

PLANT OPERATIONS MANUAL

Volume 5

05-S-01-EP-2

Section 1

Revision C

Date:

EMERGENCY PROCEDURE

COOLDOWN

SAFETY RELATED

Prepared: _____ Date _____

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Assistant Plant Manager

PSRC: _____ Date _____

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Attachment I Rev. C

8104210403

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1.0 PURPOSE

The purpose of this procedure is to depressurize and cooldown the RPV to cold shutdown conditions while maintaining RPV water level within a satisfactory range.

2.0 ENTRY CONDITIONS

This procedure is entered from EP-1 (Level Control) after the RPV water level has been stabilized.

3.0 OPERATOR ACTIONS

CAUTION

A LPCS and LPCI injection resulting from a +1.75 psig Drywell pressure signal will inject a large volume of water into the RPV when RPV pressure decreases to the LPCS and LPCI pump injection pressures. Rapid injection of this large volume of water may be detrimental to maintaining RPV water level within the desired range.

NOTE

SOI numbers and available pressure ranges are indicated for each system.

NOTE

The systems listed in paragraph 3.1 are listed in order of expected availability and ease of utilization. The choice of using the following systems may vary with plant conditions. It is preferred that the minimum of systems be used to accomplish the water level restoration.

- ☐ 3.1 Maintain RPV water level between +52" and the TAF, as follows:

NOTE

TAF = 0" as read on the following fuel zone instrumentation:

P601 - RHR Section - B21-R615

P601 - RCIC Section - B21-R610

- ☐ 3.1.1 Use the following systems:

☐ a. Feedwater (04-1-01-N21-1) (1103 - 0 psig)

☐ b. CRD (04-1-01-C11-1) (1103 - 0 psig)

(1) Operate two pumps if possible

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NOTE

RCIC operation results in Suppression Pool heating.

- ☐ c. RCIC (04-1-01-E51-1) (1103 - 50 psig)

NOTE

Maintain a minimum of 2000 RPM to ensure sufficient oil pressure by placing the RCIC FLOW CONTROLLER to MANUAL and adjusting RPM.

CAUTION

Do not place an ECCS in the MANUAL mode unless, by two independent indications:

1. misoperation in the AUTOMATIC mode is confirmed, or
2. adequate core cooling is assured.

- ☐ d. HPCS (04-1-01-E22-1) (1103 - 0 psig)

- ☐ e. LPCS (04-1-01-E21-1) (500 - 0 psig)

- ☐ f. Condensate Booster
(04-1-01-N19-1) (435 - 0 psig)

- ☐ g. Condensate (04-1-01-N19-1) (270 - 0 psig)

- ☐ h. LPCI (04-1-01-E12-1) (310 - 0 psig)

- ☐ 3.1.2 If while depressurizing, a high drywell pressure (1.75 psig) exists and LPCS or LPCI pump(s) are not required to assure adequate core cooling; then prevent injection from LPCS and/or LPCI by closing the injection valve(s).

- ☐ a. LPCI Loop A - E12 - F042A

- ☐ b. LPCI Loop B - E12 - F042B

- ☐ c. LPCI Loop C - E12 - F042C

- ☐ d. LPCS - E21 - F005A

- ☐ 3.1.3 If an ECCS system has been placed in the MANUAL mode, then all of the following actions are required:

- a. Be aware that the system will not automatically initiate.

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- ☐ b. Make frequent checks of the initiating or controlling parameter.
- ☐ c. When the MANUAL mode is no longer required, restore the system to the AUTOMATIC/STANDBY mode if possible.
- ☐ 3.1.4 If high Suppression Pool water level (18'10") or low Condensate Storage Tank level (2'0") occurs, perform the following:
 - ☐ a. Confirm automatic transfer of HPCS and RCIC suction from the Condensate Storage Tank to the Suppression Pool.
 - (1) HPCS - E22 - F015 opens and then E22 - F001 closes
 - (2) RCIC - E51 - F031 opens and then E51 - F010 closes
 - ☐ b. If the HPCS and RCIC suction did not automatically transfer as designed, then manually transfer the HPCS and RCIC suction in the sequence listed in substep a.
- ☐ 3.1.5 If RPV water level cannot be determined or maintained above TAF, proceed to EP-4 (Level Restoration).

NOTE

TAF = 0" as read on the following fuel zone instrumentation:

P601 - RHR Section - B21-R615

P601 - RCIC Section - B21-R610

- ☐ 3.2 If SRV's are cycling, manually open one SRV and reduce RPV pressure to approximately 833 psig (150 psig below the lowest SRV lift pressure of 1033 psig after low low set is actuated).
- ☐ 3.3 Depressurize the RPV and maintain cooldown rate below 100°F/hr, as follows:

NOTE

In order to (1) conserve RPV water inventory, (2) protect containment integrity, and (3) limit radioactive release to the environment, cooldown rates greater than 100°F/hr may be required.

NOTE

The systems listed in steps 3.3.1.a and 3.3.1.b are listed in order of expect effectiveness and availability. The minimum number of systems

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used will make the control of the RPV cooldown rate easier to accomplish.

☐ 3.3.1 Use the minimum number of the following systems to maintain the RPV cooldown rate less than 100°F/hr.

☐ a. Main Condenser available

☐ (1) Main Turbine Bypass Valves (preferred method)
(1103 - 0 psig)

NOTE

RCIC operation results in Suppression Pool heating.

☐ (2) RCIC (04-1-01-E51-1 at step later) (1103 - 0 psig)

NOTE

Maintain a minimum of 2000 RPV to ensure sufficient oil pressure by placing the RCIC FLOW CONTROLLER to MANUAL and adjusting RPM.

(a) Maintain greater than 50 psig RPV pressure unless motor driven pumps sufficient to maintain RPV level are running and available for injection as determined by the following sequence:

1. Observe RPV water level indication to determine indicated level.
2. Close RCIC injection valve E51-F013.
3. Observe RPV water level and attempt to maintain RPV water level with the motor driven injection pumps which are running.
4. If RPV water level cannot be maintained with the RCIC injection valve E51-F013 closed, then open E51-F013.
5. If RPV water level can be maintained with the RCIC injection valve E51-F013 closed, then RCIC can be shutdown and the RPV pressure can be decreased to less than 50 psig.

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- ☐ (3) RHR (Steam Condensing Mode) (04-1-01-E12-1 at step later) (1103 - 0 psig)
- ☐ (4) Steam Seal Generator (04-1-01-N33-1 at step later) (1103 - 150 psig)
- ☐ (5) Off Gas Preheaters (04-1-01-N64-4) (1103 - 200 psig)
- ☐ (6) SJAE's (04-1-01-N62-1) (1103 - 200 psig)
- ☐ (7) RFPT's (04-1-01-N21-1) (1103 - 350 psig)
- ☐ (8) RWCU (recirculation mode) (04-1-01-G33-1) (1103 - 0 psig)
- ☐ (9) Main Steam Line Drains (04-1-01-N11-2) (1103 - 0 psig)
- ☐ (10) RWCU (blowdown mode) (04-1-01-G33-1) (1103 - 0 psig)

☐ b. Main Condenser not available

NOTE

RCIC operation results in Suppression Pool heating.

- ☐ (1) RCIC (04-1-01-E51-1 at step later) (1103 - 0 psig)

NOTE

Maintain a minimum of 2000 RPM to ensure sufficient oil pressure by placing the RCIC FLOW CONTROLLER to MANUAL and adjusting RPM.

- (a) Maintain greater than 50 psig RPV pressure unless motor driven pumps sufficient to maintain RPV level are running and available for injection as determined by the following sequence:

1. Observe RPV water level indication to determine indicated level.
2. Close RCIC injection valve E51-F013.
3. Observe RPV water level and attempt to maintain RPV water level with the motor driven injection pumps which are running.
4. If RPV water level cannot be maintained, with the RCIC injection valve E51-F013 closed, then open E51-F013.

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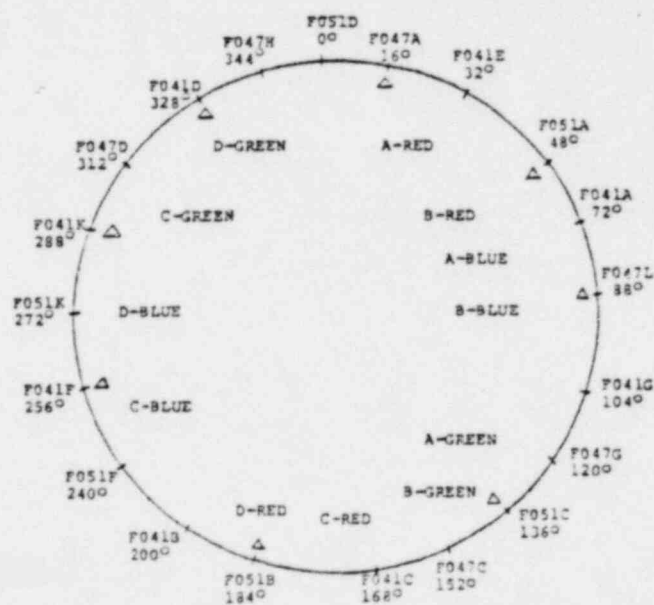
5. If RPV water level can be maintained with the RCIC injection valve E51-F013 closed then RCIC can be shutdown and the RPV pressure can be decreased to less than 50 psig.

- (2) RHR (Steam Condensing Mode) (04-1-01-E12-1 at step later) (1103 - 0 psig)
- (3) RWCU (Recirculation Mode) (04-1-01-G33-1 at step later) (1103 psig - 0 psig)

NOTE

Fewer blowdowns with increased pressure reductions are desirable to minimize SRV cycle stresses.

- (4) SRV's (04-1-01-B21-1 at step later) (1103 - 0 psig)
- (a) Each SRV actuation should be selected to equalize Suppression Pool heating, using Figure A as a guide.
- (b) If the continuous SRV pneumatic supply is or becomes unavailable, depressurize with sustained SRV opening.



- ADS VALVES

The letter followed by a color designates the pen color on suppression pool temperature recorders M71-R065A, B, C, D, on panel M413-P870.

FIGURE A

- (5) RWCU (blowdown mode) (04-1-01-G33-1 at step later) (1103 - 0 psig).

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- ☐ 3.3.2 When the RHR shutdown cooling interlocks clear as indicated by RPV pressure less than 125 psig, then initiate the shutdown cooling mode of RHR per 04-1-01-E12-1 at paragraph 5.4.
- ☐ 3.3.3 If the RHR shutdown cooling mode cannot be established and further cooldown is required, then continue to cooldown with the systems listed in substep 3.3.1.a or 3.3.1.b as applicable.
- ☐ 3.3.4 If RPV cooldown beyond that which can be accomplished by depressurization is required, then enter EP-8 (Alternate Shutdown Cooling).
- ☐ 3.3.5 If the RPV cooldown is under control and the plant condition is stable, proceed to cold shutdown in accordance with IOI 03-1-01-3.

REVISIONS:

WATER LEVEL STABLE

SHUTDOWN
(EP-2)

POOR ORIGINAL

FUEL SOLE INSTRUMENTATION (TAF)

| MAINTAIN RCV LEVEL (0'±0.5") | |
|------------------------------|---------------|
| CONDENSATE / FEED WATER | (1103-0 PSIG) |
| CRD | (1103-0 PSIG) |
| RCIC, HPCS | (1103-0 PSIG) |
| LPCS | (300-0 PSIG) |
| LPCI | (310-0 PSIG) |

