REACTOR SHUTDOWN FROM HOT STANDBY TO HOT SHUTDOWN

I. OBJECTIVE

This instruction describes the procedure to shut down the reactor from hot standby to hot shutdown. The reactor will be shut down with control rods inserted and the Reactor Coolant System maintained at operating pressure and temperature.

II. CONDITIONS

* A. The reactor is at hot standby with the reactor critical at a low power level and the control rods are within the normal operating limits.

* B. The control rods are in manual control.

* C. The turbine cycle auxiliary systems are in service and steam is being dumped to the main condenser under automatic pressure control maintaining approximately 930 psig steam pressure.

* D. The station instrumentation and controls are in service.

* E. Plant auxiliary systems are in service as required for the conditions.

* F. The Reactor Coolant System protection controls are in the operate position.

* G. The Safety Injection System is in service.

H. The water level in the steam generators is being maintained in the normal operating range by manual control of the feedwater regulators.

III. PRECAUTIONS

A. Any plant changes which produce (1) a sudden change in reactor coolant temperature in the order of 10°F, or (2) a reactor coolant boron concentration of the order of 10 ppm, must be avoided while the reactor is critical at low power.

B. Following a substantial change in reactor coolant boron concentration, the pressurizer spray must be operated to equalize boron concentration with the Reactor Coolant System.

C. The steam generator water levels should remain in the normal operating range.

* D. One shutdown rod group must be at the withdrawn position whenever positive reactivity is being inserted by boron dilution, xenon decay, reactor coolant temperature change, or the withdrawal of control rods other than this shutdown group.

1. The following two exceptions to this rule may be applied:
   a. The Reactor Coolant System has been borated to at least the hot shutdown, xenon-free, boron concentration and is being maintained at hot shutdown.
   b. The Reactor Coolant System has been borated to the cold shutdown boron concentration and the plant is being cooled down.

* 2. When possible, it is desirable to maintain a shutdown group at the withdrawn position as additional shutdown margin.

E. If it becomes necessary to remove the safety injection system from service while the reactor is at hot shutdown, the shutdown margin should first be increased to 4% Δ k/k, hot, xenon free, all rods in, to minimize the consequences of a steam line break.

F. Any time the xenon transient resulting from the shutdown cannot be reasonable predicted, the Reactor Coolant System shall be borated to the hot shutdown, xenon-free condition.

G. 1. The drive rods should not be stepped fully into the core, but should be tripped within a few inches of the bottom. This will reduce the possibility of hang ups during initial pick up.

2. When exercising one rod of a group during rod tests, one of two methods should be followed:

   a. Pull all fuses on rods being disabled.

   b. Move the rods a few steps from the bottom before pulling the lift coil fuse. This will center the latches and avoid the possiblity of damage.

* IV. CHECK-OFF LIST (not applicable)

V. INSTRUCTIONS

	Important Steps	Key Points
*	1. Trip all control rods into the core.	1. a. Check all control rods fully inserted into the core. b. Monitor nuclear instrumentation and rod positions for correct indications.
*	2. Reset reactor trip breakers and withdraw shutdown group one to the withdrawn position.	2. Shutdown group one shall remain in the withdrawn position until the conditions listed in Precautions D are met.
*	3. Reduce the number of operating reactor coolant pumps to the minimum required to maintain T_{avg} within the operating temperature limits.	3. Monitor amount of steam being dumped to the condenser as criteria.

* VI. FINAL CONDITIONS

The reactor is sub-critical with the shutdown rod group one withdrawn. The Reactor Coolant System temperature is being maintained at approximately normal no load value by reactor residual heat and a minimum number of reactor coolant pumps operating. Steam generator pressure is being maintained at 930 psig by the Steam Dump System.

H. L. Ottoson,
Superintendent

MHB:see

*Indicates revision