Form SPD-1002-1

DUKE POWER COMPANY
PROCEDURE PREPARATION
PROCESS RECORD

(1) ID No: EP/0/A/1800/11
Change(s) 1 to
1 Incorporated

(2) STATION: ONS

(3) PROCEDURE TITLE: Loss of Low Pressure Injection
(Decay Heat Removal)

(4) PREPARED BY: [signature] DATE: 1-15-80

(5) REVIEWED BY: Rick Haller DATE: 1-28-80

Cross-Disciplinary Review By: _____ N/R: RBT

(6) TEMPORARY APPROVAL (IF NECESSARY):

By: _____ (SRO) Date: _____

By: _____ Date: _____

(7) APPROVED BY: J S Page Date: 2-26-80

(8) MISCELLANEOUS:

Reviewed/~~Approved By~~: George A. Ridgeway Date: 1-31-80

Reviewed/Approved By: _____ Date: _____

8205170236

DUKE POWER COMPANY

OCONEE NUCLEAR STATION

LOSS OF LOW PRESSURE INJECTION SYSTEM

Considers the following cases:

Case A Failure of one (1) train of the Low Pressure Injection System during ECCS operation.

Case B Loss of Low Pressure Injection System during Decay Heat Removal.

CASE A: Failure of one (1) train of the Low Pressure Injection System during ECCS Operation.

1.0 Symptoms

1.1 Low flow alarm in the affected LPI header.

1.2 Failure of (3)(2) LP-17 or (3)(2) LP-18 to open.

2.0 Immediate Action

2.1 Automatic

None

2.2 Manual (required within 15 minutes of failure).

2.2.1 If (3)(2) LP-17 or (3)(2) LP-18 fails to open automatically and cannot be remotely operated, dispatch an Operator to manually open the valve.

2.2.2 If the LPI pump in the affected loop has failed, attempt to restart pump.

2.2.3 If the pump fails to start and LPI pump "C" is available, open (3)(2) LP-6 and (3)(2) LP-7 and start LPI pump "C":

2.2.3.1 If "A" header is the affected header, open (3)(2) LP-9 and throttle (3)(2) LP-12 to establish ≅ 3000 gpm flow in "A" header.

2.2.3.2 If "B" header is the affected header, open (3)(2) LP-10 and throttle (3)(2) LP-14 to establish ≅ 3000 gpm flow in "B" header.

2.2.4 If neither of the two pumps above can be started, open (3)(2) LP-9 and (3)(2) LP-10 and throttle (3)(2) LP-12 and (3)(2) LP-14 as necessary to balance flow in both headers. This action should establish ≅ 1500 gpm flow in each header.

NOTE: If valves in steps 2.2.3 or 2.2.4 cannot be remotely operated, dispatch an Operator to manually open the valve.

3.0 Subsequent Action

3.1 If LPI pumps failed to operate, attempt to repair and return LPI System to normal ECCS operation.

CASE B: Loss of Low Pressure Injection System during Decay Heat Removal

1.0 Symptoms

1.1 LP Injection flow is abnormal.

1.2 LP cooler inlet or outlet temperature increasing.

1.3 RCS incore temperature increasing.

1.4 Low pressure injection pump discharge pressure low.

1.5 Low pressure injection pump tripped or amperage abnormally low.

1.6 An LPI system valve that should be open indicates closed or partially closed.

2.0 Immediate Action

2.1 Automatic

None

2.2 Manual

2.2.1 If LP injection flow, pump discharge pressure, or LPI pump motor amperage is abnormal, secure the running LPI pump and valve in and start the standby pump, and restore normal cooling.

2.2.2 Verify LP Cooler LPSW flow is adequate.

2.2.3 Verify valves (3)(2) LP-1, (3)(2) LP-2, and (3)(2) LP-3 are open.

2.2.4 Stop any operations that would reduce RCS inventory.

3.0 Subsequent Action

3.1 If LPIP cavitation is experienced, secure LPI Pump and verify correct valve line-up. OPEN (2)(3) LP-21 and (2)(3) LP-22 from the BWST and vent the pumps. Restart a pump and refill reactor vessel and decay heat lines. Reshut (2)(3) LP-21 and (2)(3) LP-22 and re-establish decay heat removal flow.

3.2 In the event of loss of RCS/LPI inventory during decay heat removal:

3.2.1 Maintain inventory with water from the BWST or BHUT's.

NOTE: Insure make-up water has sufficient boron concentration to maintain > 1% shutdown margin.

3.2.2 Establish containment integrity as per Tech. Spec. 1.7.

3.2.3 If loss of inventory is due to leak, determine location and isolate the leak if possible.

3.2.4 If a leak is in a LPI injection line:

3.2.4.1 Stop the LPIP discharging to the affected header.

3.2.4.2 Isolate the affected header.

3.2.4.3 Align LPIP's to the redundant header.

3.2.4.4 Start an LPIP and adjust flow as required to maintain RCS temperature.

3.2.5 If a leak is in the RCS or cannot be isolated:

3.2.5.1 Maintain decay heat removal flow and start the idle LPIP in the injection mode.

3.2.5.2 1) Maintain pressurizer level if filled or,

2) Maintain water flow out the reactor vessel head flange if drained and reactor vessel head detensioned.

3) Maintain fuel transfer canal level if refueling. If the fuel transfer canal is full, maintain level by makeup from BHUT's. Insure make-up water boron concentration > 1800 ppmb.

NOTE: If the canal is empty and the seal plate removed, maintain reactor vessel level until seal plate can be installed and the transfer

tube flanges removed and flange drains shut, then flood the refueling transfer canal from the BWST.

3.2.6 When the water level in the reactor building emergency sump is greater than 3.5 ft. switch the LPIP from the injection mode to the recirculation mode.

NOTE: If the leak is not large enough to maintain sufficient level in the sump for NPSH for LPIP, cycle LPIP in recirculation mode to maintain desired RCS/Canal level.

CAUTION: Do not allow LPIP to cavitate. If not secured within 5 minutes of loss of suction, the pump will fail.

3.2.7 If it is determined that the leak is unisolable and reduction of RCS inventory cannot be stopped and a refueling transfer canal level can be maintained, fill the refueling transfer canal.

3.3 In the event the LPI system cannot be operated to maintain the reactor coolant temperature below 180°F and the RCS can be closed and pressurized:

3.3.1 Isolate the Decay Heat Removal system from the RCS by closing (2)(3) LP-1, 2 & 3. The Decay Heat Removal system must be isolated from the RCS anytime RCS pressure increases > 320 psig.

3.3.2 Refill the RCS with HPI from the BWST and close RCS vents.

3.3.3 Establish Decay Heat Removal by natural circulation or increase RCS pressure above that required for RCP NPSH by energizing the pressurizer heaters and start one RCP.

3.3.4 Initiate feedwater flow to the OTSG's and use the atmospheric dumps or turbine bypass valves, if there is a vacuum in the condensers, to control RCS temperatures.

3.3.5 If Nat. Circ. or one RCP running cannot be established immediately, refill and pressurize the RCS to 200 psig. Letdown via the decay heat removal lines through one idle LPIP and its cooler, LPI to HPI crossconnect, to the HPIP. Start the HPI system and supply RCS cooling by normal make-up flow path until Nat. Circ. or one RCP is running with at least one OTSG available to remove decay heat.

Establish Nat. Circ. or one RCP running as soon as possible since HPI flow alone may have insufficient capacity to remove decay heat.

3.4 In the event the LPI system cannot be operated to maintain the reactor coolant temperatures and the RCS pressure boundary is not intact, (i.e., Reactor vessel head de-tensioned, Pzr. reliefs removed, or OTSG primary manways removed, etc.) perform the following:

3.4.1 Open (2)(3) HP-24 and start "A" or "B" HPIP. Throttle the discharge flow until water is observed coming from the reactor vessel head flange.

NOTE: This may cause flow into the incore tank. Ensure the incore tank water-tight door is shut.

3.4.2 Establish containment integrity as per Tech. Spec. 1.7.

3.4.3 Increase make-up flow as necessary to keep the core cool. Verify water vs. steam flow from reactor vessel head flange.

3.4.4 Restore a LPI train in decay heat removal mode as soon as possible.

3.5 In the event the LPI system cannot be operated to maintain reactor coolant temperature below 140°F during refueling operations:

3.5.1 If the canal is empty and the seal plate is not installed, maintain the core covered by BWST via HPIP or by BHUT via bleed transfer pump until the seal plate is installed.

NOTE: Insure make-up water has sufficient boron concentration to maintain > 1% shutdown margin.

3.5.2 Re-establish containment integrity as per Tech. Spec. 1.7.

3.5.3 When the seal plate is installed, throttle HPIP discharge from BWST and if steam is observed in the core, allow overflow into the refueling transfer canal.

3.5.4 Return LPI decay heat removal system to service as soon as possible.

3.5.5 If the LPI decay heat removal system cannot be restored before the BWST is exhausted and the canal is full, use the SFP coolers to maintain RCS temperature:

3.5.5.1 Increase SFP cooling flow.

3.5.5.2 Align spent fuel pumps to take suction through (2)(3) LP-1, (2)(3) LP-2, (2)(3) LP-24, and (2)(3) SF-61.

3.5.5.3 Insure that at least one fuel transfer tube is open to allow flow from the SFP to the fuel transfer canal.