4.0 FOLLOW-UP ACTIONS: NO F.W. AVAILABLE

4.1 If RCP's are operating, stop all but 1 RCP per loop.

4.2 Manually open turbine bypasses if condenser is under vacuum, otherwise, open the atmospheric dump valves to allow feed from a condensate pump (if one is available, even though the auxiliary FW pump is not). If no condensate pump is available for OTSG feed, fully open dump or bypass valves and align SW feed to the OTSG's through the idle EFW pumps as follows:

CAUTION

IF ONLY A CONDENSATE PUMP IS AVAILABLE, CLOSE LO-LOAD VALVES AND MODULATE SU VALVES TO FEED SLOWLY, MONITORING RCS TEMPERATURE AND PRESSURE; FEED TO CONTROL TEMPERATURE AND RCS PRESSURE UNTIL RCS IS COOLED TO ~ 420°F, WHEN LEVEL CONTROL MAY BE ESTABLISHED.

4.2.1 Open SW supply valves to EFW suction and select "SW" position on both P-7A and P-7B suction select switches.

4.2.2 Verify both EFW block and bypass valves to each OTSG open.

NOTE

If RCS leakage is greater than normal makeup capacity, refer to 1903.10 to determine EAL.

4.3 Monitor RCS pressures and temperatures; maintain at least 50°F margin to saturation by holding RCS pressure near the minimum allowable pressure within the cooldown pressure-temperature curve (Figure 2 if RCP's are operating, Figure 3 if no RCP's are operating).

NOTE

If margin to saturation is less than 20°F for greater than 5 minutes, refer to 1903.10 to determine EAL.

4.4 Open the ERV and its block valve (if closed) under either of the following circumstances:

4.4.1 No RCP's are operating.

4.4.2 RCS re-pressurizes (indicating HPI flows are insufficient for core cooling)

NOTE

If ES actuation occurs before HPI can be manually established and the RCS pressure recovers, do not reset ES analog channels, as this would delay restart of actuated equipment in the event of a loss of off-site power as pressure would have to fall again to actuation setpoint.

NOTE

If ESAS actuates automatically, refer to 1903.10 to determine EAL.

4.5 If, at any time during the ensueing steps, emergency feedwater is made available, proceed as follows to restore OTSG levels.

4.5.1 Close atmospheric dumps and turbine bypasses.

4.5.2 Close all EFW block and bypass valves by placing Auto/Manual selector switches in "Manual, then close the block and bypass valves.

4.0 FOLLOW-UP ACTIONS: NO F.W. AVAILABLE

4.1 If RCP's are operating, stop all but 1 RCP per loop.

4.2 Manually open turbine bypasses if condenser is under vacuum, otherwise, open the atmospheric dump valves to allow feed from a condensate pump (if one is available, even though the auxiliary FW pump is not). If no condensate pump is available for OTSG feed, fully open dump or bypass valves and align SW feed to the OTSG's through the idle EFW pumps as follows:

CAUTION

IF ONLY A CONDENSATE PUMP IS AVAILABLE, CLOSE LO-LOAD VALVES AND MODULATE SU VALVES TO FEED SLOWLY; MONITORING RCS TEMPERATURE AND PRESSURE; FEED TO CONTROL TEMPERATURE AND RCS PRESSURE UNTIL RCS IS COOLED TO ~ 420°F, WHEN LEVEL CONTROL MAY BE ESTABLISHED.

4.2.1 Open SW supply valves to EFW suction and select "SW" position on both P-7A and P-7B suction select switches.

4.2.2 Verify both EFW block and bypass valves to each OTSG open.

NOTE

If RCS leakage is greater than normal makeup capacity, refer to 1903.10 to determine EAL.

4.3 Monitor RCS pressures and temperatures; maintain at least 50°F margin to saturation by holding RCS pressure near the minimum allowable pressure within the cooldown pressure-temperature curve (Figure 2 if RCP's are operating, Figure 3 if no RCP's are operating).

NOTE

If margin to saturation is less than 20°F for greater than 5 minutes, refer to 1903.10 to determine EAL.

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4.4.2 RCS re-pressurizes (indicating HPI flows are insufficient for core cooling)

NOTE

If ES actuation occurs before HPI can be manually established and the RCS pressure recovers, do not reset ES analog channels, as this would delay restart of actuated equipment in the event of a loss of off-site power as pressure would have to fall again to actuation setpoint.

NOTE

If ESAS actuates automatically, refer to 1903.10 to determine EAL.

4.5 If, at any time during the ensueing steps, emergency feedwater is made available, proceed as follows to restore OTSG levels.

4.5.1 Close atmospheric dumps and turbine bypasses.

4.5.2 Close all EFW block and bypass valves by placing Auto/Manual selector switches in "Manual, then close the block and bypass valves.

4.5.3 Select "Condensate" position on EFW pump suction selectors (if CST is available, otherwise, remain on SW feed) for both P-7A and P-7B.

4.5.4 Start P-7A or P-7B; slowly open EFW bypass valves while monitoring RCS pressure and temperature, feeding slowly to prevent gross cooldown.

4.5.5 Establish OTSG levels between 90% and 95% operate range if RCP's are not operating, or > 22" S.U. range if RCP's are running with EFW bypasses and control OTSG pressure and RCS cooldown with atmospheric dumps or turbine bypasses.

NOTE

Refer to 1102.10 for cooldown with RCP's running. Refer to 1203.13 (Natural Circulation Cooldown) if no RCP's are running.

4.5.6 If RCP's are running, attempt to close the ERV and allow system pressure to stabilize, then proceed to section 3.0 of this procedure for all further action.

4.5.7 If RCP's are not available, proceed to section 5.0 of this procedure for all further action.

4.6 Continue maximum HPI flow for cooldown without EFW until RCS is >50°F subcooled.

4.7 Monitor RB pressure; if pressure reaches 4 psig, verify reactor building isolation and cooling actuation (E.S. channels 5 & 6) and HPI and LPI actuation (channels 1, 2, 3 & 4).

NOTE

As a back-up or in case of an exceptionally high containment pressure, additional wide range (0 to 210 PSIA) instrumentation is installed. Two safety grade indicators (PI-2412 & PI-2413) and a non-safety grade wide range pressure recorder (PR-2412) are located on control panels C-486-1 & C-486-2.

NOTE

Proper ES actuation is verified by noting that the colors of components' indicating lamps on the ES panels C-16, C-18, and on C-26 correspond to the color of the switch nameplate. Proper flow ranges for HPI and LPI are marked on the meter faces. Proper Penetration Room ventilation is verified by noting all room isolation damper lamps out, flow indicated, and negative Penetration Room pressure indicated.

Verify both emergency diesels autostart and their SW supply MOV's open. Over-ride (using E.S. manual over-ride pushbuttons) and re-open the following valves to allow continued RCP and instrument air system operation:

4.7.1 Nuclear loop ICW RB isolation valves CV-2233, CV-2215 and CV-2214.

4.7.2 Non-nuclear loop ICW valves CV-2235, CV-2234, CV-2221 and CV-2220.

4.7.3 SW supply valves to the ICW heat exchangers CV-3811 and CV-3820.

4.7.4 Verify two ICW pumps and a control rod drive booster pump running and ICW flows indicated for both loops.

4.8 Prepare for LPI boost to MU pump suction and RB sump recirc as follows:

4.8.1 Verify MU tank outlet MU-13 closed.

4.8.2 Open DH-7A and DH-7B, LPI discharge to MU pumps suction, verify MU pump suction crossover valves MU-14, MU-15, MU-16, and MU-17 open, and verify MU pump discharge crossover valves MU-23, MU-24, MU-25, and MU-26 open.

4.8.3 Isolate the DH rooms by closing both DH room floor drain valves, ABS-13 and ABS-14, securing room purge dampers CV-7621, CV-7622, CV-7637, and CV-7638 from ventilation control panel (east wall of 404' Ventilation Room) and closing watertight doors.

4.8.4 Verify both DH pumps operating and both LPI Mov's open (CV-1400 and CV-1401).

4.9 Once a 50°F margin to saturation is attained, continue HPI cooldown without purposefully depressurizing the RCS until operation is within the pressure/temperature cooldown curve limits (Figure 2 of this procedure). Continue with plant cooldown and depressurize by throttling HPI MOV's after achieving operation with the pressure/temperature curve limits while holding >50°F margin to saturation. Plot cooldown rate and pressure/temperature relationship as required by 1102.10, Attachment B.

CAUTION

DO NOT DECREASE MAKEUP PUMP FLOW RATE BELOW 50 GPM WITH THE RECIRC VALVES (CV-1300 AND CV-1301) CLOSED. STOP THE ES STANDBY MAKEUP PUMP IF NECESSARY TO PREVENT GOING SOLID IN THE PRESSURIZER (MUST BE >50° SUBCOOLED).

CAUTION

HPI components are not to be over-ridden unless the following criteria are met:

1) The HPI system has been in operation for 20 minutes, and all hot and cold leg temperatures are at least 50°F below saturation temperature for the existing RCS pressure, or
2) The RCS is > 50°F subcooled, and throttling of HPI is necessary to prevent going solid in the pressurizer (with no break detected in pzr. steam space), or
3) The RCS is > 50°F subcooled, and HPI throttling is necessary to remain within the plant cooldown pressure/temperature curve limits, or
4) D.H. or LPI has been operating for > 20 minutes with flow rates of ≥ 2650 gpm per train, or > 3100 gpm with one train operating.

If margin to saturation drops below 50°F after HPI override, re-initiate maximum HPI until > 50°F subcooled. (Refer to figure 1.)

UNDER NO CIRCUMSTANCES IS HPI TO BE OVER-RIDDEN IF RCS IS NOT SUBCOOLED.

4.10 Monitor BWST level; when BWST level has fallen to ~6' indicated level, or when the corresponding BWST lo-lo-level alarm is received, verify sufficient water inventory via the RB sump (Refer to sump level indicator LI-1405 & Rx Bldg. Level indicators LI-5645 & LI-5646) and transfer suction to RB sump by verifying RB sump suction valves inside containment CV-1414 and CV-1415 open, opening RB sump suction valves outside containment CV-1405 and CV-1406 (a slight upward perturbation should be noted on pump flows indicating suction transfer); then close both BWST outlets CV-1407 and CV-1408 (Refer to 1104.04 for RCS temperature control methods). Close NaOH tank outlets CV-1616 and CV-1617. MANUAL OVERRIDE PUSHBUTTONS MUST BE DEPRESSED FOR ALL VALVE MANIPULATIONS IF ES ACTUATION HAS OCCURRED. Monitor the RB water level indicators LI-5645 and LI-5646 during the entire recirculation phase.

4.11 When RCS pressure is reduced to ~600 psig, continue slow depressurization (control discussed in step 4.9) and allow CFT's to discharge. Monitor HPI flows closely; maintain ≥ 100 gpm per pump.

4.12 Initiate R.B. H_2 sampling per section 9.0 of OP 1104.33.

4.13 When HPI flow is approaching 100 gpm per loop, stop 1 HPI pump and align for MU and purification as follows:

4.13.1 Close LPI boost to secured HPI pump (DH-7A or DH-7B).

4.13.2 Close suction cross-connect valve (MU-14 or MU-15 for B to C) or (MU-16 or MU-17 for A to B) isolating the running HPI pump from the MU tank.

4.13.3 Close running HPI pump manual recirculation valve (MU-21A, B or C).

4.13.4 Open MU-13 (MU tank outlet).

4.13.5 Over-ride ES signal and open CV-1300 and CV-1301.

4.13.6 Over-ride ES signal and open CV-1214, CV-1216 and CV-1221.

4.13.7 Verify ICW available and establish letdown.

4.13.8 Verify MU tank level $\geq$ 40" and start MU pump which was aligned for MU & P.

4.13.9 Stop HPI pump whose suction is aligned to LPI pump discharge.

4.13.10 Modulate makeup and letdown to control press/temp. If > 50°F margin to saturation cannot be maintained, restart HPI pump.

4.13.11 Stop the DH pump (which is not aligned for boost for HPI pump) and align its manual valves for normal decay heat mode per 1104.04.

NOTE
If only one LPI pump is operating, initiate repairing on the failed pump and align it for D.H. operation after repairs; meanwhile, continue HPI/LPI cooling.

4.13.12 Continue HPI/LPI cooldown to within limits of decay heat system.

4.13.13 Place decay heat system in service and stop HPI pump (if running) and its associated (booster) decay heat pump.

4.14 Select "Manual" and close all emergency FW feed valves and bypass valves; close all steam supply MOV's to P-7A to secure emergency feed.

4.15 Close main FW isolation valves.

4.16 Close MS isolation valves (if not previously closed by SLBIC) whenever OTSG's are dry.

5.0 FOLLOW-UP ACTION - No Reactor Coolant Pumps

5.1 Initiate manual EFW feed to OTSG's and slowly increase levels to between 90% and 95% on operate range. Attempt to maintain a continuous feed rate while raising levels.

NOTE

If RCS leakage is greater than normal makeup capacity, refer to 1903.10 to determine EAL.

NOTE

If ES actuation occurs before HPI can be manually established and the RCS pressure recovers, do not reset ES analog channels, as this would delay restart of actuated equipment in the event of a loss of off-site power as pressure would have to fall again to actuation setpoint.

NOTE

If ESAS actuates automatically, refer to 1903.10 to determine EAL.

5.2 Monitor RCS pressures and temperatures; maintain at least 50°F margin to saturation by holding RCS pressure within the cooldown pressure-temperature curve (Figure 3) if possible.

NOTE

As a back-up or in case of an exceptionally high containment pressure, additional wide range (0 to 210 PSIA) instrumentation is installed. Two safety grade indicators (PI-2412 & PI-2413) and a non-safety grade wide range pressure recorder (PR-2412) are located on control panels C-486-1 & C-486-2.

5.3 Monitor RB pressure; if pressure reaches 4 psig, verify reactor building isolation and cooling actuation (E.S. channels 5 & 6 and HPI & LPI actuation (channels 1, 2, 3 & 4).

NOTE

Proper ES actuation is verified by noting that the colors of components' indicating lamps on the ES panels C-16, C-18 and on C-26 correspond to the color of the switch nameplate. Proper flow ranges for HPI & LPI are marked on the meter faces. Proper Penetration Room ventilation is verified by noting all room isolation damper lamps out, flow indicated and negative Penetration Room pressure indicated.

4.14 Select "Manual" and close all emergency FW feed valves and bypass valves; close all steam supply MOV's to P-7A to secure emergency feed.

4.15 Close main FW isolation valves.

4.16 Close MS isolation valves (if not previously closed by SLBIC) whenever OTSG's are dry.

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NOTE

If ES actuation occurs before HPI can be manually established and the RCS pressure recovers, do not reset ES analog channels, as this would delay restart of actuated equipment in the event of a loss of off-site power as pressure would have to fall again to actuation setpoint.

NOTE

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5.2 Monitor RCS pressures and temperatures; maintain at least 50°F margin to saturation by holding RCS pressure within the cooldown pressure-temperature curve (Figure 3) if possible.

NOTE

As a back-up or in case of an exceptionally high containment pressure, additional wide range (0 to 210 PSIA) instrumentation is installed. Two safety grade indicators (PI-2412 & PI-2413) and a non-safety grade wide range pressure recorder (PR-2412) are located on control panels C-486-1 & C-486-2.

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NOTE

Proper ES actuation is verified by noting that the colors of components' indicating lamps on the ES panels C-16, C-18 and on C-26 correspond to the color of the switch nameplate. Proper flow ranges for HPI & LPI are marked on the meter faces. Proper Penetration Room ventilation is verified by noting all room isolation damper lamps out, flow indicated and negative Penetration Room pressure indicated.

FIGURE 3

ALLOWABLE RCS PRESSURE VS. TEMPERATURE
DURING COOLDOWN WITHOUT RCP'S OPERATING