



GE Nuclear Energy

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REVISION STATUS SHEET

DOCUMENT TITLE IOP-8, UNIT OFF-LINE TO HOT STANDBY OR HOT SHUTDOWNLEGEND OR DESCRIPTION OF GROUPS _____ TYPE: OPERATING PROCEDUREFMF: K 6 / 7MPL ITEM NO: A80-3020

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1.0 SCOPE/APPLICABILITY

This procedure provides the detailed instructions for proceeding from a generator off-line condition to a Hot Standby or Hot Shutdown operating mode.

2.0 DISCUSSION

The plant conditions of Hot Standby and Hot shutdown are defined as follows:

<u>Condition</u>	<u>Mode Switch Position</u>	<u>Average Reactor Coolant Temperature</u>
Hot Standby	STARTUP/HOT STANDBY	Any temperature
Hot Shutdown	SHUTDOWN	> 93 °C

This procedure outlines the steps required to take the reactor to the Hot Standby or Hot Shutdown mode from a generator off-line condition as established in IOP-5, "Unit Shutdown to Unit Off-Line, Main Condenser Available".

3.0 PRECAUTIONS AND LIMITATIONS

- 3.1 If desired to remain in the Hot Standby Mode for an extended period, RPV pressure should be reduced to approximately 28 kg/cm², if possible, to minimize the feedwater-to-reactor differential temperature.
- 3.2 While operating in the Hot Standby condition with the reactor critical in the heating range, closely monitor the neutron instruments for indicated changes in reactivity or power due to xenon transients or temperature changes. Insert control rods as necessary to prevent inadvertent power increases.
- 3.3 Operation in the Hot Standby Mode with reactor coolant temperature greater than 93 °C should be with the reactor maintained in a vented condition via steam flow through the main turbine bypass valves. This will prevent non-condensable gas buildup in the reactor coolant.



3.0 PRECAUTIONS AND LIMITATIONS(continued)

- 3.4 Operation of the reactor in the Hot Standby condition should be performed with a minimum amount of steam flow through the turbine bypass valves. This will limit the amount of cold feedwater flow to the reactor vessel for makeup.
- 3.5 The cooldown rate should be limited, when reducing pressure, such that the rate of positive reactivity added by moderator cooldown does not exceed the capability of the control rods to insert negative reactivity to maintain the reactor subcritical.
- 3.6 As each control rod is inserted, verify that the FULL-IN indication is operable.

4.0 PREREQUISITES

Reactor power has been reduced to approximately [10%] in accordance with instructions in IOP-5, "Unit Shutdown to Unit Off-Line, Main Condenser Available", and the turbine generator is off-line.

5.0 PROCEDURE

5.1 Preparation for Hot Standby or Hot Shutdown

- 5.1.1 Select Display Formats [LATER].
- 5.1.2 Insert control rods in the selected sequence to reduce reactor power to approximately [8%].
- 5.1.3 Verify that the SRNMS instruments are operating properly as power decreases.
- 5.1.4 Place the Reactor Mode Switch to the STARTUP/HOT STANDBY position.
- 5.1.5 Insert control rods in the selected sequence until:
 - a. All turbine bypass valves are closed with the pressure regulator setpoint of [66.5 kg/cm²], and
 - b. The reactor is critical.



*** NOTE ***

Execute step 5.2 to go into Hot Standby or step 5.3 to go into Hot Shutdown.

5.2 Placing the Unit in Hot Standby

Execute the following steps to place the unit on Hot Standby condition:

- 5.2.1 Initiate cooldown by opening a turbine bypass valve to establish a cooldown rate. Maintain the setpoint of the Pressure Regulator [2 kg/cm²] above reactor pressure. Cooldown may be terminated whenever the desired final conditions of temperature and pressure are reached; however, the goal is to maintain reactor pressure at approximately 28 kg/cm² to minimize the feedwater-to-reactor differential temperature(TE-later).
- 5.2.2 When reactor pressure is maintained below [40 kg/cm²] and decreasing, control reactor water level in the Low Flow Control mode with one LPCP and one HPCP. Refer to SOP-C31 and SOP-[later].
- 5.2.3 Continue to insert control rods in the selected sequence. Maintain the reactor critical [with SRNMS in the heating range].
- 5.2.4 If the Reactor must be isolated, execute steps in Subsection 5.3 to place the unit in Hot Shutdown.

[This step is necessary until a strategy is developed so that the MSIVs can be closed with the reactor subcritical by a specified amount. This condition should correspond to a condition where RCIC can control stable reactor pressure,since with the reactor isolated and if the decay heat exceeds the capability of RCIC, reactor pressure will increase and a safety relief valve will have to be opened to control pressure. Upon closure of the safety relief valve, the pressure increase may cause inadvertent criticality if initially the reactor is subcritical by a smaller amount than the positive reactivity caused by the safety relieve valve closure.]
- 5.2.5 Refer to IOP-9, "Maintaining Hot Standby or Hot Shutdown" for operational procedures on maintenance of the Hot Standby Mode of operation.



5.3 Placing the Unit in Hot Shutdown

Execute the following steps to place the unit in Hot Shutdown :

- 5.3.1 Fully insert all control rods in the selected sequence.
- 5.3.2 If the MSIVs are open and the main condenser is available, initiate cooldown by opening a turbine bypass valve to establish a cooldown rate. Maintain the setpoint of the Pressure Regulator [2 kg/cm²] above reactor pressure. Cooldown may be terminated whenever the desired final conditions of temperature and pressure are reached.
- 5.3.3 When reactor pressure falls below [40 kg/cm²] and decreasing, control reactor water level in the Low Flow Control mode with one LPCP and one HPCP. Refer to SOP-C31 and SOP-[later].
- 5.3.4 After all control rods are inserted, place the Reactor Mode Switch to SHUTDOWN position.
- 5.3.5 Reset the Reactor Trip System in accordance with section 6.1 of SOP-C71, "Reactor Trip System".
- 5.3.6 If the reactor is to be isolated:
 - If main condenser vacuum is to be maintained, start the Startup SJAEs and shift the gland sealing steam from the Steam Seal Evaporator to the Auxiliary Boiler.
 - Verify that reactor water level is being controlled in accordance with steps 5.3.3.
 - Close the inboard MSIVs (B21-F071s) one at a time by placing its control switch to TEST CLOSE position.
 - Close the main steam line drain line containment isolation valves (B21-F141 and F142).
 - When steam pressure downstream of the MSIVs has decreased to [later], similarly close the outboard MSIVs (B21-F072s).
 - Use the SRVs for depressurization and initiate RHR suppression pool cooling if necessary.



5.3 Placing the Unit in Hot Shutdown(continued)

5.3.7 Refer to IOP-9, "Maintaining Hot Standby or Hot Shutdown" for operational procedures on maintenance of the Hot Shutdown Mode of operation, or to IOP-6, "Cooldown to Cold Shutdown, Main Condenser Available", or to IOP-7, "Cooldown to Cold Shutdown, Main Condenser Not Available", as directed.

6.0 REFERENCES

6.1 General Electric Service Information Letter SIL-208, "Minimizing Feedwater Nozzle Thermal Duty", Revision 1, October, 1978.