 lb/hr or above 25 lb/hr) is an indicator that the DLN_x control system or other operating parameters may need adjustment. Such adjustment could be required due to degradation of components within acceptable tolerances, an equipment malfunction or changes in ambient conditions (i.e., summer versus winter weather).

Action: Control Room Operator will review alarms and other turbine operating parameters to verify there is no specific equipment malfunction. If a malfunction is discovered, Maintenance and Management staff will be notified and will then initiate an investigation and corrective actions, as warranted. If there is no apparent malfunction, the Control Room Operator should contact Management to work with GE to review performance of the combustion turbine and conduct remote tuning, if appropriate.

Note: The unit may continue to operate while repairs are affected to the extent that compliance with the emission limits is not in jeopardy and the turbine remains in pre-mix mode.

Appendix A

Non-LTSA Preventive Maintenance Program

Non-LTSA Preventive Maintenance Program

As noted previously, many aspects of the preventative maintenance activities for the LM6000 and 7EA combustion turbines are covered in the Long-Term Service Agreement (LTSA) with GE, including routine inspections and maintenance and periodic overhauls designed to return the equipment to OEM specifications. The remainder of this document focus on those maintenance activities outside the scope of the LTSA.

Identification of Supervisory Personnel

The Senior Operations and Maintenance Manager, Operations and Maintenance Manager, Production Supervisor, and Supervisor of Maintenance & Outage are responsible for overseeing the inspection, maintenance and repair of emission control devices and monitoring equipment. Repair work is completed by either a skilled Plant Technician or an outside contractor experienced in the maintenance and operation of these devices.

Description of Items that shall be inspected/preventive maintenance

Inspection and routine preventive maintenance by the operations and maintenance staff are performed on a regular basis for all emission control equipment. Specific inspection and maintenance tasks are part of the facility's SAP maintenance tracking system, which identifies inspection and maintenance task information for all process and control equipment (See Table 1). Records of all inspections and maintenance activities performed are maintained with the SAP system. Table 1 contains the Jackson Generating Station's preventive maintenance program including frequency of inspections/maintenance.

Table 1

PM#	Description
20-W1 [1]	Inspection and Manual calibration of the continuous monitor equipment
20-S2	Replace diaphragm in vacuum pump (semi-annual)
20-A2	NO_x Analyzer – Conduct Annual Maintenance
20-A3	CO Analyzer – Conduct Annual Maintenance
20-A4	Replace stack inlet filters (annual)
20-A9	O_2 Analyzer - Conduct Annual Maintenance
20-A10	Conduct Annual Maintenance Wall Mount Conditioning Panel & Equipment
200LM-A16	Annual Inspection of LM Steam Skid and Components

[1] This preventative maintenance activity is not tied to formal SAP maintenance tracking. Rather, this is part of operational activities during rounds or periodic Plant Management inspections. Informal tracking includes CEMS maintenance logbook entries when changes are made as a result of the inspections (i.e., tracking is generally by exception).

Procedures have been written to cover the maintenance task. If a procedure has not been written, the maintenance technician will use the procedure as written in the Maintenance Manual.

Appendix B

Identification of Major Replacement Parts/ Components to be Maintained in Inventory

Identification of Major Replacement Parts/Components to be Maintained in Inventory

A critical spare parts inventory has been identified and is maintained for the emission control devices and monitoring equipment. Critical spare parts are those that are deemed unique in their design and/or are difficult to obtain and may contribute to a malfunction of existing control equipment based on supplier information, plant operating experience, and good engineering judgment. The critical spare parts inventory tracking is part of the SAP Computerized maintenance system. SAP reorders parts based upon quantity on hand and a specified Re-order point. Inventory audits for minimum quantity of critical spare parts are performed periodically to ensure parts availability. Table 1 lists the typical CEMS spare parts which are inventoried at the Jackson Generating Station, while Table 2 identifies the LM6000 steam injection system spare parts. As noted previously, certain LM6000 steam injection components (i.e., those integral to the combustion turbines), as well as the 7EA DLN_x control system components, are covered by a LTSA with GE, and they maintain the associated spare parts in reasonable proximity to the plant in order to permit expeditious repairs.

Table 1. CEMS Spare Parts

Part Number	Location	Description
10212872	Enter part # in SAP for location	Power Supply (Conditioning Panel)
10210297	Enter part # in SAP for location	1 Micron Filter (Stack)
10211249	Enter part # in SAP for location	Heater/Thermistor
10210243	Enter part # in SAP for location	Filter Spec SS
10212895	Enter part # in SAP for location	Stack Sample Chamber
10210241	Enter part # in SAP for location	Filter 23 Micron DFU
10210240	Enter part # in SAP for location	Desiccant 5GR Package
10211267	Enter part # in SAP for location	Pressure Switch
10211252	Enter part # in SAP for location	Sample Pump Head
10211253	Enter part # in SAP for location	Fuse, AC Supply
10211254	Enter part # in SAP for location	Heat Sink, Fan
10213072	Enter part # in SAP for location	NOX Analyzer Annual Kit
10213071	Enter part # in SAP for location	CO Analyzer Annual Kit
10211256	Enter part # in SAP for location	Heat Sample Line Boot
10211257	Enter part # in SAP for location	Door Latch
10211258	Enter part # in SAP for location	Chiller
10213073	Enter part # in SAP for location	Optical Filter (NO_x)
10211260	Enter part # in SAP for location	Pump Assy
10211261	Enter part # in SAP for location	Solenoid, Blowback
10213075	Enter part # in SAP for location	Orifice (orange)
10172242	Enter part # in SAP for location	Wall Mount Repair Kit, Vac Pump
10211268	Enter part # in SAP for location	Solenoid Manifold Cover Plate
10211169	Enter part # in SAP for location	Solenoid 3-Way Valve
10211270	Enter part # in SAP for location	4-Way, 2 Stack Valve
10211271	Enter part # in SAP for location	Valve Actuator, 90 Degs, 2 position

Part Number	Location	Description
10211272	Enter part # in SAP for location	Filter for N2 Regulator
10211273	Enter part # in SAP for location	Hose
10211274	Enter part # in SAP for location	Tubing, Peristaltic Pump
10211266	Enter part # in SAP for location	NOX Regulator Seal
10211278	Enter part # in SAP for location	Accumulator Sphere
10211279	Enter part # in SAP for location	Heater, Probe
10211283	Enter part # in SAP for location	Peristaltic Pump Head
10210386	Enter part # in SAP for location	Flow Meter, 5 Liter
10211285	Enter part # in SAP for location	Moisture Sensor
10210192	Enter part # in SAP for location	Motor, Peristaltic Pump
10211282	Enter part # in SAP for location	Low Temp Switch
10224923	Enter part # in SAP for location	Sync DMOD Board
10162335	Enter part # in SAP for location	Assy Source M300
10212656	Enter part # in SAP for location	Vacuum Switch
10212536	Enter part # in SAP for location	Spare NOX Analyzer 754
10212535	Enter part # in SAP for location	Spare CO Analyzer 2969
10212394	Enter part # in SAP for location	Spare O2 Analyzer 203
10226599	Enter part # in SAP for location	Rebuild Kit for NO_x Pump
10226598	Enter part # in SAP for location	Stack Filter O-Ring 208 Viton 75
10226597	Enter part # in SAP for location	Stack Filter O-Ring 216 Viton 75
10226605	Enter part # in SAP for location	NOX Exhaust Scrubber
10226604	Enter part # in SAP for location	Motor CO Analyzer
10226596	Enter part # in SAP for location	Panel Tubing
10226595	Enter part # in SAP for location	CO Vacuum Pump Kit
10226594	Enter part # in SAP for location	O2 Vacuum Pump Kit
10226593	Enter part # in SAP for location	Spare CO Vacuum Pump
10226592	Enter part # in SAP for location	NOX Vacuum Gauge
10226471	Enter part # in SAP for location	CO Flow Sensor
10226470	Enter part # in SAP for location	NOX Moly Guts Kit
10226469	Enter part # in SAP for location	NOX Dryer Tube Assy.
10162259	Enter part # in SAP for location	CO or O2 PCA Pressure Sensor Board

Table 2. LM6000 Steam Injection System Spare Parts

Part Number	Location	Description
10212612	Enter part # in SAP for location	V1 Valve
10210550	Enter part # in SAP for location	V2 Valve
10212613	Enter part # in SAP for location	V3 Valve
10212610	Enter part # in SAP for location	V4 Valve
10212772	Enter part # in SAP for location	Orifice 2.5" 300#
10212773	Enter part # in SAP for location	Orifice 2" 300#
10212774	Enter part # in SAP for location	Orifice 1" 300#
10212710	Enter part # in SAP for location	Check Valve (2)
10210502	Enter part # in SAP for location	Bellow Single Hinge
10210501	Enter part # in SAP for location	Bellow Double Hinge
10212534	Enter part # in SAP for location	Annubar
10210718	Enter part # in SAP for location	Transmitter, pressure