AI-PART C

ATTACHMENT C.9.i.

Renaissance Power Plant

Startup, Shutdown, and Malfunction (SSM) Plan

Revision 2

DTE Electric Company – Renaissance Power Plant
Startup, Shutdown, and Malfunction (SSM) Plan

The development and implementation of this Startup, Shutdown, and Malfunction (SSM) Plan is required by Condition 6 in Section D-III of the Renaissance Renewable Operating Permit (ROP).

CT EMISSIONS PROFILE

Emissions of NOx, CO, and VOCs from the Renaissance CTs are lowest when the CTs are generating full power at normal operating conditions (> 70% of baseload).

Emissions of NOx, CO, and VOCs are higher during CT startups and shutdowns (< 70% of baseload), when combustion conditions are less than optimal due to lower combustion air flow and generally lower combustion chamber temperatures.

The CT manufacturer's normal startup procedure is designed to bring the CT from a Turning Gear operations to 70% of baseload in the minimum amount of time that is safe and protective of the equipment, while consuming the least fuel to do so. This normal startup procedure is the major component of the automated startup control sequence that is programmed into the CT's control system. Completing the normal CT startup automated control sequence brings the CT up to full operation in the minimum amount of time and results in generating the minimum emissions of NOx, CO, and VOCs.

The same principle applies to CT shutdowns – use of the automated shutdown sequence programmed into the CT control system results in the shortest time to full shutdown, consumption of the least fuel, and generation of minimum emissions of NOx, CO, and VOCs.

STARTUPS

Operators have very little capability to manually intervene in the automated CT startup control sequence. The Operator's primary role in CT startups is to conduct a pre-startup manual inspection of the CT and its key auxiliary systems, then once the equipment configuration and readiness has been verified, set target operating parameters, initiate the automated start sequence from the control console, and monitor the operation as the startup proceeds.

See Operating Procedure, OP-201 Section 3 for Startup Procedures.

Occurrence	*Operator Response Steps to Minimize Emissions*

SHUTDOWNS

Similarly, operators have very little capability to manually control the CT shutdown sequence. The automated shutdown sequence programmed into the control system by the CT manufacturer is designed to take the CT from normal operation to Turning Gear operation in the minimum amount of time that is safe and protective of the turbine and its auxiliary systems, while consuming the least fuel and generating the least emissions of NOx, CO, and VOCs.

See Operating Procedure, OP-201 Section 5 for Shutdown Procedures.

Occurrence	*Operator Response Steps to Minimize Emissions*

MALFUNCTIONS

Malfunctions of the CTs can occur at any time between initiation of startup and completion of shutdown. Malfunctions can potentially be caused by a large number of factors, including:

- Unanticipated failure of CT or auxiliary system components
- Unusual or unanticipated operating conditions (extremely cold or hot, precipitation, lightning, etc.)
- Unusual fuel characteristics

CT malfunctions may or may not trigger emissions of air contaminants greater than those permitted by the Renaissance Air Operating Permit (ROP). The CT and key auxiliary systems are equipped with a robust system of instruments and hard-wired and software interlocks that will trigger shutdown of the CT if the control system detects operating conditions that could be unsafe or cause damage to the CT. Many interlock trips will result in initiation of an immediate shutdown of the CT. Other unusual operating conditions will initiate alarms on the CT Operator control console.

See Operating Procedure, OP-201 Section 1 for Precautions, Limitations and Protective functions.

The CEM and Dynamics Monitoring Systems are important components in monitoring the CT Combustion Process. If the CT stack gas NOx or CO levels are above permitted emission limits, the DAHS and TXP alarms will alert the Operator. The Operator will immediately initiate troubleshooting to determine and correct the cause of the elevated emissions. The Operators primary tool in correcting elevated emissions is the use of Bias Adjustments to make minor changes to the Combustor Fuel, Air and Water ratios. The following table indicates general parameter effects of the available Bias Adjustments. These parameters are balanced to provide efficient operation and minimum emissions.

Bias Component	Parameters Increased	Parameters Decreased
Pilot Fuel Increased	NOx, HR	CO, CD
Pilot Fuel Decreased	CO, CD	NOx, HR
C Stage Fuel Increased	CO,CD, HR	NOx
C Stage Fuel Decreased	NOx	CO, CD, HR
Inlet Guide Vane (Air) Increased	MW, CO	NOx
Inlet Guide Vane (Air) Decreased	NOx	MW, CO
Pilot Water Injection Increased	MW, CO, CD	NOx
Pilot Water Injection Decreased	NOx,	MW, CO, CD

CD : Combustor Dynamics MW: Mega Watt Output HR: Heat Rate/ Fuel Usage
NOx: NOx Emissions Rate CO: CO Emissions Rate

Occurrence	***Operator Response Steps to Minimize Emissions***

In all cases, if troubleshooting continues for more than 30 minutes without identifying the cause of the malfunction, and emissions remain above permitted levels, the Operator should initiate necessary notifications and initiate shutdown of the CT.

AI-PART C

ATTACHMENT C.9.ii.

Renaissance Power Plant

Operations Procedure 201 (OP-201)

Revision 5