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August 31, 2017
NRC-17-0067

10 CFR 50.90

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Reference: Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

Subject: Application to Revise Technical Specifications to Adopt TSTF-542,
"Reactor Pressure Vessel Water Inventory Control"

In accordance with the provisions of 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," DTE Electric Company (DTE) requests amendment to Appendix A, Technical Specifications of Renewed Facility Operating License NPF-43 for Fermi Unit 2 (Fermi 2).

The proposed change replaces existing Technical Specifications (TS) requirements related to "operations with a potential for draining the reactor vessel" (OPDRVs) with new requirements on Reactor Pressure Vessel Water Inventory Control (RPV WIC) to protect Safety Limit 2.1.1.3. Safety Limit 2.1.1.3 requires reactor vessel water level to be greater than the top of active irradiated fuel.

Enclosure 1 provides a description and assessment of the proposed changes including an analysis of the significant hazards considerations using the standards of 10 CFR 50.92. DTE has concluded that the changes proposed herein do not result in a significant hazards consideration. Enclosure 2 provides the existing TS pages marked to show the proposed changes. Enclosure 3 provides revised (clean) TS pages. Enclosure 4 provides existing TS Bases pages marked to show the proposed changes for information only.

Approval of the proposed amendment is requested by August 31, 2018 to support the next refueling outage. Once approved, the amendment shall be implemented within 120 days.

No new commitments are being made in this submittal.

In accordance with 10 CFR 50.91, a copy of this application, with enclosures, is being provided to the designated Michigan State Official.

Should you have any questions or require additional information, please contact Mr. Scott Maglio, Manager – Nuclear Licensing at (734) 586-5076.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on August 31, 2017



Keith J. Polson
Site Vice President
Nuclear Generation

Enclosures:

1. Description and Assessment
2. Proposed Technical Specification Changes (Mark-Up)
3. Revised Technical Specification Pages
4. Proposed Technical Specification Bases Changes (Mark-Up)
(For Information Only)

cc: NRC Project Manager
NRC Resident Office
Reactor Projects Chief, Branch 5, Region III
Regional Administrator, Region III
Michigan Public Service Commission
Regulated Energy Division (kindschl@michigan.gov)

**Enclosure 1 to
NRC-17-0067**

**Fermi 2 NRC Docket No. 50-341
Operating License No. NPF-43**

**License Amendment Request to Adopt TSTF-542, "Reactor Pressure Vessel Water
Inventory Control"**

Description and Assessment

Description and Assessment of the Proposed License Amendment

1.0 Description

The proposed change replaces existing Technical Specifications (TS) requirements related to "operations which have the potential for draining the reactor vessel" (OPDRVs) with new requirements on Reactor Pressure Vessel Water Inventory Control (RPV WIC) to protect Safety Limit 2.1.1.3. Safety Limit 2.1.1.3 requires reactor vessel water level to be greater than the top of active irradiated fuel.

2.0 Assessment

2.1 Applicability of Published Safety Evaluation

DTE Electric Company (DTE) has reviewed the safety evaluation provided to the Technical Specifications Task Force (TSTF) on December 20, 2016, as well as the information provided in TSTF-542. DTE has concluded that the justifications presented in TSTF-542 and the safety evaluation prepared by the NRC staff are applicable to Fermi 2 and justify this amendment for the incorporation of the changes to the Fermi 2 TS.

The following Fermi 2 TS reference OPDRVs or are related to OPDRVs and are affected by the proposed change:

- 3.3.5.1, Emergency Core Cooling System (ECCS) Instrumentation
- 3.3.6.1, Primary Containment Isolation Instrumentation
- 3.3.6.2, Secondary Containment Isolation Instrumentation
- 3.3.7.1, Control Room Emergency Filtration (CREF) System Instrumentation
- 3.5.2, ECCS – Shutdown
- 3.6.1.3, Primary Containment Isolation Valves (PCIVs)
- 3.6.4.1, Secondary Containment
- 3.6.4.2, Secondary Containment Isolation Valves (SCIVs)
- 3.6.4.3, Standby Gas Treatment (SGT) System
- 3.7.3, Control Room Emergency Filtration (CREF) System
- 3.7.4, Control Center Air Conditioning (AC) System
- 3.8.2, AC Sources – Shutdown
- 3.8.5, DC Sources – Shutdown
- 3.8.8, Distribution Systems – Shutdown

2.2 Variations

DTE is proposing the following variations from the TS changes described in the TSTF-542 or the applicable parts of the NRC staff's safety evaluation. These variations do not affect the applicability of TSTF-542 or the NRC staff's safety evaluation to the proposed license amendment.

DTE proposes to implement the RPV WIC Instrumentation specification as TS 3.3.5.3 and not renumber the existing TS 3.3.5.2, Reactor Core Isolation Cooling (RCIC) System Instrumentation.

In a few instances, the Fermi 2 TS utilize different numbering and titles than the Standard Technical Specifications (STS) on which TSTF-542 was based. Specifically, the titles for the following Fermi 2 TS vary from the STS discussed in TSTF-542. These differences are administrative and do not affect the applicability of TSTF-542 to the Fermi 2 TS.

1. Fermi 2 TS 3.3.7.1, "Control Room Emergency Filtration (CREF) System Instrumentation," corresponds to STS 3.3.7.1, "Main Control Room Environmental Control System Instrumentation."
2. Fermi 2 TS 3.7.3, "Control Room Emergency Filtration (CREF) System," corresponds to STS 3.7.4, "Main Control Room Environmental Control System."
3. Fermi 2 TS 3.7.4, "Control Center Air Conditioning (AC) System," corresponds to STS 3.7.5, "Control Room Air Conditioning (AC) System."
4. Fermi 2 TS 3.8.8, "Distribution Systems – Shutdown," corresponds to STS 3.8.10, "Distribution Systems – Shutdown."

The Fermi 2 TS contain a Note in Surveillance Requirement (SR) 3.5.2.5 regarding realignment to the Low Pressure Coolant Injection mode which is similar to the Note in the STS LCO 3.5.2. Fermi 2 proposes to move Note 1 from SR 3.5.2.5 to the LCO for 3.5.2. This has no effect on the adoption of the TSTF-542 and is an acceptable variation.

The Fermi 2 TS contain a Surveillance Frequency Control Program. Therefore, the Surveillance Requirement Frequencies for Specification 3.5.2 and 3.3.5.3 are "In accordance with the Surveillance Frequency Control Program." This has no effect on the adoption of the TSTF-542 and is an acceptable variation.

Fermi 2 TS Table 3.3.5.1-1 Footnote (a) and Table 3.3.6.1-1 Footnote (c) are deleted as part of TSTF-542. DTE proposes to delete the footnotes and replace with "Not Used." This eliminates the administrative need to update all subsequent footnotes in the table, has no effect on the adoption of TSTF-542, and is an acceptable variation.

DTE proposes to add a closed parenthesis to the title of Fermi 2 TS 3.6.4.2, "Secondary Containment Isolation Valves (SCIVs)." This is an administrative change and has no effect on the adoption of TSTF-542.

The Fermi 2 TS contain the following requirements that differ from the STS on which TSTF-542 was based, but are encompassed in the TSTF-542 justification:

1. The proposed Fermi 2 TS 3.3.5.3, "Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation," Table 3.3.5.3-1 does not include functions corresponding to STS Table 3.3.5.1-1, Function 1.d, "Core Spray Pump Discharge Flow – Low," and

Function 2.g, “Low Pressure Coolant Injection Pump Discharge Flow – Low,” since the Fermi TS do not currently contain these functions in TS Table 3.3.5.1-1.

2. Fermi 2 Table 3.3.5.1-1, Function 2.d, “Reactor Vessel Water Level – Low Low, Level 2 (Loop Select Logic),” and Function 2.e, “Reactor Steam Dome Pressure – Low (Break Detection Logic),” are not included in the STS Table 3.3.5.1-1. Function 2.d and 2.e enable and initiate LPCI loop select logic. The logic then has time to detect a broken recirculation loop and select the unbroken recirculation loop for LPCI injection. TSTF-542 states that if there are plant-specific design and TS that provide different automatic functions that can be credited for isolating penetrations flow paths below the top of active fuel on low RPV water level, that those functions should be included in the RPV Water Inventory Control Instrumentation TS (Fermi 2 proposed TS 3.3.5.3). Function 2.d and 2.e are automatic functions for enabling LPCI loop select logic and do not meet the criteria stated in TSTF-542 for inclusion in the proposed TS Table 3.3.5.3-1. Correspondingly, the existing Mode 4 and Mode 5 requirements for TS Table 3.3.5.1-1 Function 2.d and 2.e are removed, consistent with TSTF-542 justification.
3. The required channels per function in Fermi 2 TS Table 3.3.5.1-1, Function 1.d, “Manual Initiation” of the Core Spray system and 2.h, “Manual Initiation” of the LPCI system, are modified by a footnote stating, “Individual Component Controls.” The footnote is retained for the manual initiation functions of Core Spray System and LPCI system in the proposed TS Table 3.3.5.3-1, RPV Water Inventory Control Instrumentation as footnote (c) consistent with the current Fermi 2 TS requirements.
4. The Fermi 2 TS Bases LCO 3.5.2 definition of an ECCS subsystem for Core Spray and LCPI is updated to be consistent with the STS Bases LCO 3.5.2 definition as one motor driven pump, piping, and valves to transfer water to the RPV, as discussed and justified by TSTF-542.
5. Fermi 2 TS 3.3.5.1 does not include a condition corresponding to STS 3.3.5.1 Condition E; therefore, the proposed changes by TSTF-542 to STS 3.3.5.1 Condition E are not applicable to Fermi 2.
6. TSTF-542 inadvertently omitted the corresponding TS Bases markup for the deletion of TS 3.3.6.1 Required Action J.2 regarding actions to isolate RHR shutdown cooling. Fermi 2 TS Bases changes are made consistent with this TS change.
7. Fermi 2 TS Table 3.3.6.2-1 Function 3, “Fuel Pool Ventilation Exhaust Radiation – High” is equivalent to STS Table 3.3.6.2-1 Function 4, “Refueling Floor Exhaust Radiation – High.” In addition, Fermi 2 TS Table 3.3.6.2-1 does not have a function corresponding to STS Table 3.3.6.2-1 Function 3.
8. Fermi 2 TS Table 3.3.7.1-1 Function 3, “Fuel Pool Ventilation Exhaust Radiation – High” is equivalent to STS Table 3.3.7.1-1 Function 4, “Refueling Floor Area Radiation – High” and Fermi 2 TS Table 3.3.7.1-1 Function 4, “Control Center Normal Makeup Air Radiation – High” is equivalent to STS Table 3.3.7.1-1 Function 5, “Control Room Air Inlet Radiation – High.”
9. Fermi 2 TS currently have TS SR 3.5.2.3, which is not included in STS. The TS SR is renumbered to SR 3.5.2.4 and all subsequent TS SRs 3.5.2.5 through 3.5.2.9 are incremented by one compared to TSTF-542.
10. Fermi 2 TS 3.6.1.3 Action F.1 is to initiate action to isolate RHR-Shutdown Cooling System. This action differs slightly from STS 3.6.1.3 Action H.1 to initiate action to

suspend OPDRVs; however, both actions direct immediate action to isolate PCIVs to prevent inadvertent draindown. Therefore, Fermi 2 TS 3.6.1.3 Action F.1 is removed consistent with the TSTF-542 justification.

11. Fermi 2 TS 3.6.4.1 Condition D and Required Action D.2 correspond to STS TS 3.6.4.1 Condition C and Required Action C.2; and therefore, the changes proposed to Fermi 2 TS 3.6.4.1 Condition D and Required Action D.2 are consistent with TSTF-542 justification.
12. The Fermi 2 CREF and the Control Center AC systems (i.e., TS 3.7.3 and 3.7.4 respectively) provide Control Room habitability functions. Changes to the TS controls on these systems are justified by the discussion in Section 3.4.3 of the TSTF-542 justification. Specifically, these Fermi 2 specific systems provide similar Control Room habitability functions as those described in the STS, and changes to these TS are similarly justified.
13. The Fermi 2 TS Section 3.7.3 for the CREF System retains the existing Note, renumbered to Note 2, in the Actions section modifying Required Action F.2. This change has no effect on the adoption of the TSTF-542 and is an acceptable variation.
14. Fermi 2 TS 3.8.5 Required Action A.2.3 corresponds to STS TS 3.8.5 Required Action B.2.3; and therefore, the change proposed to Fermi 2 TS 3.8.5 Required Action A.2.3 is consistent with TSTF-542 justification.
15. Fermi 2 TS do not include TS corresponding to STS 3.8.8, "Inverters – Shutdown" and therefore the changes proposed by TSTF-542 to STS 3.8.8 are not applicable to Fermi 2.

DTE's proposed variations from the TS changes described in the TSTF-542 or the applicable parts of the NRC staff's safety evaluation do not affect the applicability of TSTF-542 or the NRC staff's safety evaluation to the proposed license amendment.

3.0 Regulatory Analysis

3.1 No Significant Hazards Consideration Analysis

DTE requests adoption of TSTF-542 "Reactor Pressure Vessel Water Inventory Control," which is an approved change to the STS, into the Fermi 2 TS. The proposed amendment replaces the existing requirements in the TS related to OPDRVs with new requirements on RPV WIC to protect Safety Limit 2.1.1.3. Safety Limit 2.1.1.3 requires reactor vessel water level to be greater than the top of active irradiated fuel.

DTE has evaluated whether or not a significant hazards consideration is involved with the proposed amendment(s) by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No

The proposed change replaces existing TS requirements related to OPDRVs with new requirements on RPV WIC that will protect Safety Limit 2.1.1.3. Draining of RPV water inventory in Mode 4 (i.e., cold shutdown) and Mode 5 (i.e., refueling) is not an accident previously evaluated and, therefore, replacing the existing TS controls to prevent or mitigate such an event with a new set of controls has no effect on any accident previously evaluated. RPV water inventory control in Mode 4 or Mode 5 is not an initiator of any accident previously evaluated. The existing OPDRV controls or the proposed RPV WIC controls are not mitigating actions assumed in any accident previously evaluated.

The proposed change reduces the probability of an unexpected draining event (which is not a previously evaluated accident) by imposing new requirements on the limiting time in which an unexpected draining event could result in the reactor vessel water level dropping to the top of the active fuel (TAF). These controls require cognizance of the plant configuration and control of configurations with unacceptably short drain times. These requirements reduce the probability of an unexpected draining event. The current TS requirements are only mitigating actions and impose no requirements that reduce the probability of an unexpected draining event.

The proposed change reduces the consequences of an unexpected draining event (which is not a previously evaluated accident) by requiring an Emergency Core Cooling System (ECCS) subsystem to be operable at all times in Modes 4 and 5. The current TS requirements do not require any water injection systems, ECCS or otherwise, to be Operable in certain conditions in Mode 5. The change in requirement from two ECCS subsystems to one ECCS subsystem in Modes 4 and 5 does not significantly affect the consequences of an unexpected draining event because the proposed Actions ensure equipment is available within the limiting drain time that is as capable of mitigating the event as the current requirements. The proposed controls provide escalating compensatory measures to be established as calculated drain times decrease, such as verification of a second method of water injection and additional confirmations that containment and/or filtration would be available if needed.

The proposed change reduces or eliminates some requirements that were determined to be unnecessary to manage the consequences of an unexpected draining event, such as automatic initiation of an ECCS subsystem and control room ventilation. These changes do not affect the consequences of any accident previously evaluated since a draining event in Modes 4 and 5 is not a previously evaluated accident and the requirements are not needed to adequately respond to a draining event.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed amendment create the possibility of a new or different kind of accident from any previously evaluated?

Response: No

The proposed change replaces existing TS requirements related to OPDRVs with new requirements on RPV WIC that will protect Safety Limit 2.1.1.3. The proposed change will not alter the design function of the equipment involved. Under the proposed change, some systems that are currently required to be operable during OPDRVs would be required to be available within the limiting drain time or to be in service depending on the limiting drain time. Should those systems be unable to be placed into service, the consequences are no different than if those systems were unable to perform their function under the current TS requirements.

The event of concern under the current requirements and the proposed change is an unexpected draining event. The proposed change does not create new failure mechanisms, malfunctions, or accident initiators that would cause a draining event or a new or different kind of accident not previously evaluated or included in the design and licensing bases.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No

The proposed change replaces existing TS requirements related to OPDRVs with new requirements on RPV WIC. The current requirements do not have a stated safety basis and no margin of safety is established in the licensing basis. The safety basis for the new requirements is to protect Safety Limit 2.1.1.3. New requirements are added to determine the limiting time in which the RPV water inventory could drain to the top of the active fuel in the reactor vessel should an unexpected draining event occur. Plant configurations that could result in lowering the RPV water level to the TAF within one hour are now prohibited. New escalating compensatory measures based on the limiting drain time replace the current controls. The proposed TS establish a safety margin by providing defense-in-depth to ensure that the Safety Limit is protected and to protect the public health and safety. While some less restrictive requirements are proposed for plant configurations with long calculated drain times, the overall effect of the change is to improve plant safety and to add safety margin.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, DTE concludes that the proposed change presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

4.0 Environmental Evaluation

The proposed change would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed change does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed change meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed change.

**Enclosure 2 to
NRC-17-0067**

**Fermi 2 NRC Docket No. 50-341
Operating License No. NPF-43**

**License Amendment Request to Adopt TSTF-542, "Reactor Pressure Vessel Water
Inventory Control"**

Proposed Technical Specification Changes (Mark-Up)

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1.1 Definitions (continued)

CORE OPERATING LIMITS
REPDRT (COLR)

The COLR is the unit specific document that provides cycle specific parameter limits for the current reload cycle. These cycle specific limits shall be determined for each reload cycle in accordance with Specification 5.6.5. Plant operation within these limits is addressed in individual Specifications.

DOSE EQUIVALENT I-131

DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries/gram) that alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Table III of TID-14844, AEC, 1962, "Calculation of Distance Factors for Power and Test Reactor Sites."

INSERT
DRAIN TIME Definition

EMERGENCY CORE COOLING
SYSTEM (ECCS) RESPONSE
TIME

The ECCS RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its ECCS initiation setpoint at the channel sensor until the ECCS equipment is capable of performing its safety function (i.e., the valves travel to their required positions, pump discharge pressures reach their required values, etc.). Times shall include diesel generator starting and sequence loading delays, where applicable. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured.

ISOLATION SYSTEM
RESPONSE TIME

The ISOLATION SYSTEM RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its isolation initiation setpoint at the channel sensor until the isolation valves travel to their required positions. Times shall include diesel generator starting and sequence loading delays, where applicable. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured.

(continued)

INSERT

DRAIN TIME Definition

DRAIN TIME

The DRAIN TIME is the time it would take for the water inventory in and above the Reactor Pressure Vessel (RPV) to drain to the top of the active fuel (TAF) seated in the RPV assuming:

- a) The water inventory above the TAF is divided by the limiting drain rate;
- b) The limiting drain rate is the larger of the drain rate through a single penetration flow path with the highest flow rate, or the sum of the drain rates through multiple penetration flow paths susceptible to a common mode failure (e.g., seismic event, loss of normal power, single human error), for all penetration flow paths below the TAF except:
 - 1. Penetration flow paths connected to an intact closed system, or isolated by manual or automatic valves that are locked, sealed, or otherwise secured in the closed position, blank flanges, or other devices that prevent flow of reactor coolant through the penetration flow paths; or
 - 2. Penetration flow paths capable of being isolated by valves that will close automatically without offsite power prior to the RPV water level being equal to the TAF when actuated by RPV water level isolation instrumentation; or
 - 3. Penetration flow paths with isolation devices that can be closed prior to the RPV water level being equal to the TAF by a dedicated operator trained in the task, who in continuous communication with the control room, is stationed at the controls, and is capable of closing the penetration flow path isolation device without offsite power.
- c) The penetration flow paths required to be evaluated per paragraph b) are assumed to open instantaneously and are not subsequently isolated, and no water is assumed to be subsequently added to the RPV water inventory;
- d) No additional draining events occur; and
- e) Realistic cross-sectional areas and drain rates are used.

A bounding DRAIN TIME may be used in lieu of a calculated value.

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. As required by Required Action A.1 and referenced in Table 3.3.5.1-1.	<p>B.1</p> <p>-----NOTES-----</p> <p>1. Only applicable in MODES 1, 2, and 3.</p> <p>2. Only applicable for Functions 1.a, 1.b, 2.a, 2.b, 2.d, and 2.g.</p> <p>-----</p> <p>Declare supported feature(s) inoperable when its redundant feature ECCS initiation capability is inoperable.</p>	1 hour from discovery of loss of initiation capability for feature(s) in both divisions
	<p><u>AND</u></p> <p>B.2</p> <p>-----NOTE-----</p> <p>Only applicable for Functions 3.a and 3.b.</p> <p>-----</p> <p>Declare High Pressure Coolant Injection (HPCI) System inoperable.</p>	
	<p><u>AND</u></p> <p>B.3</p> <p>Place channel in trip.</p>	24 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. As required by Required Action A.1 and referenced in Table 3.3.5.1-1.	<p>C.1</p> <p>-----NOTES-----</p> <p>1. Only applicable in MODES 1, 2, and 3.</p> <p>2. Only applicable for Functions 1.c, 2.c, 2.e, and 2.f.</p> <p>-----</p> <p>Declare supported feature(s) inoperable when its redundant feature ECCS initiation capability is inoperable.</p>	<p>1 hour from discovery of loss of initiation capability for feature(s) in both divisions</p>
	<p><u>AND</u></p> <p>C.2 Restore channel to OPERABLE status.</p>	

(continued)

Table 3.3.5.1-1 (page 1 of 5)
Emergency Core Cooling System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Core Spray System					
a. Reactor Vessel Water Level - Low Low Low, Level 1	1.2.3, 4(a), 5(a)	4(b)	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.4 SR 3.3.5.1.5	≥ 24.8 inches
b. Drywell Pressure - High	1.2.3	4(b)	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.4 SR 3.3.5.1.5	≤ 1.88 psig
c. Reactor Steam Dome Pressure - Low (Injection Permissive)	1.2.3	4	C	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.4 SR 3.3.5.1.5	≥ 441 psig
	4(a), 5(a)	4	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.4 SR 3.3.5.1.5	≥ 441 psig
d. Manual Initiation	1.2.3, 4(a), 5(a)	2(c)	C	SR 3.3.5.1.6	NA

(continued)

- (a) ~~When associated subsystem(s) of LCO 3.5.2 are required to be OPERABLE.~~
- (b) Also required to initiate the associated emergency diesel generator (EDG).
- (c) Individual component controls.

Not Used.

Table 3.3.5.1-1 (page 2 of 5)
Emergency Core Cooling System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
2. Low Pressure Coolant Injection (LPCI) System					
a. Reactor Vessel Water Level - Low Low Low, Level 1	1.2.3, 4(a), 5(a)	4	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.4 SR 3.3.5.1.5	≥ 24.8 inches
b. Drywell Pressure - High	1.2.3	4	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.4 SR 3.3.5.1.5	≥ 1.88 psig
c. Reactor Steam Dome Pressure - Low (Injection Permissive)	1.2.3	4	C	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.4 SR 3.3.5.1.5	≥ 441 psig
	4(a), 5(a)	4	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.4 SR 3.3.5.1.5	≥ 441 psig
d. Reactor Vessel Water Level - Low Low, Level 2 (Loop Select Logic)	1.2.3, 4(a), 5(a)	4	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.4 SR 3.3.5.1.5	≥ 103.8 inches
e. Reactor Steam Dome Pressure - Low (Break Detection Logic)	1.2.3, 4(a), 5(a)	4	C	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.4 SR 3.3.5.1.5	≥ 886 psig
f. Riser Differential Pressure - High (Break Detection)	1.2.3	4	C	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.4 SR 3.3.5.1.5	≥ 0.927 psid
g. Recirculation Pump Differential Pressure - High (Break Detection)	1.2.3	4 per pump	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.4 SR 3.3.5.1.5	≥ 1.927 psid
h. Manual Initiation	1.2.3, 4(a), 5(a)	2(c)	C	SR 3.3.5.1.6	NA

(continued)

~~(a) When associated subsystem(s) of LCO 3.5.2 are required to be OPERABLE.~~

(c) Individual component controls.

3.3 INSTRUMENTATION

3.3.5.3 Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation

LCO 3.3.5.3 The RPV Water Inventory Control instrumentation for each function in Table 3.3.5.3-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.5.3-1.

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more channels inoperable.	A.1 Enter the Condition referenced in Table 3.3.5.3-1 for the channel.	Immediately
B. As required by Required Action A.1 and referenced in Table 3.3.5.3-1.	B.1 Declare associated penetration flow path(s) incapable of automatic isolation.	Immediately
	<u>AND</u> B.2 Calculate DRAIN TIME.	Immediately
C. As required by Required Action A.1 and referenced in Table 3.3.5.3-1.	C.1 Place channel in trip.	1 hour
D. As required by Required Action A.1 and referenced in Table 3.3.5.3-1.	D.1 Restore channel to OPERABLE status.	24 hours
E. Required Action and associated Completion Time of Condition C or D not met.	E.1 Declare associated low pressure ECCS injection/spray subsystem inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

-----NOTE-----

Refer to Table 3.3.5.3-1 to determine which SRs apply for each ECCS Function.

SURVEILLANCE		FREQUENCY
SR 3.3.5.3.1	Perform CHANNEL CHECK.	In accordance with the Surveillance Frequency Control Program
SR 3.3.5.3.2	Perform CHANNEL FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program
SR 3.3.5.3.3	Perform LOGIC SYSTEM FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program

Table 3.3.5.3-1 (page 1 of 1)
RPV Water Inventory Control Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Core Spray System					
a. Reactor Steam Dome Pressure – Low (Injection Permissive)	4, 5	4	C	SR 3.3.5.3.1 SR 3.3.5.3.2	≥ 441 psig
b. Manual Initiation	4, 5	1 per subsystem (a), (c)	D	SR 3.3.5.3.3	NA
2. Low Pressure Coolant Injection (LPCI) System					
a. Reactor Steam Dome Pressure – Low (Injection Permissive)	4, 5	4	C	SR 3.3.5.3.1 SR 3.3.5.3.2	≥ 441 psig
b. Manual Initiation	4, 5	1 per subsystem (a), (c)	D	SR 3.3.5.3.3	NA
3. RHR System Isolation					
a. Reactor Vessel Water Level – Low, Level 3	(b)	2 in one trip system	B	SR 3.3.5.3.1 SR 3.3.5.3.2	≥ 171.9 inches
4. Reactor Water Cleanup (RWCU) System Isolation					
a. Reactor Vessel Water Level – Low Low, Level 2	(b)	2 in one trip system	B	SR 3.3.5.3.1 SR 3.3.5.3.2	≥ 103.8 inches

(a) Associated with an ECCS subsystem required to be OPERABLE by LCO 3.5.2, "Reactor Pressure Vessel Water Inventory Control."

(b) When automatic isolation of the associated penetration flow path(s) is credited in calculating DRAIN TIME.

(c) Individual component controls.

Primary Containment Isolation Instrumentation
3.3.6.1

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>H. As required by Required Action C.1 and referenced in Table 3.3.6.1-1.</p> <p><u>OR</u></p> <p>Required Action and associated Completion Time for Condition F or G not met.</p>	H.1 Be in MODE 3.	12 hours
	<p><u>AND</u></p> <p>H.2 Be in MODE 4.</p>	36 hours
<p>I. As required by Required Action C.1 and referenced in Table 3.3.6.1-1.</p>	I.1 Declare associated standby liquid control subsystem (SLC) inoperable.	1 hour
	<p><u>OR</u></p> <p>I.2 Isolate the Reactor Water Cleanup System.</p>	1 hour
<p>J. As required by Required Action C.1 and referenced in Table 3.3.6.1-1.</p>	J.1 Initiate action to restore channel to OPERABLE status.	Immediately
	<p><u>OR</u></p> <p>J.2 Initiate action to isolate the Residual Heat Removal (RHR) Shutdown Cooling System.</p>	Immediately

Primary Containment Isolation Instrumentation 3.3.6.1

Table 3.3.6.1-1 (page 4 of 5)
Primary Containment Isolation Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	CONDITIONS REFERENCED FROM REQUIRED ACTION C.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
5. Reactor Water Cleanup (RWCU) System Isolation					
a. Differential Flow - High	1,2,3	1	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.5	≤ 63.4 gpm
b. Area Temperature - High	1,2,3	1 per area	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.5	≤ 183°F
c. Area Ventilation Differential Temperature - High	1,2,3	(d)	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.5	≤ 53°F
d. SLC System Initiation	1,2	2 ^(b)	I	SR 3.3.6.1.5	NA
e. Reactor Vessel Water Level - Low Low, Level 2	1,2,3	2	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.3 SR 3.3.6.1.4 SR 3.3.6.1.5	≥ 103.8 inches
f. Manual Initiation	1,2,3	1 per valve	G	SR 3.3.6.1.6	NA
6. Shutdown Cooling System Isolation					
a. Reactor Steam Dome Pressure - High	1,2,3	1	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.3 SR 3.3.6.1.4 SR 3.3.6.1.5	≤ 95.5 psig
b. Reactor Vessel Water Level - Low, Level 3	3 4,5	2 (c)	J	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.3 SR 3.3.6.1.4 SR 3.3.6.1.5	≥ 171.9 inches
c. Manual Initiation	1,2,3	1 per valve	G	SR 3.3.6.1.6	NA

(continued)

(b) SLC System Initiation only inputs into one of the two trip systems.

Not Used.

(c) ~~Only one trip system required in MODES 4 and 5 when RWR Shutdown Cooling System integrity maintained.~~

(d) For Function 5.c, Reactor Water Cleanup (RWCU) System Isolation, Area Ventilation Differential Temperature - High, the required channels is 1 per room.

Secondary Containment Isolation Instrumentation
3.3.6.2

Table 3.3.6.2-1 (page 1 of 1)
Secondary Containment Isolation Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Reactor Vessel Water Level - Low Low, Level 2	1.2.3. (a)	2	SR 3.3.6.2.1 SR 3.3.6.2.2 SR 3.3.6.2.3 SR 3.3.6.2.4 SR 3.3.6.2.5	≥ 103.8 inches
2. Drywell Pressure-High	1.2.3	2	SR 3.3.6.2.1 SR 3.3.6.2.2 SR 3.3.6.2.3 SR 3.3.6.2.4 SR 3.3.6.2.5	≤ 1.88 psig
3. Fuel Pool Ventilation Exhaust Radiation-High	1.2.3. (a) (b)	2	SR 3.3.6.2.1 SR 3.3.6.2.2 SR 3.3.6.2.4 SR 3.3.6.2.5	≤ 6 mR/hr
4. Manual Initiation	1.2.3. (a) (b)	1	SR 3.3.6.2.5	NA

~~(a) During operations with a potential for draining the reactor vessel.~~

~~(b) During movement of recently irradiated fuel assemblies in secondary containment.~~

(a)

Table 3.3.7.1-1 (page 1 of 1)
Control Room Emergency Filtration System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Reactor Vessel Water Level - Low Low, Level 2	1.2.3, (a)	2	B	SR 3.3.7.1.1 SR 3.3.7.1.3 SR 3.3.7.1.4 SR 3.3.7.1.5 SR 3.3.7.1.6	≥ 103.8 inches
2. Drywell Pressure - High	1.2.3	2	B	SR 3.3.7.1.1 SR 3.3.7.1.3 SR 3.3.7.1.4 SR 3.3.7.1.5 SR 3.3.7.1.6	≤ 1.88 psig
3. Fuel Pool Ventilation Exhaust Radiation - High	1.2.3, (a), (b)	2	B	SR 3.3.7.1.1 SR 3.3.7.1.3 SR 3.3.7.1.5 SR 3.3.7.1.6	≤ 6 mR/hr
4. Control Center Normal Makeup Air Radiation - High	1.2.3, (a), (b)	1	C	SR 3.3.7.1.1 SR 3.3.7.1.2 SR 3.3.7.1.5	≤ 5 mR/hr

~~(a) During operations with a potential for draining the reactor vessel.~~

~~(b) During movement of recently irradiated fuel assemblies in the secondary containment.~~

(a)

RPV WATER INVENTORY CONTROL,

ECCS— Operating
3.5.1

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS) AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

3.5.1. ECCS— Operating

LCO 3.5.1 Each ECCS injection/spray subsystem and the Automatic Depressurization System (ADS) function of five safety/relief valves shall be OPERABLE.

APPLICABILITY: MODE 1,
MODES 2 and 3, except high pressure coolant injection (HPCI) and ADS valves are not required to be OPERABLE with reactor steam dome pressure ≤ 150 psig.

ACTIONS

NOTE
LCO 3.0.4.b is not applicable to HPCI.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One low pressure ECCS injection/spray subsystem inoperable.	A.1 Restore low pressure ECCS injection/spray subsystem to OPERABLE status.	7 days
B. One LPCI pump in both LPCI subsystems inoperable.	B.1 Restore both LPCI pumps to OPERABLE status.	7 days
C. One CSS subsystem inoperable. <u>AND</u> One LPCI subsystem inoperable.	C.1 Restore CSS subsystem to OPERABLE status. <u>OR</u> C.2 Restore LPCI subsystem to OPERABLE status.	72 hours 72 hours

(continued)

Reactor Pressure Vessel (RPV) Water Inventory Control

RPV Water Inventory Control

~~ECCS - Shutdown~~
3.5.2

RPV WATER INVENTORY CONTROL,

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS) AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

3.5.2 ~~ECCS - Shutdown~~

DRAIN TIME of RPV water inventory to the top of active fuel (TAF) shall be ≥ 36 hours.

AND

LCO 3.5.2 ~~One~~ Two low pressure ECCS injection/spray subsystems shall be OPERABLE.

NOTE

A Low Pressure Coolant Injection (LPCI) subsystem may be considered OPERABLE during alignment and operation for decay heat removal if capable of being manually realigned and not otherwise inoperable.

APPLICABILITY:

MODE 4.
MODE 5, except with the spent fuel storage pool gates removed and water level ≥ 20 ft 6 inches over the top of the reactor pressure vessel flange.

MODES 4 and 5

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One Required ECCS injection/spray subsystem inoperable.	A.1 Restore required ECCS injection/spray subsystem to OPERABLE status.	4 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Initiate action to suspend operations with a potential for draining the reactor vessel (OPDRVs).	Immediately establish a method of water injection capable of operating without offsite electrical power.
C. Two required ECCS injection/spray subsystems inoperable.	C.1 Initiate action to suspend OPDRVs. AND C.2 Restore one ECCS injection/spray subsystem to OPERABLE status.	Immediately 4 hours

INSERT New LCO 3.5.2, CONDITION C and D (see next 2 pages)

(continued)

INSERT New LCO 3.5.2, CONDITION C and D

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. DRAIN TIME < 36 hours and \geq 8 hours	C.1 Verify secondary containment boundary is capable of being established in less than the DRAIN TIME.	4 hours
	<u>AND</u>	
	C.2 Verify each secondary containment penetration flow path is capable of being isolated in less than the DRAIN TIME.	4 hours
	<u>AND</u>	
	C.3 Verify one standby gas treatment subsystem is capable of being placed in operation in less than the DRAIN TIME.	4 hours
D. DRAIN TIME < 8 hours	<p>D.1 -----NOTE----- Required ECCS injection/spray subsystem or additional method of water injection shall be capable of operating without offsite electrical power.</p> <p>----- Initiate action to establish an additional method of water injection with water sources capable of maintaining RPV water level > TAF for \geq 36 hours.</p> <p><u>AND</u></p>	Immediately

INSERT New LCO 3.5.2, CONDITION C and D

CONDITION	REQUIRED ACTION	COMPLETION TIME
	D.2 Initiate action to establish secondary containment boundary. <u>AND</u>	Immediately
	D.3 Initiate action to isolate each secondary containment penetration flow path or verify it can be manually isolated from the control room. <u>AND</u>	Immediately
	D.4 Initiate action to verify one standby gas treatment subsystem is capable of being placed in operation.	Immediately

RPV Water Inventory Control

~~ECCS - Shutdown~~
3.5.2

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>E</p> <p>D. Required Action C.2 and associated Completion Time not met.</p> <p>of Condition C or D</p> <p>OR</p> <p>DRAIN TIME < 1 hour</p>	<p>D.1 Initiate action to restore secondary containment to OPERABLE status.</p> <p>AND</p> <p>D.2 Initiate action to restore one standby gas treatment subsystem to OPERABLE status.</p> <p>AND</p> <p>D.3 Initiate action to restore isolation capability in each required secondary containment penetration flow path not isolated.</p>	<p>Immediately</p> <p>DRAIN TIME to ≥ 36 hours.</p> <p>Immediately</p> <p>Immediately</p>

INSERT New SR 3.5.2.1
(see next Page)

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.5.2.1</p> <p>Verify, for each required low pressure coolant injection (LPCI) subsystem, the suppression pool water level is ≥ -66 inches.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>

(continued)

INSERT

New SR 3.5.2.1

SR 3.5.2.1 Verify DRAIN TIME \geq 36 hours.

In accordance
with the
Surveillance
Frequency
Control Program

RPV Water Inventory Control

ECCS Shutdown
3.5.2

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.5.2.2³ Verify, for each^a required core spray (CS) subsystem, the:</p> <p>a. Suppression pool water level is \geq -66 inches; or</p> <p>b. <div style="border: 1px solid black; padding: 5px; display: inline-block;"> <p>-----NOTE----- Only one required CS subsystem may take credit for this option during OPDRVs. -----</p> </div></p> <p>Condensate storage tank water level is \geq 19 ft.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>
<p>SR 3.5.2.3⁴ Verify correct voltage and breaker alignment to the LPCI swing bus.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>
<p>SR 3.5.2.4⁵ Verify, for each^{the} required ECCS injection/spray subsystem, locations susceptible to gas accumulation are sufficiently filled with water.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY												
SR 3.5.2.5	<div>6</div> <div>NOTES</div> <div>1. LPCI subsystem(s) may be considered OPERABLE during alignment and operation for decay heat removal if capable of being manually realigned and not otherwise inoperable.</div> <div>2. Not required to be met for system vent flow paths opened under administrative control.</div> <div>Verify <div>for the</div> each required ECCS injection/spray subsystem manual, power operated, and automatic valve in the flow path, that is not locked, sealed, or otherwise secured in position, is in the correct position. <div>each</div></div>	In accordance with the Surveillance Frequency Control Program												
SR 3.5.2.6	<div>7</div> <div>Verify each required ECCS pump develops the specified flow rate against a system head corresponding to the specified reactor pressure.</div> <table><thead><tr><th>SYSTEM</th><th>FLOW RATE</th><th>NO. OF PUMPS</th><th>SYSTEM HEAD CORRESPONDING TO A REACTOR PRESSURE OF</th></tr></thead><tbody><tr><td>CS</td><td>≥ 5725 gpm</td><td>2</td><td>≥ 100 psig</td></tr><tr><td>LPCI</td><td>≥ 10,000 gpm</td><td>1</td><td>≥ 20 psig</td></tr></tbody></table>	SYSTEM	FLOW RATE	NO. OF PUMPS	SYSTEM HEAD CORRESPONDING TO A REACTOR PRESSURE OF	CS	≥ 5725 gpm	2	≥ 100 psig	LPCI	≥ 10,000 gpm	1	≥ 20 psig	<div>In accordance with the Inservice Testing Program</div> <div>In accordance with the Surveillance Frequency Control Program</div>
SYSTEM	FLOW RATE	NO. OF PUMPS	SYSTEM HEAD CORRESPONDING TO A REACTOR PRESSURE OF											
CS	≥ 5725 gpm	2	≥ 100 psig											
LPCI	≥ 10,000 gpm	1	≥ 20 psig											
3.5.2.7	<div>9</div> <div>NOTE</div> <div>Vessel injection/spray may be excluded.</div> <div>Verify <div>the</div> each required ECCS <div>a manual</div> injection/spray subsystem actuates on an actual or simulated automatic initiation signal.</div>	In accordance with the Surveillance Frequency Control Program												

INSERT

New SR 3.5.2.8

SR 3.5.2.8	Verify each valve credited for automatically isolating a penetration flow path actuates to the isolation position on an actual or simulated isolation signal.	In accordance with the Surveillance Frequency Control Program
------------	---	---

RCIC System
3.5.3

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS) AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

3.5.3 RCIC System

, RPV WATER INVENTORY CONTROL,

LCO 3.5.3 The RCIC System shall be OPERABLE.


APPLICABILITY: MODE 1,
MODES 2 and 3 with reactor steam dome pressure > 150 psig.

ACTIONS

-----NOTE-----
LCO 3.0.4.b is not applicable to RCIC.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. RCIC System inoperable.	A.1 Verify by administrative means High Pressure Coolant Injection System is OPERABLE.	Immediately
	<u>AND</u> A.2 Restore RCIC System to OPERABLE status.	14 days
B. Required Action and associated Completion Time not met.	B.1 -----NOTE----- LCO 3.0.4.a is not applicable when entering MODE 3. ----- Be in MODE 3.	12 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Required Action and associated Completion Time of Condition A, B, C, or D not met in MODE 1, 2, or 3.	E.1 Be in MODE 3. <u>AND</u>	12 hours
	E.2 Be in MODE 4.	36 hours
F. Required Action and associated Completion Time of Condition A, B, C, or D not met for RHR-SDC PCIV(s) required to be OPERABLE during MODE 4 or 5.	F.1 Initiate action to isolate RHR-Shutdown Cooling System. <u>OR</u>	Immediately
	F.2  Initiate action to restore valve(s) to OPERABLE status.	Immediately

Secondary Containment
3.6.4.1

3.6 CONTAINMENT SYSTEMS

3.6.4.1 Secondary Containment

LCO 3.6.4.1 The secondary containment shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3,
During movement of recently irradiated fuel assemblies in
the secondary containment ~~0~~ ← 1.

~~During operations with a potential for draining the reactor vessel (OPDRVs).~~

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Secondary Containment inoperable due to one railroad bay access door inoperable.	A.1 Restore railroad bay door to OPERABLE status.	7 days
B. Secondary containment inoperable in MODE 1, 2, or 3 for reasons other than Condition A.	B.1 Restore secondary containment to OPERABLE status.	4 hours
C. Required Action and associated Completion Time of Condition A or B not met.	C.1 <div style="text-align: center;"> <p>-----NOTE-----</p> <p>LCO 3.0.4.a is not applicable when entering MODE 3.</p> <p>-----</p> <p>Be in MODE 3.</p> </div>	12 hours

(continued)

Secondary Containment
3.6.4.1

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Secondary containment inoperable during movement of recently irradiated fuel assemblies in the secondary containment or during OPDRVs.	-----NOTE----- LCO 3.0.3 is not applicable. -----	
	D.1 Suspend movement of recently irradiated fuel assemblies in the secondary containment.	Immediately
	<u>AND</u> D.2 Initiate action to suspend OPDRVs.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.6.4.1.1 Verify secondary containment vacuum is ≥ 0.125 inch of vacuum water gauge.	In accordance with the Surveillance Frequency Control Program

(continued)

3.6 CONTAINMENT SYSTEMS

3.6.4.2 Secondary Containment Isolation Valves (SCIVs)

LCO 3.6.4.2 Each SCIV shall be OPERABLE.

Insert ")"

APPLICABILITY: MODES 1, 2, and 3,
During movement of recently irradiated fuel assemblies in
the secondary containment.

~~During operations with a potential for draining the reactor
vessel (OPDRVs).~~

ACTIONS

NOTES

1. Penetration flow paths may be unisolated intermittently under administrative controls.
2. Separate Condition entry is allowed for each penetration flow path.
3. Enter applicable Conditions and Required Actions for systems made inoperable by SCIVs.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more penetration flow paths with one SCIV inoperable.	A.1 Isolate the affected penetration flow path by use of at least one closed and de-activated automatic valve, closed manual valve, or blind flange.	8 hours
	<u>AND</u>	(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition A or B not met during movement of recently irradiated fuel assemblies in the secondary containment or during OPDRVs.	<p>-----NOTE----- LCO 3.0.3 is not applicable. -----</p>	
	D.1 Suspend movement of recently irradiated fuel assemblies in the secondary containment.	Immediately
	<p><u>AND</u></p> <p>D.2 Initiate action to suspend OPDRVs.</p>	Immediately

3.6 CONTAINMENT SYSTEMS

3.6.4.3 Standby Gas Treatment (SGT) System

LCO 3.6.4.3 Two SGT subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3,
During movement of recently irradiated fuel assemblies in
the secondary containment ~~0~~ ← .

~~During operations with a potential for draining the reactor
vessel (OPDRVs).~~

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One SGT subsystem inoperable.	A.1 Restore SGT subsystem to OPERABLE status.	7 days
B. Required Action and associated Completion Time of Condition A not met in MODE 1, 2, or 3.	B.1 <div style="text-align: center;"> <p>-----NOTE-----</p> <p>LCO 3.0.4.a is not applicable when entering MODE 3.</p> <p>-----</p> <p>Be in MODE 3.</p> </div>	12 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Required Action and associated Completion Time of Condition A not met during movement of recently irradiated fuel assemblies in the secondary containment or during OPDRVs.	<p>-----NOTE----- LCO 3.0.3 is not applicable. -----</p>	
	C.1 Place OPERABLE SGT subsystem in operation.	Immediately
	OR	
	C.2.1 Suspend movement of recently irradiated fuel assemblies in secondary containment.	Immediately
	<p>AND</p> <p>C.2.2 Initiate action to suspend OPDRVs.</p>	Immediately
D. Two SGT subsystems inoperable in MODE 1, 2, or 3.	<p>D.1 -----NOTE----- LCO 3.0.4.a is not applicable when entering MODE 3. -----</p> <p>Be in MODE 3.</p>	12 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Two SGT subsystems inoperable during movement of recently irradiated fuel assemblies in the secondary containment or during OPDRVs.NOTE..... LCO 3.0.3 is not applicable.	
	E.1 Suspend movement of recently irradiated fuel assemblies in secondary containment.	Immediately
	<p><u>AND</u></p> <p>E.2 Initiate action to suspend OPDRVs.</p>	Immediately

3.7 PLANT SYSTEMS

3.7.3 Control Room Emergency Filtration (CREF) System

LCO 3.7.3 The CREF System shall be OPERABLE.

-----NOTE-----
The control room envelope (CRE) boundary may be opened intermittently under administrative control.

APPLICABILITY: MODES 1, 2, and 3,
During movement of recently irradiated fuel assemblies in the secondary containment.

During operations with a potential for draining the reactor vessel (OPDRVs).

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One CREF subsystem inoperable for reasons other than Condition B.	A.1 Restore CREF subsystem to OPERABLE status.	7 days
B. One or more CREF subsystems inoperable due to inoperable CRE boundary in MODE 1, 2, or 3.	B.1 Initiate action to implement mitigating actions.	Immediately
	<u>AND</u>	
	B.2 Verify mitigating actions ensure CRE occupant exposures to radiological and chemical hazards will not exceed limits and CRE occupants are protected from smoke hazards.	24 hours
	<u>AND</u>	
	B.3 Restore CRE boundary to OPERABLE status.	90 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Required Action and associated Completion Time of Condition A or B not met in MODE 1, 2, or 3.	C.1 -----NOTE----- LCO 3.0.4.a is not applicable when entering MODE 3. ----- Be in MODE 3.	12 hours
D. Required Action and associated Completion Time of Condition A not met during movement of recently irradiated fuel assemblies in the secondary containment, or during OPDRVs.	-----NOTE----- LCO 3.0.3 is not applicable. ----- D.1 Place OPERABLE CREF subsystem in recirculation mode. <u>OR</u> <div style="border: 1px solid red; padding: 2px;">D.2.1 Initiate action to suspend OPDRVs. <u>AND</u></div> -----NOTE----- Not required for a CREF System or subsystem inoperable due to failure to provide the required filtration efficiency, or due to replacement of charcoal filtration media. ----- D.2.2 Suspend movement of recently irradiated fuel assemblies in the secondary containment.	Immediately <div style="border: 1px solid red; padding: 2px; margin-top: 10px;">Immediately</div> <div style="color: red; font-size: 2em; margin-top: 10px;">←</div>

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Two CREF subsystems or a non-redundant component or portion of the CREF System inoperable in MODE 1, 2, or 3 for reasons other than Condition B.	E.1NOTE..... LCO 3.0.4.a is not applicable when entering MODE 3. Be in MODE 3.	12 hours
F. Two CREF subsystems or a non-redundant component or portion of the CREF System inoperable during movement of recently irradiated fuel assemblies in the secondary containment, or during OPDRVs. <u>OR</u> One or more CREF subsystems inoperable due to an inoperable CRE boundary during movement of recently irradiated fuel assemblies in the secondary containment or during OPDRVs.	<p>.....NOTE..... LCO 3.0.3 is not applicable.</p> <p>F.1 Initiate action to suspend OPDRVs.</p> <p>AND</p> <p>NOTE</p> <p>1. Not required for a CREF System or subsystem inoperable due to failure to provide the required filtration efficiency, or due to replacement of charcoal filtration media.</p> <p>2.</p> <p>F.2 Suspend movement of recently irradiated fuel assemblies in the secondary containment.</p> <p>1</p>	<p>Immediately</p> <p>Immediately</p>

Control Center AC System
3.7.4

3.7 PLANT SYSTEMS

3.7.4 Control Center Air Conditioning (AC) System

LCO 3.7.4 Two control center AC subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.
During movement of recently irradiated fuel assemblies in the secondary containment ~~0~~ ← .

~~During operations with a potential for draining the reactor vessel (OPDRVs).~~

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One control center AC subsystem inoperable.	A.1 Restore control center AC subsystem to OPERABLE status.	30 days
B. Two control center AC subsystems inoperable.	B.1 Verify control room area temperature <90°F.	Once per 4 hours
	<u>AND</u> B.2 Restore one control center AC subsystem to OPERABLE status.	72 hours
C. Required Action and associated Completion Time of Condition A or B not met in MODE 1, 2, or 3.	C.1NOTE..... LCO 3.0.4.a is not applicable when entering MODE 3. Be in MODE 3.	12 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition A not met during movement of recently irradiated fuel assemblies in the secondary containment or during OPDRVs.	<p>-----NOTE----- LCO 3.0.3 is not applicable -----</p>	
	D.1 Place OPERABLE control center AC subsystem in operation.	Immediately
	OR	
	D.2.1 Suspend movement of recently irradiated fuel assemblies in the secondary containment.	Immediately
	<p>AND</p> <p>D.2.2 Initiate action to suspend OPDRVs.</p>	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Required Action and associated Completion Time of Condition B not met during movement of recently irradiated fuel assemblies in the secondary containment or during OPDRVs.	<p>-----NOTE----- LCO 3.0.3 is not applicable -----</p> <p>E.1 Suspend movement of recently irradiated fuel assemblies in the secondary containment.</p>	Immediately
	<p><u>AND</u></p> <p>E.2 Initiate actions to suspend OPDRVs.</p>	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.7.4.1 Verify the control room air temperature is $\leq 95^{\circ}\text{F}$.	In accordance with the Surveillance Frequency Control Program

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	A.2.2 Suspend movement of recently irradiated fuel assemblies in the secondary containment.	Immediately
	<u>AND</u>	
	A.2.3 Initiate action to suspend operations with a potential for draining the reactor vessel (OPDRVs).	Immediately
	<u>AND</u>	
	A.2.4 Initiate action to restore required offsite power circuit to OPERABLE status.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One or both required EDGs inoperable.	B.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	B.2 Suspend movement of recently irradiated fuel assemblies in secondary containment.	Immediately
	<u>AND</u>	
	B.3 Initiate action to suspend OPDRVs.	Immediately
	<u>AND</u>	
	B.4 Initiate action to restore required EDGs to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.8.2.1NOTE.....</p> <p>The following SRs are not required to be performed: SR 3.8.1.2, SR 3.8.1.3, and SR 3.8.1.7 through SR 3.8.1.17.</p> <p>.....</p> <p>For AC sources required to be OPERABLE SR 3.8.1.1 through SR 3.8.1.17, are applicable.</p>	In accordance with applicable SRs

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	A.2.2 Suspend movement of recently irradiated fuel assemblies in the secondary containment.	Immediately
	<u>AND</u>	
	A.2.3 Initiate action to suspend operations with a potential for draining the reactor vessel.	Immediately
	<u>AND</u>	
	A.2.4 Initiate action to restore required DC electrical power subsystems to OPERABLE status.	Immediately

Distribution Systems-Shutdown
3.8.8

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	<p>A.2.3 Initiate action to suspend operations with a potential for draining the reactor vessel.</p> <p><u>AND</u></p>	Immediately
	<p>3 ↑ A.2.4 Initiate actions to restore required AC and DC electrical power distribution subsystems to OPERABLE status.</p> <p><u>AND</u></p>	Immediately
	<p>4 ↑ A.2.5 Declare associated required shutdown cooling subsystem(s) inoperable and not in operation.</p>	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.8.8.1 Verify correct breaker alignments and voltage to required AC and DC electrical power distribution subsystems.	In accordance with the Surveillance Frequency Control Program

**Enclosure 3 to
NRC-17-0067**

**Fermi 2 NRC Docket No. 50-341
Operating License No. NPF-43**

**License Amendment Request to Adopt TSTF-542, "Reactor Pressure Vessel Water
Inventory Control"**

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1.1 Definitions (continued)

CORE OPERATING LIMITS REPORT (COLR)

The COLR is the unit specific document that provides cycle specific parameter limits for the current reload cycle. These cycle specific limits shall be determined for each reload cycle in accordance with Specification 5.6.5. Plant operation within these limits is addressed in individual Specifications.

DOSE EQUIVALENT I-131

DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries/gram) that alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in Table III of TID-14844, AEC, 1962, "Calculation of Distance Factors for Power and Test Reactor Sites."

DRAIN TIME

The DRAIN TIME is the time it would take for the water inventory in and above the Reactor Pressure Vessel (RPV) to drain to the top of the active fuel (TAF) seated in the RPV assuming:

- a) The water inventory above the TAF is divided by the limiting drain rate;
- b) The limiting drain rate is the larger of the drain rate through a single penetration flow path with the highest flow rate, or the sum of the drain rates through multiple penetration flow paths susceptible to a common mode failure (e.g., seismic event, loss of normal power, single human error), for all penetration flow paths below the TAF except:
 1. Penetration flow paths connected to an intact closed system, or isolated by manual or automatic valves that are locked, sealed, or otherwise secured in the closed position, blank flanges, or other devices that prevent flow of reactor coolant through the penetration flow paths; or

(continued)

1.1 Definitions (continued)

2. Penetration flow paths capable of being isolated by valves that will close automatically without offsite power prior to the RPV water level being equal to the TAF when actuated by RPV water level isolation instrumentation; or
 3. Penetration flow paths with isolation devices that can be closed prior to the RPV water level being equal to the TAF by a dedicated operator trained in the task, who in continuous communication with the control room, is stationed at the controls, and is capable of closing the penetration flow path isolation device without offsite power.
- c) The penetration flow paths required to be evaluated per paragraph b) are assumed to open instantaneously and are not subsequently isolated, and no water is assumed to be subsequently added to the RPV water inventory;
 - d) No additional draining events occur; and
 - e) Realistic cross-sectional areas and drain rates are used.

A bounding DRAIN TIME may be used in lieu of a calculated value.

EMERGENCY CORE COOLING SYSTEM (ECCS) RESPONSE TIME

The ECCS RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its ECCS initiation setpoint at the channel sensor until the ECCS equipment is capable of performing its safety function (i.e., the valves travel to their required positions, pump discharge pressures reach their required values, etc.). Times shall include diesel generator starting and sequence loading delays, where applicable. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured.

(continued)

1.1 Definitions (continued)

ISOLATION SYSTEM RESPONSE TIME

The ISOLATION SYSTEM RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its isolation initiation setpoint at the channel sensor until the isolation valves travel to their required positions. Times shall include diesel generator starting and sequence loading delays, where applicable. The response time may be measured by means of any series of sequential, overlapping, or total steps so that the entire response time is measured.

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. As required by Required Action A.1 and referenced in Table 3.3.5.1-1.	B.1	
	-----NOTE----- Only applicable for Functions 1.a, 1.b, 2.a, 2.b, 2.d, and 2.g. -----	
	Declare supported feature(s) inoperable when its redundant feature ECCS initiation capability is inoperable.	1 hour from discovery of loss of initiation capability for feature(s) in both divisions
	<u>AND</u>	
	B.2	
	-----NOTE----- Only applicable for Functions 3.a and 3.b. -----	
	Declare High Pressure Coolant Injection (HPCI) System inoperable.	1 hour from discovery of loss of HPCI initiation capability
	<u>AND</u>	
	B.3	
	Place channel in trip.	24 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. As required by Required Action A.1 and referenced in Table 3.3.5.1-1.	C.1 -----NOTE----- Only applicable for Functions 1.c, 2.c, 2.e, and 2.f. ----- Declare supported feature(s) inoperable when its redundant feature ECCS initiation capability is inoperable.	1 hour from discovery of loss of initiation capability for feature(s) in both divisions
	<u>AND</u>	
	C.2 Restore channel to OPERABLE status.	24 hours

(continued)

Table 3.3.5.1-1 (page 1 of 5)
Emergency Core Cooling System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Core Spray System					
a. Reactor Vessel Water Level – Low Low Low, Level 1	1,2,3	4(b)	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.4 SR 3.3.5.1.5	≥ 24.8 inches
b. Drywell Pressure – High	1,2,3	4(b)	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.4 SR 3.3.5.1.5	≤ 1.88 psig
c. Reactor Steam Dome Pressure – Low (Injection Permissive)	1,2,3	4	C	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.4 SR 3.3.5.1.5	≥ 441 psig
d. Manual Initiation	1,2,3	2(c)	C	SR 3.3.5.1.6	NA
(continued)					

(a) Not Used.

(b) Also required to initiate the associated emergency diesel generator (EDG).

(c) Individual component controls.

Table 3.3.5.1-1 (page 2 of 5)
Emergency Core Cooling System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
2. Low Pressure Coolant Injection (LPCI) System					
a. Reactor Vessel Water Level—Low Low Low, Level 1	1,2,3	4	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.4 SR 3.3.5.1.5	≥ 24.8 inches
b. Drywell Pressure—High	1,2,3	4	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.4 SR 3.3.5.1.5	≤ 1.88 psig
c. Reactor Steam Dome Pressure—Low (Injection Permissive)	1,2,3	4	C	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.4 SR 3.3.5.1.5	≥ 441 psig
d. Reactor Vessel Water Level—Low Low, Level 2 (Loop Select Logic)	1,2,3	4	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.4 SR 3.3.5.1.5	≥ 103.8 inches
e. Reactor Steam Dome Pressure—Low (Break Detection Logic)	1,2,3	4	C	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.4 SR 3.3.5.1.5	≥ 886 psig
f. Riser Differential Pressure—High (Break Detection)	1,2,3	4	C	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.4 SR 3.3.5.1.5	≤ 0.927 psid
g. Recirculation Pump Differential Pressure—High (Break Detection)	1,2,3	4 per pump	B	SR 3.3.5.1.1 SR 3.3.5.1.2 SR 3.3.5.1.3 SR 3.3.5.1.4 SR 3.3.5.1.5	≤ 1.927 psid
h. Manual Initiation	1,2,3	2 ^(c)	C	SR 3.3.5.1.6	NA
(continued)					

(c) Individual component controls.

3.3 INSTRUMENTATION

3.3.5.3 Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation

LCO 3.3.5.3 The RPV Water Inventory Control instrumentation for each function in Table 3.3.5.3-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.5.3-1.

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more channels inoperable.	A.1 Enter the Condition referenced in Table 3.3.5.3-1 for the channel.	Immediately
B. As required by Required Action A.1 and referenced in Table 3.3.5.3-1.	B.1 Declare associated penetration flow path(s) incapable of automatic isolation.	Immediately
	<u>AND</u> B.2 Calculate DRAIN TIME.	Immediately
C. As required by Required Action A.1 and referenced in Table 3.3.5.3-1.	C.1 Place channel in trip.	1 hour
D. As required by Required Action A.1 and referenced in Table 3.3.5.3-1.	D.1 Restore channel to OPERABLE status.	24 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Required Action and associated Completion Time of Condition C or D not met.	E.1 Declare associated low pressure ECCS injection/spray subsystem inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

-----NOTE-----
Refer to Table 3.3.5.3-1 to determine which SRs apply for each ECCS Function.

SURVEILLANCE	FREQUENCY
SR 3.3.5.3.1 Perform CHANNEL CHECK.	In accordance with the Surveillance Frequency Control Program
SR 3.3.5.3.2 Perform CHANNEL FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program
SR 3.3.5.3.3 Perform LOGIC SYSTEM FUNCTIONAL TEST.	In accordance with the Surveillance Frequency Control Program

RPV Water Inventory Control Instrumentation

3.3.5.3

Table 3.3.5.3-1 (page 1 of 1)
RPV Water Inventory Control Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER FUNCTION	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Core Spray System					
a. Reactor Steam Dome Pressure—Low (Injection Permissive)	4,5	4	C	SR 3.3.5.3.1 SR 3.3.5.3.2	≥ 441 psig
b. Manual Initiation	4,5	1 per subsystem (a), (c)	D	SR 3.3.5.3.3	NA
2. Low Pressure Coolant Injection (LPCI) System					
a. Reactor Steam Dome Pressure—Low (Injection Permissive)	4,5	4	C	SR 3.3.5.3.1 SR 3.3.5.3.2	≥ 441 psig
b. Manual Initiation	4,5	1 per subsystem (a), (c)	D	SR 3.3.5.3.3	NA
3. RHR System Isolation					
a. Reactor Vessel Water Level—Low, Level 3	(b)	2 in one trip system	B	SR 3.3.5.3.1 SR 3.3.5.3.2	≥ 171.9 inches
4. Reactor Water Cleanup (RWCU) System Isolation					
a. Reactor Vessel Water Level—Low Low, Level 2	(b)	2 in one trip system	B	SR 3.3.5.3.1 SR 3.3.5.3.2	≥ 103.8 inches

- (a) Associated with an ECCS subsystem required to be OPERABLE by LCO 3.5.2, "Reactor Pressure Vessel Water Inventory Control."
- (b) When automatic isolation of the associated penetration flow path(s) is credited in calculating DRAIN TIME.
- (c) Individual component controls.

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
H. As required by Required Action C.1 and referenced in Table 3.3.6.1-1. <u>OR</u> Required Action and associated Completion Time for Condition F or G not met.	H.1 Be in MODE 3.	12 hours
	<u>AND</u> H.2 Be in MODE 4.	36 hours
I. As required by Required Action C.1 and referenced in Table 3.3.6.1-1.	I.1 Declare associated standby liquid control subsystem (SLC) inoperable.	1 hour
	<u>OR</u> I.2 Isolate the Reactor Water Cleanup System.	1 hour
J. As required by Required Action C.1 and referenced in Table 3.3.6.1-1.	J.1 Initiate action to restore channel to OPERABLE status.	Immediately

Primary Containment Isolation Instrumentation

3.3.6.1

Table 3.3.6.1-1 (page 4 of 5)
Primary Containment Isolation Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	CONDITIONS REFERENCED FROM REQUIRED ACTION C.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
5. Reactor Water Cleanup (RWCU) System Isolation					
a. Differential Flow – High	1,2,3	1	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.5	≤ 63.4 gpm
b. Area Temperature – High	1,2,3	1 per area	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.5	≤ 183°F
c. Area Ventilation Differential Temperature – High	1,2,3	(d)	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.4 SR 3.3.6.1.5	≤ 53°F
d. SLC System Initiation	1,2	2(b)	I	SR 3.3.6.1.5	NA
e. Reactor Vessel Water Level – Low Low, Level 2	1,2,3	2	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.3 SR 3.3.6.1.4 SR 3.3.6.1.5	≥ 103.8 inches
f. Manual Initiation	1,2,3	1 per valve	G	SR 3.3.6.1.6	NA
6. Shutdown Cooling System Isolation					
a. Reactor Steam Dome Pressure - High	1,2,3	1	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.3 SR 3.3.6.1.4 SR 3.3.6.1.5	≤ 95.5 psig
b. Reactor Vessel Water Level - Low, Level 3	3	2	J	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.3 SR 3.3.6.1.4 SR 3.3.6.1.5	≥ 171.9 inches
c. Manual Initiation	1,2,3	1 per valve	G	SR 3.3.6.1.6	NA

(continued)

(b) SLC System Initiation only inputs into one of the two trip systems.

(c) Not Used.

(d) For Function 5.c, Reactor Water Cleanup (RWCU) System Isolation, Area Ventilation Differential Temperature - High, the required channels is 1 per room.

Secondary Containment Isolation Instrumentation 3.3.6.2

Table 3.3.6.2-1 (page 1 of 1)
Secondary Containment Isolation Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Reactor Vessel Water Level – Low Low, Level 2	1,2,3	2	SR 3.3.6.2.1 SR 3.3.6.2.2 SR 3.3.6.2.3 SR 3.3.6.2.4 SR 3.3.6.2.5	≥ 103.8 inches
2. Drywell Pressure – High	1,2,3	2	SR 3.3.6.2.1 SR 3.3.6.2.2 SR 3.3.6.2.3 SR 3.3.6.2.4 SR 3.3.6.2.5	≤ 1.88 psig
3. Fuel Pool Ventilation Exhaust Radiation – High	1,2,3, (a)	2	SR 3.3.6.2.1 SR 3.3.6.2.2 SR 3.3.6.2.4 SR 3.3.6.2.5	≤ 6 mR/hr
4. Manual Initiation	1,2,3, (a)	1	SR 3.3.6.2.5	NA

(a) During movement of recently irradiated fuel assemblies in secondary containment.

Table 3.3.7.1-1 (page 1 of 1)
Control Room Emergency Filtration System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Reactor Vessel Water Level – Low Low, Level 2	1,2,3	2	B	SR 3.3.7.1.1 SR 3.3.7.1.3 SR 3.3.7.1.4 SR 3.3.7.1.5 SR 3.3.7.1.6	≥ 103.8 inches
2. Drywell Pressure – High	1,2,3	2	B	SR 3.3.7.1.1 SR 3.3.7.1.3 SR 3.3.7.1.4 SR 3.3.7.1.5 SR 3.3.7.1.6	≤ 1.88 psig
3. Fuel Pool Ventilation Exhaust Radiation – High	1,2,3, (a)	2	B	SR 3.3.7.1.1 SR 3.3.7.1.3 SR 3.3.7.1.5 SR 3.3.7.1.6	≤ 6 mR/hr
4. Control Center Normal Makeup Air Radiation – High	1,2,3, (a)	1	C	SR 3.3.7.1.1 SR 3.3.7.1.2 SR 3.3.7.1.5	≤ 5 mR/hr

(a) During movement of recently irradiated fuel assemblies in the secondary containment.

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS), RPV WATER INVENTORY CONTROL, AND
REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

3.5.1 ECCS – Operating

LC0 3.5.1 Each ECCS injection/spray subsystem and the Automatic
Depressurization System (ADS) function of five safety/relief
valves shall be OPERABLE.

APPLICABILITY: MODE 1,
MODES 2 and 3, except high pressure coolant injection (HPCI)
and ADS valves are not required to be OPERABLE with
reactor steam dome pressure \leq 150 psig.

ACTIONS

-----NOTE-----
LC0 3.0.4.b is not applicable to HPCI.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One low pressure ECCS injection/spray subsystem inoperable.	A.1 Restore low pressure ECCS injection/spray subsystem to OPERABLE status.	7 days
B. One LPCI pump in both LPCI subsystems inoperable.	B.1 Restore both LPCI pumps to OPERABLE status.	7 days
C. One CSS subsystem inoperable.	C.1 Restore CSS subsystem to OPERABLE status.	72 hours
<u>AND</u>	<u>OR</u>	
One LPCI subsystem inoperable.	C.2 Restore LPCI subsystem to OPERABLE status.	72 hours

(continued)

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS), RPV WATER INVENTORY CONTROL, AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

3.5.2 Reactor Pressure Vessel (RPV) Water Inventory Control

LC0 3.5.2 DRAIN TIME of RPV water inventory to the top of active fuel (TAF) shall be ≥ 36 hours.

AND

One low pressure ECCS injection/spray subsystem shall be OPERABLE.

-----NOTE-----
A Low Pressure Coolant Injection (LPCI) subsystem may be considered OPERABLE during alignment and operation for decay heat removal if capable of being manually realigned and not otherwise inoperable.

APPLICABILITY: MODES 4 and 5

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required ECCS injection/spray subsystem inoperable.	A.1 Restore required ECCS injection/spray subsystem to OPERABLE status.	4 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Initiate action to establish a method of water injection capable of operating without offsite electrical power.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. DRAIN TIME < 36 hours and \geq 8 hours	C.1 Verify secondary containment boundary is capable of being established in less than the DRAIN TIME.	4 hours
	<u>AND</u>	
	C.2 Verify each secondary containment penetration flow path is capable of being isolated in less than the DRAIN TIME.	4 hours
	<u>AND</u>	
	C.3 Verify one standby gas treatment subsystem is capable of being placed in operation in less than the DRAIN TIME.	4 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. DRAIN TIME < 8 hours	D.1 -----NOTE----- Required ECCS injection/spray subsystem or additional method of water injection shall be capable of operating without offsite electrical power. ----- Initiate action to establish an additional method of water injection with water sources capable of maintaining RPV water level > TAF for ≥ 36 hours.	Immediately
	<u>AND</u> D.2 Initiate action to establish secondary containment boundary.	Immediately
	<u>AND</u> D.3 Initiate action to isolate secondary containment penetration flow path or verify it can be manually isolated from the control room.	Immediately
	<u>AND</u> D.4 Initiate action to verify one standby gas treatment subsystem is capable of being placed in operation.	Immediately

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Required Action and associated Completion Time of Condition C or D not met. <u>OR</u> DRAIN TIME < 1 hour	E.1 Initiate action to restore DRAIN TIME to ≥ 36 hours.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.5.2.1 Verify DRAIN TIME ≥ 36 hours.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.2 Verify, for a required low pressure coolant injection (LPCI) subsystem, the suppression pool water level is ≥ -66 inches.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.3 Verify, for a required Core Spray (CS) subsystem, the: <ul style="list-style-type: none"> a. Suppression pool water level is ≥ -66 inches; or b. Condensate storage tank water level is ≥ 19 ft. 	In accordance with the Surveillance Frequency Control Program

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.5.2.4	Verify correct voltage and breaker alignment to the LPCI swing bus.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.5	Verify, for the required ECCS injection/spray subsystem, locations susceptible to gas accumulation are sufficiently filled with water.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.6	<p>-----NOTE----- Not required to be met for system vent flow paths opened under administrative control. -----</p> <p>Verify, for the required ECCS injection/spray subsystem, each manual, power operated, and automatic valve in the flow path, that is not locked, sealed, or otherwise secured in position, is in the correct position.</p>	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.7	Operate the required ECCS injection/spray subsystem through the recirculation line for ≥ 10 minutes.	In accordance with the Surveillance Frequency Control Program
SR 3.5.2.8	Verify each valve credited for automatically isolating a penetration flow path actuates to the isolation position on an actual or simulated isolation signal.	In accordance with the Surveillance Frequency Control Program

(continued)

SURVEILLANCE REQUIREMENTS (continued)		
SURVEILLANCE		FREQUENCY
SR 3.5.2.9	<p>-----NOTE-----</p> <p>Vessel injection/spray may be excluded.</p> <p>-----</p> <p>Verify the required ECCS injection/spray subsystem actuates on a manual initiation signal.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS), RPV WATER INVENTORY CONTROL, AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

3.5.3 RCIC System

LCO 3.5.3 The RCIC System shall be OPERABLE.

APPLICABILITY: MODE 1,
MODES 2 and 3 with reactor steam dome pressure > 150 psig.

ACTIONS

-----NOTE-----
LCO 3.0.4.b is not applicable to RCIC.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. RCIC System inoperable.	A.1 Verify by administrative means High Pressure Coolant Injection System is OPERABLE.	Immediately
	<u>AND</u> A.2 Restore RCIC System to OPERABLE status.	14 days
B. Required Action and associated Completion Time not met.	B.1 -----NOTE----- LCO 3.0.4.a is not applicable when entering MODE 3. ----- Be in MODE 3.	12 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Required Action and associated Completion Time of Condition A, B, C, or D not met in MODE 1, 2, or 3.	E.1 Be in MODE 3.	12 hours
	<u>AND</u> E.2 Be in MODE 4.	36 hours
F. Required Action and associated Completion Time of Condition A, B, C, or D not met for RHR-SDC PCIV(s) required to be OPERABLE during MODE 4 or 5.	F.1 Initiate action to restore valve(s) to OPERABLE status.	Immediately

3.6 CONTAINMENT SYSTEMS

3.6.4.1 Secondary Containment

LCO 3.6.4.1 The secondary containment shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3,
During movement of recently irradiated fuel assemblies in
the secondary containment.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Secondary Containment inoperable due to one railroad bay access door inoperable.	A.1 Restore railroad bay door to OPERABLE status.	7 days
B. Secondary containment inoperable in MODE 1, 2, or 3 for reasons other than Condition A.	B.1 Restore secondary containment to OPERABLE status.	4 hours
C. Required Action and associated Completion Time of Condition A or B not met.	C.1 -----NOTE----- LCO 3.0.4.a is not applicable when entering MODE 3. ----- Be in MODE 3.	12 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Secondary containment inoperable during movement of recently irradiated fuel assemblies in the secondary containment.	D.1 -----NOTE----- LCO 3.0.3 is not applicable. ----- Suspend movement of recently irradiated fuel assemblies in the secondary containment.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.6.4.1.1 Verify secondary containment vacuum is ≥ 0.125 inch of vacuum water gauge.	In accordance with the Surveillance Frequency Control Program

(continued)

3.6 CONTAINMENT SYSTEMS

3.6.4.2 Secondary Containment Isolation Valves (SCIVs)

LC0 3.6.4.2 Each SCIV shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3,
During movement of recently irradiated fuel assemblies in
the secondary containment.

ACTIONS

- NOTES-----
1. Penetration flow paths may be unisolated intermittently under administrative controls.
 2. Separate Condition entry is allowed for each penetration flow path.
 3. Enter applicable Conditions and Required Actions for systems made inoperable by SCIVs.
-

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more penetration flow paths with one SCIV inoperable.	A.1 Isolate the affected penetration flow path by use of at least one closed and de-activated automatic valve, closed manual valve, or blind flange.	8 hours
	<u>AND</u>	(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition A or B not met during movement of recently irradiated fuel assemblies in the secondary containment.	<p>D.1</p> <p>-----NOTE----- LCO 3.0.3 is not applicable. -----</p> <p>Suspend movement of recently irradiated fuel assemblies in the secondary containment.</p>	Immediately

3.6 CONTAINMENT SYSTEMS

3.6.4.3 Standby Gas Treatment (SGT) System

LCO 3.6.4.3 Two SGT subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3,
During movement of recently irradiated fuel assemblies in
the secondary containment.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One SGT subsystem inoperable.	A.1 Restore SGT subsystem to OPERABLE status.	7 days
B. Required Action and associated Completion Time of Condition A not met in MODE 1, 2, or 3.	B.1 -----NOTE----- LCO 3.0.4.a is not applicable when entering MODE 3. ----- Be in MODE 3.	12 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Required Action and associated Completion Time of Condition A not met during movement of recently irradiated fuel assemblies in the secondary containment.	<p>-----NOTE----- LCO 3.0.3 is not applicable. -----</p> <p>C.1 Place OPERABLE SGT subsystem in operation.</p> <p><u>OR</u></p> <p>C.2 Suspend movement of recently irradiated fuel assemblies in secondary containment.</p>	<p>Immediately</p> <p>Immediately</p>
D. Two SGT subsystems inoperable in MODE 1, 2, or 3.	<p>D.1 -----NOTE----- LCO 3.0.4.a is not applicable when entering MODE 3. -----</p> <p>Be in MODE 3.</p>	<p>12 hours</p>

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Two SGT subsystems inoperable during movement of recently irradiated fuel assemblies in the secondary containment.	<p>E.1 -----NOTE----- LCO 3.0.3 is not applicable. -----</p> <p>Suspend movement of recently irradiated fuel assemblies in secondary containment.</p>	Immediately

3.7 PLANT SYSTEMS

3.7.3 Control Room Emergency Filtration (CREF) System

LC0 3.7.3 The CREF System shall be OPERABLE.

-----NOTE-----
The control room envelope (CRE) boundary may be opened intermittently under administrative control.

APPLICABILITY: MODES 1, 2, and 3,
During movement of recently irradiated fuel assemblies in
the secondary containment.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One CREF subsystem inoperable for reasons other than Condition B.	A.1 Restore CREF subsystem to OPERABLE status.	7 days
B. One or more CREF subsystems inoperable due to inoperable CRE boundary in MODE 1, 2, or 3.	B.1 Initiate action to implement mitigating actions.	Immediately
	<u>AND</u>	
	B.2 Verify mitigating actions ensure CRE occupant exposures to radiological and chemical hazards will not exceed limits and CRE occupants are protected from smoke hazards.	24 hours
	<u>AND</u>	
	B.3 Restore CRE boundary to OPERABLE status.	90 days

(continued)

ACTIONS (continued)

[illegible]

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Two CREF subsystems or a non-redundant component or portion of the CREF System inoperable in MODE 1, 2, or 3 for reasons other than Condition B.	E.1 -----NOTE----- LCO 3.0.4.a is not applicable when entering MODE 3. ----- Be in MODE 3.	12 hours
F. Two CREF subsystems or a non-redundant component or portion of the CREF System inoperable during movement of recently irradiated fuel assemblies in the secondary containment. <u>OR</u> One or more CREF subsystems inoperable due to an inoperable CRE boundary during movement of recently irradiated fuel assemblies in the secondary containment.	F.1 -----NOTES----- 1. LCO 3.0.3 is not applicable. 2. Not required for a CREF System or subsystem inoperable due to failure to provide the required filtration efficiency, or due to replacement of charcoal filtration media. ----- Suspend movement of recently irradiated fuel assemblies in the secondary containment.	Immediately

3.7 PLANT SYSTEMS

3.7.4 Control Center Air Conditioning (AC) System

LCO 3.7.4 Two control center AC subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.
During movement of recently irradiated fuel assemblies in the secondary containment.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One control center AC subsystem inoperable.	A.1 Restore control center AC subsystem to OPERABLE status.	30 days
B. Two control center AC subsystems inoperable.	B.1 Verify control room area temperature <90°F.	Once per 4 hours
	<u>AND</u> B.2 Restore one control center AC subsystem to OPERABLE status.	72 hours
C. Required Action and associated Completion Time of Condition A or B not met in MODE 1, 2, or 3.	C.1 -----NOTE----- LCO 3.0.4.a is not applicable when entering MODE 3. ----- Be in MODE 3.	12 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition A not met during movement of recently irradiated fuel assemblies in the secondary containment.	-----NOTE----- LCO 3.0.3 is not applicable -----	
	D.1 Place OPERABLE control center AC subsystem in operation.	Immediately
	<u>OR</u> D.2 Suspend movement of recently irradiated fuel assemblies in the secondary containment.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Required Action and associated Completion Time of Condition B not met during movement of recently irradiated fuel assemblies in the secondary containment.	E.1 -----NOTE----- LCO 3.0.3 is not applicable ----- Suspend movement of recently irradiated fuel assemblies in the secondary containment.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.7.4.1 Verify the control room air temperature is $\leq 95^{\circ}\text{F}$.	In accordance with the Surveillance Frequency Control Program

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	A.2.2 Suspend movement of recently irradiated fuel assemblies in the secondary containment.	Immediately
	<u>AND</u>	
	A.2.3 Initiate action to restore required offsite power circuit to OPERABLE status.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One or both required EDGs inoperable.	B.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	B.2 Suspend movement of recently irradiated fuel assemblies in secondary containment.	Immediately
	<u>AND</u>	
	B.3 Initiate action to restore required EDGs to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.8.2.1 -----NOTE----- The following SRs are not required to be performed: SR 3.8.1.2, SR 3.8.1.3, and SR 3.8.1.7 through SR 3.8.1.17. ----- For AC sources required to be OPERABLE SR 3.8.1.1 through SR 3.8.1.17, are applicable.</p>	In accordance with applicable SRs

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	A.2.2 Suspend movement of recently irradiated fuel assemblies in the secondary containment.	Immediately
	<u>AND</u>	
	A.2.3 Initiate action to restore required DC electrical power subsystems to OPERABLE status.	Immediately

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.3 Initiate actions to restore required AC and DC electrical power distribution subsystems to OPERABLE status.	Immediately
	<p style="text-align: center;"><u>AND</u></p> A.2.4 Declare associated required shutdown cooling subsystem(s) inoperable and not in operation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.8.8.1 Verify correct breaker alignments and voltage to required AC and DC electrical power distribution subsystems.	In accordance with the Surveillance Frequency Control Program

**Enclosure 4 to
NRC-17-0067**

**Fermi 2 NRC Docket No. 50-341
Operating License No. NPF-43**

**License Amendment Request to Adopt TSTF-542, "Reactor Pressure Vessel Water
Inventory Control"**

**Proposed Technical Specification Bases Changes (Mark-Up)
(For Information Only)**

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RPV WATER INVENTORY CONTROL

RPV Water Inventory Control

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

Core Spray and Low Pressure Coolant Injection Systems

1.a, 2.a. Reactor Vessel Water Level—Low Low Low, Level 1

Low reactor pressure vessel (RPV) water level indicates that the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage could result. The low pressure ECCS and associated EDGs are initiated at Level 1 to ensure that core spray and flooding functions are available to prevent or minimize fuel damage. The Reactor Vessel Water Level—Low Low Low, Level 1 is one of the Functions assumed to be OPERABLE and capable of initiating the ECCS during the transients analyzed in Reference 2. In addition, the Reactor Vessel Water Level—Low Low Low, Level 1 Function is directly assumed in the analysis of the recirculation line break (Ref. 1). The core cooling function of the ECCS, along with the scram action of the Reactor Protection System (RPS), ensures that the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

Reactor Vessel Water Level—Low Low Low, Level 1 signals are initiated from four level transmitters that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the vessel.

The Reactor Vessel Water Level—Low Low Low, Level 1 Allowable Value is chosen to allow time for the low pressure core flooding systems to activate and provide adequate cooling.

In Modes 1, 2, and 3,
refer

Four channels of Reactor Vessel Water Level—Low Low Low, Level 1 Function are only required to be OPERABLE when the ECCS or EDG(s) are required to be OPERABLE to ensure that no single instrument failure can preclude ECCS and EDG initiation. Refer to LCO 3.5.1 and LCO 3.5.2, "ECCS—Shutdown," for Applicability Bases for the low pressure ECCS subsystems; LCO 3.8.1, "AC Sources—Operating"; and LCO 3.8.2, "AC Sources—Shutdown," for Applicability Bases for the EDGs.

and

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

analysis of the recirculation line break (Ref. 1). The core cooling function of the ECCS, along with the scram action of the RPS, ensures that the fuel peak cladding temperature remains below the limits of 10 CFR 50.46.

The Reactor Steam Dome Pressure-Low signals are initiated from four pressure transmitters that sense the reactor dome pressure.

The Allowable Value is low enough to prevent overpressuring the equipment in the low pressure ECCS, but high enough to ensure that the ECCS injection prevents the fuel peak cladding temperature from exceeding the limits of 10 CFR 50.46.

In Modes 1, 2, and 3,
refer

Four channels of Reactor Steam Dome Pressure-Low Function are only required to be OPERABLE when the ECCS is required to be OPERABLE to ensure that no single instrument failure can preclude ECCS initiation. > Refer to LCO 3.5.1 and ~~LCO 3.5.2~~ for Applicability Bases for the low pressure ECCS subsystems.

1.d. 2.h. Manual Initiation

The Manual Initiation channel provides manual initiation capability by means of individual component controls. There is one manual initiation channel for each of the CS and LPCI subsystems (i.e., two for CS and two for LPCI).

The Manual Initiation Function is not assumed in any accident or transient analyses in the UFSAR. However, the Function is retained for overall redundancy and diversity of the low pressure ECCS function as required by the NRC in the plant licensing basis.

There is no Allowable Value for this Function since the channels are mechanically actuated based solely on the position of the individual components. Each channel of the Manual Initiation Function is only required to be OPERABLE when the associated ECCS is required to be OPERABLE. > Refer to LCO 3.5.1 and ~~LCO 3.5.2~~ for Applicability Bases for the low pressure ECCS subsystems.

In Modes 1, 2, and 3,
refer

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

2.d Reactor Vessel Water Level—Low Low Level 2 (Loop Selection Logic)

LPCI Loop selection logic is initiated on decreasing RPV water level at level 2. This gives the logic time to detect the broken recirculation loop and select the unbroken recirculation loop for LPCI injection. The LPCI pumps are initiated at level 1.

Reactor Vessel Water Level—Low Low, Level 2 signals are initiated from four level transmitters that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the vessel. The transmitter signals feed trip units whose outputs drive relays. Output contacts of the relays are configured in a one-out-of-two taken twice initiation logic.

The same instrumentation and relay logic is used for HPCI initiation (Function 3a). That system's design basis establishes the Allowable Value while accounting for measurement uncertainties. LPCI loop selection initiation is not directly assumed by any safety or transient analysis, but is required to function to support the LPCI system, which is assumed to function in the accident analysis (Ref. 1).

per LCO 3.5.1,

Four channels are required to be OPERABLE whenever LPCI is required to be OPERABLE to ensure that no single instrument failure can preclude LPCI initiation.

2.e. Reactor Steam Dome Pressure—Low (Break Detection Logic)

This function is provided in the LPCI break detection logic. If only one recirculation pump is running, the logic trips that pump in order to obtain a meaningful measurement of recirculation riser differential pressure (Function 2.f). Reactor Steam Dome Pressure—Low inhibits the break detection logic from acting on the value of riser differential pressure until reactor pressure has fallen below the set point due to the pump trip. This allows the logic to identify the broken recirculation loop. Although this function is not directly assumed by the safety analysis, it is required for the LPCI loop selection logic,

BASES

per LCO 3.5.1

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

and LPCI to be OPERABLE, and is therefore a supporting function for that assumed by the analysis of Reference 1.

Reactor Steam Dome Pressure—Low signals are initiated from four pressure transmitters that sense reactor steam dome pressure. The Allowable Value was selected, allowing for measurement uncertainties, to give adequate time, based on reactor pressure decrease following RPT, for an accurate riser differential pressure measurement to be made. The logic for this Function is one-out-of-two taken twice.

per LCO 3.5.1,

Four channels of Reactor Steam Dome Pressure—Low are required to be OPERABLE when LPCI is required to be OPERABLE to ensure that no single instrument failure can preclude LPCI injection.

2.f. Riser Differential Pressure—High (Break Detection)

The LPCI break detection logic determines which recirculation loop is broken by comparing the pressure of the two recirculation loops. The broken loop will indicate a lower pressure than the unbroken loop. The loop with the higher pressure is then used for LPCI injection. If both pressures are the same, loop B is selected by default.

Riser Differential Pressure—High signals are initiated from four differential pressure transmitters that sense the difference between corresponding recirculation loop riser pipes. Logic is one-out-of-two taken twice.

The Riser Differential Pressure—High Allowable Value is selected, allowing for measurement uncertainties, based on the analytical limit of 1.0 psid between corresponding risers.

Four channels of Riser Differential Pressure—High are required to be OPERABLE to ensure that no single instrument failure prevents LPCI injection into the unbroken riser loop and support the LPCI function.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

3.c. Reactor Vessel Water Level - High, Level 8

High RPV water level indicates that sufficient cooling water inventory exists in the reactor vessel such that there is no danger to the fuel. Therefore, the Level 8 signal is used to trip the HPCI turbine to prevent overflow into the main steam lines (MSLs). The Reactor Vessel Water Level - High, Level 8 Function is not assumed in the accident and transient analyses. It was retained since it is a potentially significant contributor to risk.

Reactor Vessel Water Level - High, Level 8 signals for HPCI are initiated from two level transmitters from the wide range water level measurement instrumentation. Both Level 8 signals are required in order to trip the HPCI turbine. This ensures that no single instrument failure can preclude HPCI initiation. The Reactor Vessel Water Level - High, Level 8 Allowable Value is chosen to prevent flow from the HPCI System from overflowing into the MSLs.

Two channels of Reactor Vessel Water Level - High, Level 8 Function are required to be OPERABLE only when HPCI is required to be OPERABLE. Refer to LCO 3.5.1 and LCO 3.5.2 for HPCI Applicability Bases.

3.d. Condensate Storage Tank Level - Low

Low level in the CST indicates the unavailability of an adequate supply of makeup water from this normal source. Normally the suction valves between HPCI and the CST are open and, upon receiving a HPCI initiation signal, water for HPCI injection would be taken from the CST. However, if the water level in the CST falls below a preselected level, first the suppression pool suction valves automatically open, and then the CST suction valve automatically closes. This ensures that an adequate supply of makeup water is available to the HPCI pump. To prevent losing suction to the pump, the suction valves are interlocked so that the suppression pool suction valves must be open before the CST suction valve automatically closes. The Function is implicitly assumed in the accident and transient analyses (which take credit for HPCI) since the analyses assume that the HPCI suction source is the suppression pool.

BASES

ACTIONS (continued)

Action B.3 is not appropriate and the feature(s) associated with the inoperable, untripped channels must be declared inoperable within 1 hour. As noted (Note 1 to Required

Action B.1), Required Action B.1 is only applicable in MODES 1, 2, and 3. In MODES 4 and 5, the specific initiation time of the low pressure ECCS is not assumed and the probability of a LOCA is lower. Thus, a total loss of initiation capability for 24 hours (as allowed by Required Action B.3) is allowed during MODES 4 and 5. There is no similar Note provided for Required Action B.2 since HPCI instrumentation is not required in MODES 4 and 5; thus, a Note is not necessary.

the Note

Notes are also provided (Note 2 to Required Action B.1 and the Note to Required Action B.2) to delineate which Required Action is applicable for each Function that requires entry into Condition B if an associated channel is inoperable. This ensures that the proper loss of initiation capability check is performed.

The Completion Time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." For Required Action B.1, the Completion Time only begins upon discovery that a redundant feature in the same system (e.g., both CS subsystems) cannot be automatically initiated due to inoperable, untripped channels within the same Function as described in the paragraph above. For Required Action B.2, the Completion Time only begins upon discovery that the HPCI System cannot be automatically initiated due to two inoperable, untripped channels for the associated Function in the same trip system. The 1 hour Completion Time from discovery of loss of initiation capability is acceptable because it minimizes risk while allowing time for restoration or tripping of channels.

Because of the diversity of sensors available to provide initiation signals and the redundancy of the ECCS design, an allowable out of service time of 24 hours has been shown to be acceptable (Ref. 4) to permit restoration of any inoperable channel to OPERABLE status. If the inoperable channel cannot be restored to OPERABLE status within the allowable out of service time, the channel must be placed in the tripped condition per Required Action B.3. Placing the inoperable channel in trip would conservatively compensate

BASES

ACTIONS (continued)

for the inoperability, restore capability to accommodate a single failure, and allow operation to continue. Alternately, if it is not desired to place the channel in trip (e.g., as in the case where placing the inoperable channel in trip would result in an initiation), Condition G must be entered and its Required Action taken.

C.1 and C.2

Required Action C.1 is intended to ensure that appropriate actions are taken if multiple, inoperable channels within the same Function result in redundant automatic initiation capability being lost for the feature(s). Required Action C.1 features would be those that are initiated by Functions 1.c, 2.c, 2.e, and 2.f (i.e., low pressure ECCS). Redundant automatic initiation capability is lost if either: (a) two Function 1.c channels are inoperable in the same trip system, (b) two Function 2.c channels are inoperable in the same trip system, (c) two Function 2.e channels are inoperable in the same trip system, or (d) two or more Function 2.f channels are inoperable. In this situation (loss of redundant automatic initiation capability), the 24 hour allowance of Required Action C.2 is not appropriate and the feature(s) associated with the inoperable channels must be declared inoperable within 1 hour. Since each inoperable channel would have Required Action C.1 applied separately (refer to ACTIONS Note), each inoperable channel would only require the affected portion of the associated system to be declared inoperable. However, since channels for both low pressure ECCS subsystems are inoperable (e.g., both CS subsystems), and the Completion Times started concurrently for the channels in both subsystems, this results in the affected portions in both subsystems being concurrently declared inoperable. For Functions 1.c, 2.c, 2.e, and 2.f, the affected portions are the associated low pressure ECCS pumps. ~~As noted (Note 1), Required Action C.1 is only applicable in MODES 1, 2, and 3. In MODES 4 and 5, the specific initiation time of the ECCS is not assumed and the probability of a LOCA is lower. Thus, a total loss of automatic initiation capability for 24 hours (as allowed by Required Action C.2) is allowed during MODES 4 and 5.~~

BASES

ACTIONS (continued)

The → Note 2 states that Required Action C.1 is only applicable for Functions 1.c, 2.c, 2.e, and 2.f. Required Action C.1 is not applicable to Functions 1.d, 2.h, and 3.f (which also require entry into this Condition if a channel in these Functions is inoperable), since they are the Manual Initiation Functions and are not assumed in any accident or transient analysis. Thus, a total loss of manual initiation capability for 24 hours (as allowed by Required Action C.2) is allowed. Required Action C.1 is also not applicable to Function 3.c (which also requires entry into this Condition if a channel in this Function is inoperable), since the loss of one channel results in a loss of the Function (two-out-of-two logic). This loss was considered during the development of Reference 4 and considered acceptable for the 24 hours allowed by Required Action C.2.

The Completion Time is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." For Required Action C.1, the Completion Time only begins upon discovery that the same feature in both subsystems (e.g., both CS subsystems) cannot be automatically initiated due to inoperable channels within the same Function as described in the paragraph above. The 1 hour Completion Time from discovery of loss of initiation capability is acceptable because it minimizes risk while allowing time for restoration of channels.

Because of the diversity of sensors available to provide initiation signals and the redundancy of the ECCS design, an allowable out of service time of 24 hours has been shown to be acceptable (Ref. 4) to permit restoration of any inoperable channel to OPERABLE status. If the inoperable channel cannot be restored to OPERABLE status within the allowable out of service time, Condition G must be entered, and its Required Action taken. The Required Actions do not allow placing the channel in trip since this action would either cause the initiation or it would not necessarily result in a safe state for the channel in all events.

B 3.3 INSTRUMENTATION

B 3.3.5.3 Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation

BASES

BACKGROUND

The RPV contains penetrations below the top of the active fuel (TAF) that have the potential to drain the reactor coolant inventory to below the TAF. If the water level should drop below the TAF, the ability to remove decay heat is reduced, which could lead to elevated cladding temperatures and clad perforation. Safety Limit 2.1.1.3 requires the RPV water level to be above the top of the active irradiated fuel at all times to prevent such elevated cladding temperatures.

Technical Specifications are required by 10 CFR 50.36 to include limiting safety system settings (LSSS) for variables that have significant safety functions. LSSS are defined by the regulation as "Where a LSSS is specified for a variable on which a safety limit has been placed, the setting must be chosen so that automatic protective actions will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytical Limit is the limit of the process variable at which a safety action is initiated to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the Analytical Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protection channels must be chosen to be more conservative than the Analytical Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur. The actual settings for the automatic isolation channels are the same as those established for the same functions in MODES 1, 2, and 3 in LCO 3.3.5.1, "Emergency Core Cooling System (ECCS) Instrumentation," or LCO 3.3.6.1, "Primary Containment Isolation Instrumentation."

With the unit in MODE 4 or 5, RPV water inventory control is not required to mitigate any events or accidents evaluated in the safety analyses. RPV water inventory control is required in MODES 4 and 5 to protect Safety Limit 2.1.1.3 and the fuel cladding barrier to prevent the release of radioactive material should a draining event occur. Under the definition of DRAIN TIME, some penetration flow paths may be excluded from the DRAIN TIME calculation if they will be isolated by valves that will close automatically without offsite power prior to the RPV water level being equal to the TAF when actuated by RPV water level isolation instrumentation.

The purpose of the RPV Water Inventory Control Instrumentation is to support the requirements of LCO 3.5.2, "Reactor Pressure Vessel (RPV) Water Inventory Control," and the definition of DRAIN TIME. There are functions that are required for manual initiation or operation of the ECCS injection/spray subsystem required to be OPERABLE by LCO 3.5.2 and other functions that support automatic isolation of Residual Heat Removal subsystem and Reactor Water Cleanup system penetration flow path(s) on low RPV water level.

The RPV Water Inventory Control Instrumentation supports operation of core spray (CS) and low pressure coolant injection (LPCI). The equipment involved with each of these systems is described in the Bases for LCO 3.5.2.

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APPLICABLE
SAFETY
ANALYSES, LCO,
and APPLICABILITY

With the unit in MODE 4 or 5, RPV water inventory control is not required to mitigate any events or accidents evaluated in the safety analyses. RPV water inventory control is required in MODES 4 and 5 to protect Safety Limit 2.1.1.3 and the fuel cladding barrier to prevent the release of radioactive material should a draining event occur.

A double-ended guillotine break of the Reactor Coolant System (RCS) is not postulated in MODES 4 and 5 due to the reduced RCS pressure, reduced piping stresses, and ductile piping systems. Instead, an event is postulated in which a single operator error or initiating event allows draining of the RPV water inventory through a single penetration flow path with the highest flow rate, or the sum of the drain rates through multiple penetration flow paths susceptible to a common mode failure (e.g., seismic event, loss of normal power, single human error). It is assumed, based on engineering judgment, that while in MODES 4 and 5, one low pressure ECCS injection/spray subsystem can be manually initiated to maintain adequate reactor vessel water level.

As discussed in References 1, 2, 3, 4, and 5, operating experience has shown RPV water inventory to be significant to public health and safety. Therefore, RPV Water Inventory Control satisfies Criterion 4 of 10 CFR 50.36(c)(2)(ii).

Permissive and interlock setpoints are generally considered as nominal values without regard to measurement accuracy.

The specific Applicable Safety Analyses, LCO, and Applicability discussions are listed below on a Function by Function basis.

Core Spray and Low Pressure Coolant Injection Systems

1.a, 2.a. Reactor Steam Dome Pressure - Low (Injection Permissive)

Low reactor steam dome pressure signals are used as permissives for the low pressure ECCS injection/spray subsystem manual injection functions. This function ensures that, prior to opening the injection valves of the low pressure ECCS subsystems, the reactor pressure has fallen to a value below these subsystems' maximum design pressure. While it is assured during MODES 4 and 5 that the reactor steam dome pressure will be below the ECCS maximum design pressure, the Reactor Steam Dome Pressure - Low signals are assumed to be OPERABLE and capable of permitting initiation of the ECCS.

The Reactor Steam Dome Pressure - Low signals are initiated from four pressure transmitters that sense the reactor dome pressure. The transmitters are connected to four trip units. The outputs of the trip units are connected to relays whose contacts are arranged in a one-out-of-two taken twice logic.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

The Allowable Value is low enough to prevent overpressuring the equipment in the low pressure ECCS.

The four channels of Reactor Steam Dome Pressure - Low Function are required to be OPERABLE in MODES 4 and 5 when ECCS manual initiation is required to be OPERABLE by LCO 3.5.2.

1.b, 2.b. Manual Initiation

The Manual Initiation channel provides manual initiation capability by means of individual component controls. There is one manual initiation channel for each of the CS and LPCI subsystems (i.e., four for CS and four for LPCI).

The Manual Initiation Function is not assumed in any accident or transient analyses in the UFSAR. However, the Function is retained for overall redundancy and diversity of the low pressure ECCS function as required by the NRC in the plant licensing basis.

There is no Allowable Value for this Function since the channels are mechanically actuated based solely on the position of the individual components. Each channel of the Manual Initiation Function is only required to be OPERABLE in MODES 4 and 5 when the associated ECCS subsystems are required to be OPERABLE per LCO 3.5.2.

RHR System Isolation3.a - Reactor Vessel Water Level - Low, Level 3

The definition of DRAIN TIME allows crediting the closing of penetration flow paths that are capable of being isolated by valves that will close automatically without offsite power prior to the RPV water level being equal to the TAF when actuated by RPV water level isolation instrumentation. The Reactor Vessel Water Level - Low, Level 3 Function associated with RHR System isolation may be credited for automatic isolation of penetration flow paths associated with the RHR System.

Reactor Vessel Water Level - Low, Level 3 signals are initiated from four level transmitters that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the vessel. While four channels (two channels per trip system) of the Reactor Vessel Water Level - Low, Level 3 Function are available, only two channels (both in the same trip system) are required to be OPERABLE.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

The Reactor Vessel Water Level - Low, Level 3 Allowable Value was chosen to be the same as the Primary Containment Isolation Instrumentation Reactor Vessel Water Level - Low, Level 3 Allowable Value (LCO 3.3.6.1), since the capability to cool the fuel may be threatened.

The Reactor Vessel Water Level - Low, Level 3 Function is only required to be OPERABLE when automatic isolation of the associated penetration flow path is credited in calculating DRAIN TIME (i.e., this Function must be OPERABLE if the DRAIN TIME calculation assumes the RHR System would be automatically isolated).

This Function isolates the Group 3 valves.

Reactor Water Cleanup (RWCU) System Isolation4.a - Reactor Vessel Water Level - Low Low, Level 2

The definition of DRAIN TIME allows crediting the closing of penetration flow paths that are capable of being isolated by valves that will close automatically without offsite power prior to the RPV water level being equal to the TAF when actuated by RPV water level isolation instrumentation. The Reactor Vessel Water Level - Low Low, Level 2 Function associated with RWCU System isolation may be credited for automatic isolation of penetration flow paths associated with the RWCU System.

Reactor Vessel Water Level - Low Low, Level 2 signals are initiated from four level transmitters that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the vessel. While four channels (two channels per trip system) of the Reactor Vessel Water Level - Low, Level 2 Function are available, only two channels (both in the same trip system) are required to be OPERABLE.

The Reactor Vessel Water Level - Low Low, Level 2 Allowable Value was chosen to be the same as the ECCS Reactor Vessel Water Level - Low Low, Level 2 Allowable Value (LCO 3.3.5.1), since the capability to cool the fuel may be threatened.

The Reactor Vessel Water Level - Low Low, Level 2 Function is only required to be OPERABLE when automatic isolation of the associated penetration flow path is credited in calculating DRAIN TIME (i.e., this Function must be OPERABLE if the DRAIN TIME calculation assumes the RWCU System would be automatically isolated).

This Function isolates the Group 10 and 11 valves.

BASES

ACTIONS

A Note has been provided to modify the ACTIONS related to RPV Water Inventory Control instrumentation channels. Section 1.3, Completion Times, specifies that once a Condition has been entered, subsequent divisions, subsystems, components, or variables expressed in the Condition discovered to be inoperable or not within limits will not result in separate entry into the Condition. Section 1.3 also specifies that Required Actions continue to apply for each additional failure, with Completion Times based on initial entry into the Condition. However, the Required Actions for inoperable RPV Water Inventory Control instrumentation channels provide appropriate compensatory measures for separate inoperable Condition entry for each inoperable RPV Water Inventory Control instrumentation channel.

A.1

Required Action A.1 directs entry into the appropriate Condition referenced in Table 3.3.5.3-1. The applicable Condition referenced in the Table is Function dependent. Each time a channel is discovered inoperable, Condition A is entered for that channel and provides for transfer to the appropriate subsequent Condition.

B.1 and B.2

RHR System Isolation, Reactor Vessel Water Level - Low Level 3, and Reactor Water Cleanup System, Reactor Vessel Water Level - Low Low, Level 2 functions are applicable when automatic isolation of the associated penetration flow path is credited in calculating DRAIN TIME. If the instrumentation is inoperable, Required Action B.1 directs an immediate declaration that the associated penetration flow path(s) are incapable of automatic isolation. Required Action B.2 directs calculation of DRAIN TIME. The calculation cannot credit automatic isolation of the affected penetration flow paths.

C.1

Low reactor steam dome pressure signals are used as permissives for the low pressure ECCS injection/spray subsystem manual injection functions. If the permissive is inoperable, manual initiation of ECCS is prohibited. Therefore, the permissive must be placed in the trip condition within 1 hour. With the permissive in the trip condition, manual initiation may be performed. Prior to placing the permissive in the tripped condition, the operator can take manual control of the pump and the injection valve to inject water into the RPV.

The Completion Time of 1 hour is intended to allow the operator time to evaluate any discovered inoperabilities and to place the channel in trip.

BASES

ACTIONS (continued)

D.1

There is a risk that the associated low pressure ECCS pump could overheat when the pump is operating and the associated injection valve is not fully open. In this condition, the operator can take manual control of the pump and the injection valve to ensure the pump does not overheat. If a manual initiation function is inoperable, the ECCS subsystem pumps can be started manually and the valves can be opened manually, but this is not the preferred condition.

The 24 hour Completion Time was chosen to allow time for the operator to evaluate and repair any discovered inoperabilities. The Completion Time is appropriate given the ability to manually start the ECCS pumps and open the injection valves and to manually ensure the pump does not overheat.

E.1

With the Required Action and associated Completion Time of Condition C or D not met, the associated low pressure ECCS injection/spray subsystem may be incapable of performing the intended function, and must be declared inoperable immediately.

SURVEILLANCE
REQUIREMENTS

As noted in the beginning of the SRs, the SRs for each RPV Water Inventory Control instrument Function are found in the SRs column of Table 3.3.5.3-1.

SR 3.3.5.3.1

Performance of the CHANNEL CHECK ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is normally a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between the instrument channels could be an indication of excessive instrument drift in one of the channels or something even more serious. A CHANNEL CHECK guarantees that undetected outright channel failure is limited; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL FUNCTIONAL TEST.

Agreement criteria are determined by the plant staff, based on a combination of the channel instrument uncertainties, including indication and readability. If a channel is outside the criteria, it may be an indication that the instrument has drifted outside its limit.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

BASES

SURVEILLANCE REQUIREMENTS (continued)

The CHANNEL CHECK supplements less formal, but more frequent, checks of channels during normal operational use of the displays associated with the channels required by the LCO.

SR 3.3.5.3.2

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the entire channel will perform the intended function. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL FUNCTIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests.

Any setpoint adjustment shall be consistent with the assumptions of the current plant specific setpoint methodology.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.3.5.3.3

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the required initiation logic for a specific channel. The system functional testing performed in LCO 3.5.2 overlaps this Surveillance to complete testing of the assumed safety function.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

REFERENCES

1. Information Notice 84-81 "Inadvertent Reduction in Primary Coolant Inventory in Boiling Water Reactors During Shutdown and Startup," November 1984.
2. Information Notice 86-74, "Reduction of Reactor Coolant Inventory Because of Misalignment of RHR Valves," August 1986.
3. Generic Letter 92-04, "Resolution of the Issues Related to Reactor Vessel Water Level Instrumentation in BWRs Pursuant to 10 CFR 50.54(F)," August 1992.
4. NRC Bulletin 93-03, "Resolution of Issues Related to Reactor Vessel Water Level Instrumentation in BWRs," May 1993.
5. Information Notice 94-52, "Inadvertent Containment Spray and Reactor Vessel Draindown at Millstone 1," July 1994.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

6.b. Reactor Vessel Water Level-Low, Level 3

Low RPV water level indicates that the capability to cool the fuel may be threatened. Should RPV water level decrease too far, fuel damage could result. Therefore, isolation of some reactor vessel interfaces occurs to begin isolating the potential sources of a break. The Reactor Vessel Water Level-Low, Level 3 Function associated with RHR Shutdown Cooling System isolation is not directly assumed in safety analyses because a break of the RHR Shutdown Cooling System is bounded by breaks of the recirculation and MSL. The RHR Shutdown Cooling System isolation on Level 3 supports actions to ensure that the RPV water level does not drop below the top of the active fuel during a vessel draindown event caused by a leak (e.g., pipe break or inadvertent valve opening) in the RHR Shutdown Cooling System.

Reactor Vessel Water Level-Low, Level 3 signals are initiated from four level transmitters that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the vessel. Four channels (two channels per trip system) of the Reactor Vessel Water Level-Low, Level 3 Function are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function. ~~As noted (footnote (c) to Table 3.3.6.1-1), only two channels of the Reactor Vessel Water Level-Low, Level 3 Function are required to be OPERABLE in MODES 4 and 5 (and must input into the same trip system), provided the RHR Shutdown Cooling System integrity is maintained. System integrity is maintained provided the piping is intact and no maintenance is being performed that has the potential for draining the reactor vessel through the system.~~

The Reactor Vessel Water Level-Low, Level 3 Allowable Value was chosen to be the same as the RPS Reactor Vessel Water Level-Low, Level 3 Allowable Value (LCD 3.3.1.1), since the capability to cool the fuel may be threatened.

The Reactor Vessel Water Level-Low, Level 3 Function is only required to be OPERABLE in ~~MODES 3, 4, and 5~~ to prevent this potential flow path from lowering the reactor vessel level to the top of the fuel. In MODES 1 and 2, another isolation (i.e., Reactor Steam Dome Pressure-High) and administrative controls ensure that this flow path remains

Primary Containment Isolation Instrumentation
B 3.3.6.1

BASES

ACTIONS (continued)

The 1 hour Completion Time is acceptable because it minimizes risk while allowing sufficient time for personnel to isolate the RWCU System.

~~J.1 and J.2~~

~~If the channel is not restored to OPERABLE status or placed in trip within the allowed Completion Time, the associated penetration flow path should be closed. However, if the shutdown cooling function is needed to provide core cooling, these Required Actions allow the penetration flow path to remain unisolated provided action is immediately initiated to restore the channel to OPERABLE status or to isolate the RHR Shutdown Cooling System (i.e., provide alternate decay heat removal capabilities so the penetration flow path can be isolated). Actions must continue until the channel is restored to OPERABLE status or the RHR Shutdown Cooling System is isolated.~~

SURVEILLANCE
REQUIREMENTS

As noted at the beginning of the SRs, the SRs for each Primary Containment Isolation instrumentation Function are found in the SRs column of Table 3.3.6.1-1.

The Surveillances are modified by a Note to indicate that when a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed. Upon completion of the Surveillance, or expiration of the allowance, the channel must be returned to OPERABLE status or the applicable Condition entered and Required Actions taken. This Note is based on the reliability analysis (Refs. 5 and 6) assumption of the average time required to perform channel surveillance. That analysis demonstrated that the testing allowance does not significantly reduce the probability that the PCIVs will isolate the penetration flow path(s) when necessary. Note 2.b clarifies that the isolation function is maintained for Function 5.c, RWCU Area Differential Temperature-High, provided Function 5.b, RWCU Area Temperature-High is OPERABLE in the affected area.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

Reactor Vessel Water Level—Low Low, Level 2 Function are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function. Instrument channels are derived from the RPS powered instruments to be consistent with the nuclear steam supply shut-off system design bases, which includes isolation on loss of power, or a deenergize-to-trip logic.

The Reactor Vessel Water Level—Low Low, Level 2 Allowable Value was chosen to be the same as the High Pressure Coolant Injection/Reactor Core Isolation Cooling (HPCI/RCIC) Reactor Vessel Water Level—Low Low, Level 2 Allowable Value (LCO 3.3.5.1 and LCO 3.3.5.2), since this could indicate that the capability to cool the fuel is being threatened.

The Reactor Vessel Water Level—Low Low, Level 2 Function is required to be OPERABLE in MODES 1, 2, and 3 where considerable energy exists in the Reactor Coolant System (RCS); thus, there is a probability of pipe breaks resulting in significant releases of radioactive steam and gas. In MODES 4 and 5, the probability and consequences of these events are low due to the RCS pressure and temperature limitations of these MODES; thus, this Function is not required. ~~In addition, the Function is also required to be OPERABLE during operations with a potential for draining the reactor vessel (OPDRVs) because the capability of isolating potential sources of leakage must be provided to ensure that offsite dose limits are not exceeded if core damage occurs.~~

2. Drywell Pressure—High

High drywell pressure can indicate a break in the reactor coolant pressure boundary (RCPB). An isolation of the secondary containment and actuation of the SGT System are initiated in order to minimize the potential of an offsite dose release. The isolation on high drywell pressure supports actions to ensure that any offsite releases are within the limits calculated in the safety analysis. However, the Drywell Pressure—High Function associated with isolation is not assumed in any UFSAR accident or transient analyses. It is retained for the overall redundancy and

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

individual monitor whose trip outputs are assigned to an isolation channel. Four channels of Fuel Pool Ventilation Exhaust Radiation-High Function are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

The Allowable Values are chosen to promptly detect gross failure of the fuel cladding.

The Fuel Pool Ventilation Exhaust Radiation-High Function is required to be OPERABLE in MODES 1, 2, and 3 where considerable energy exists; thus, there is a probability of pipe breaks resulting in significant releases of radioactive steam and gas. In MODES 4 and 5, the probability and consequences of these events are low due to the RCS pressure and temperature limitations of these MODES; thus, this Function is not required. In addition, the Function is also required to be OPERABLE during ~~OPDRVs and movement of~~ recently irradiated fuel assemblies in the secondary containment, because the capability of detecting radiation releases due to fuel failures (due to ~~fuel uncover or~~ dropped fuel assemblies) must be provided to ensure that offsite dose limits are not exceeded. Due to radioactive decay, this Function is only required to isolate secondary containment during fuel handling accidents involving recently irradiated fuel. "Recently irradiated fuel" is fuel that has occupied part of a critical reactor core within the previous 6.3 days. Handling new (non-irradiated) fuel bundles over the open reactor core or the spent fuel pool is subject to the same requirements of handling recently irradiated fuel, as long as any fuel in the core or fuel pool is recently irradiated.

4. Manual Initiation

The Manual Initiation push button channels introduce signals into the secondary containment isolation and SGTS initiation logic that are redundant to the automatic protective instrumentation channels and provide manual isolation capability. There is no specific UFSAR safety analysis that takes credit for this Function. It is retained for the overall redundancy and diversity of the secondary

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

containment isolation instrumentation as required by the NRC approved licensing basis.

There are two push buttons for the logic, one manual initiation push button per trip system. There is no Allowable Value for this Function, since the channels are mechanically actuated based solely on the position of the push buttons.

Two channels of Manual Initiation Function are available and are required to be OPERABLE in MODES 1, 2, and 3, and during ~~OPDRVs and~~ movement of recently irradiated fuel assemblies in the secondary containment. These are the MODES and other specified conditions in which the Secondary Containment Isolation automatic Functions are required to be OPERABLE.

ACTIONS

A Note has been provided to modify the ACTIONS related to secondary containment isolation instrumentation channels. Section 1.3, Completion Times, specifies that once a Condition has been entered, subsequent divisions, subsystems, components, or variables expressed in the Condition, discovered to be inoperable or not within limits, will not result in separate entry into the Condition. Section 1.3 also specifies that Required Actions of the Condition continue to apply for each additional failure, with Completion Times based on initial entry into the Condition. However, the Required Actions for inoperable secondary containment isolation instrumentation channels provide appropriate compensatory measures for separate inoperable channels. As such, a Note has been provided that allows separate Condition entry for each inoperable secondary containment isolation instrumentation channel.

A.1

Because of the diversity of sensors available to provide isolation signals and the redundancy of the isolation design, an allowable out of service time of 12 hours for Function 2, and 24 hours for Functions other than Function 2, has been shown to be acceptable (Refs. 4 and 5) to permit restoration of any inoperable channel to OPERABLE status. This out of service time is only acceptable provided the associated Function is still maintaining isolation capability (refer to Required Action B.1 Bases).

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

channels that must function in harsh environments as defined by 10 CFR 50.49) are accounted for.

For Functions 3 and 4, the instrument trip setpoint is set as a function of the background radiation level, with the alarm setpoint at approximately three times the background level. Calculations have determined that setpoints as high as a thousand times the typical background level are adequate to warn of airborne radionuclide concentrations which might result in the limiting 5 rem dose to the control room operator provided by General Design Criteria 19 of Appendix A to 10 CFR 50. The allowable value was selected by allowing a margin to the setpoint based on engineering judgment.

The specific Applicable Safety Analyses, LCO, and Applicability discussions are listed below on a Function by Function basis.

1. Reactor Vessel Water Level - Low Low, Level 2

Low reactor pressure vessel (RPV) water level indicates that the capability of cooling the fuel may be threatened. A low reactor vessel water level could indicate a LOCA and will automatically initiate the CREF System, since this could be a precursor to a potential radiation release and subsequent radiation exposure to control room personnel.

Reactor Vessel Water Level - Low Low, Level 2 signals are initiated from four level transmitters that sense the difference between the pressure due to a constant column of water (reference leg) and the pressure due to the actual water level (variable leg) in the vessel. Four channels of Reactor Vessel Water Level - Low Low, Level 2 Function are available (two channels per trip system) and are required to be OPERABLE to ensure that no single instrument failure can preclude CREF System initiation. The Reactor Vessel Water Level - Low Low, Level 2 Allowable Value was chosen to be the same as the ECCS Reactor Vessel Water Level - Low Low, Level 2 Allowable Value (LCO 3.3.5.1, "ECCS Instrumentation").

The Reactor Vessel Water Level - Low Low, Level 2 Function is required to be OPERABLE in MODES 1, 2, and 3, ~~and during operations with a potential for draining the reactor vessel (OPDRVs)~~ to ensure that the control room personnel are

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

protected during a LOCA. In MODES 4 and 5 ~~at times other than OPDRVs, the probability of a vessel draindown event resulting in a release of radioactive material into the environment is minimal.~~ In addition, adequate protection is performed by the Control Room Air Inlet Radiation-High Function. Therefore, this Function is not required in other MODES and specified conditions.

2. Drywell Pressure-High

High pressure in the drywell could indicate a break in the reactor coolant pressure boundary. A high drywell pressure signal could indicate a LOCA and will automatically initiate the CREF System, since this could be a precursor to a potential radiation release and subsequent radiation exposure to control room personnel.

Drywell Pressure-High signals are initiated from four pressure transmitters that sense drywell pressure. Four channels of Drywell Pressure-High Function are available (two channels per trip system) and are required to be OPERABLE to ensure that no single instrument failure can preclude CREF System initiation. The Drywell Pressure-High Allowable Value was chosen to be the same as the ECCS Drywell Pressure-High Allowable Value (LCO 3.3.5.1).

The Drywell Pressure-High Function is required to be OPERABLE in MODES 1, 2, and 3 to ensure that control room personnel are protected in the event of a LOCA. In MODES 4 and 5, the Drywell Pressure-High Function is not required since there is insufficient energy in the reactor to pressurize the drywell to the Drywell Pressure-High setpoint.

3. Fuel Pool Ventilation Exhaust Radiation-High

High radiation in the fuel pool ventilation exhaust could be the result of a fuel handling accident. A fuel pool ventilation exhaust high radiation signal will automatically initiate the CREF System, since this radiation release could result in radiation exposure to control room personnel.

The fuel pool ventilation exhaust radiation equipment consists of four monitors and channels located in the refueling floor area (two channels on the east fuel pool ventilation exhaust, and two channels on the west fuel pool

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

ventilation exhaust). Four channels of Fuel Pool Ventilation Exhaust Radiation-High Function are available (two channels per trip system) and are required to be OPERABLE to ensure that no single instrument failure can preclude CREF System initiation. The Allowable Value was selected to ensure that the Function will promptly detect high activity that could threaten exposure to control room personnel.

or

The Fuel Pool Ventilation Exhaust Radiation-High Function is required to be OPERABLE in MODES 1, 2, and 3 and during movement of recently irradiated fuel assemblies in the secondary containment and operations with a potential for draining the reactor vessel (OPDRVs), to ensure that control room personnel are protected during a LOCA, fuel handling event, or vessel draindown event. During MODES 4 and 5, when these specified conditions are not in progress (e.g., OPDRVs, the probability of a LOCA is low; thus, the Function is not required. Also due to radioactive decay, this Function is only required to initiate the CREF system during fuel handling accidents involving recently irradiated fuel. "Recently irradiated fuel" is fuel that has occupied part of a critical reactor core within the previous 6.3 days. Handling new (non-irradiated) fuel bundles over the open reactor core or the spent fuel pool is subject to the same requirements of handling recently irradiated fuel, as long as any fuel in the core or fuel pool is recently irradiated.

4. Control Center Normal Makeup Air Radiation-High

The control center normal makeup air radiation monitors measure radiation levels before filtration in the inlet ducting of the MCR. A high radiation level may pose a threat to MCR personnel; thus, automatically initiating the CREF System.

The Control Center Normal Makeup Air Radiation-High Function consists of two independent monitors. Two channels of Control Center Normal Makeup Air Radiation-High are available and are required to be OPERABLE to ensure that no single instrument failure can preclude CREF System

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

initiation. The Allowable Value was selected to ensure protection of the control room personnel.

or

The Control Center Normal Makeup Air Radiation-High Function is required to be OPERABLE in MODES 1, 2, and 3 and during ~~OPDRVs and~~ movement of recently irradiated fuel assemblies in the secondary containment, to ensure that control room personnel are protected during a LOCA ~~fuel handling event, or vessel draindown event.~~ During MODES 4 and 5, ~~when these specified conditions are not in progress (e.g., OPDRVs),~~ the probability of a LOCA is low; thus, the Function is not required. Also due to radioactive decay, this Function is only required to initiate the CREF system during fuel handling accidents involving recently irradiated fuel. "Recently irradiated fuel" is fuel that has occupied part of a critical reactor core within the previous 6.3 days. Handling new (non-irradiated) fuel bundles over the open reactor core or the spent fuel pool is subject to the same requirements of handling recently irradiated fuel, as long as any fuel in the core or fuel pool is recently irradiated.

, RPV WATER INVENTORY CONTROL,

ECCS - Operating
B 3.5.1

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS) AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM

B 3.5.1 ECCS - Operating

BASES

BACKGROUND

The ECCS is designed, in conjunction with the primary and secondary containment, to limit the release of radioactive materials to the environment following a loss of coolant accident (LOCA). The ECCS uses two independent methods (flooding and spraying) to cool the core during a LOCA. The ECCS network consists of the High Pressure Coolant Injection (HPCI) System, the Core Spray (CS) System, the low pressure coolant injection (LPCI) mode of the Residual Heat Removal (RHR) System, and the Automatic Depressurization System (ADS). The suppression pool provides the required source of water for the ECCS. Although no credit is taken in the safety analyses for the condensate storage tank (CST), it is capable of providing a source of water for the HPCI and CS systems.

On receipt of an initiation signal, ECCS pumps automatically start; simultaneously, the system aligns and the pumps inject water, taken either from the CST or suppression pool, into the Reactor Coolant System (RCS) as RCS pressure is overcome by the discharge pressure of the ECCS pumps. Although the system is initiated, ADS action is delayed, allowing the operator to interrupt the timed sequence if the system is not needed. The HPCI pump discharge pressure almost immediately exceeds that of the RCS, and the pump injects coolant into the vessel to cool the core. If the break is small, the HPCI System will maintain coolant inventory as well as vessel level while the RCS is still pressurized. If HPCI fails, it is backed up by ADS in combination with LPCI and CS. In this event, the ADS timed sequence would be allowed to time out and open the selected safety/relief valves (SRVs) depressurizing the RCS, thus allowing the LPCI and CS to overcome RCS pressure and inject coolant into the vessel. If the break is large, RCS pressure initially drops rapidly and the LPCI and CS cool the core.

In the large break DBA scenario, water from the break returns to the suppression pool where it is used again and again. Water in the suppression pool is circulated through a heat exchanger cooled by the RHR Service Water System. Depending on the location and size of the break, portions of

BASES

LCO (continued)

ECCS subsystems should provide the required core cooling, thereby allowing operation of RHR shutdown cooling when necessary. The LPCI System cross-tie valves must be open to support OPERABILITY of both LPCI subsystems. Similarly, the LPCI swing bus (480 V MCC 72CF) is required to be energized to support both LPCI subsystems. Therefore, with the LPCI cross-tie valve not full open, or the LPCI swing bus not energized, both LPCI subsystems are declared inoperable.

APPLICABILITY

All ECCS subsystems are required to be OPERABLE during MODES 1, 2, and 3, when there is considerable energy in the reactor core and core cooling would be required to prevent fuel damage in the event of a break in the primary system piping. In MODES 2 and 3, when reactor steam dome pressure is ≤ 150 psig, ADS and HPCI are not required to be OPERABLE because the low pressure ECCS subsystems can provide sufficient flow below this pressure. ~~ECCS requirements for MODES 4 and 5 are specified in LCO 3.5.2, "ECCS Shutdown."~~

RPV Water Inventory Control

ACTIONS

A Note prohibits the application of LCO 3.0.4.b to an inoperable HPCI system. There is an increased risk associated with entering a MODE or other specified condition in the Applicability with an inoperable HPCI system and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

A.1

If any one low pressure ECCS injection/spray subsystem is inoperable, the inoperable subsystem must be restored to OPERABLE status within 7 days. In this Condition, the remaining OPERABLE subsystems provide adequate core cooling during a LOCA. However, overall ECCS reliability is reduced, because a single failure in one of the remaining OPERABLE subsystems, concurrent with a LOCA, may result in the ECCS not being able to perform its intended safety function. The 7 day Completion Time is based on a reliability study (Ref. 12) that evaluated the impact on ECCS availability, assuming various components and subsystems were taken out of service. The results were used to calculate the average availability of ECCS equipment needed to mitigate the consequences of a LOCA as a function of allowed outage times (i.e., Completion Times).

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS) AND REACTOR CORE ISOLATION
COOLING (RCIC) SYSTEM

B 3.5.2 ECCS-Shutdown

BASES

BACKGROUND A description of the Core Spray (CS) System and the low pressure coolant injection (LPCI) mode of the Residual Heat Removal (RHR) System is provided in the Bases for LCO 3.5.1, "ECCS-Operating."

APPLICABLE SAFETY ANALYSES The ECCS performance is evaluated for the entire spectrum of break sizes for a postulated loss of coolant accident (LOCA). The long term cooling analysis following a design basis LOCA (Ref. 1) demonstrates that only one low pressure ECCS injection/spray subsystem is required, post LOCA, to maintain adequate reactor vessel water level in the event of an inadvertent vessel draindown. It is reasonable to assume, based on engineering judgement, that while in MODES 4 and 5, one low pressure ECCS injection/spray subsystem can maintain adequate reactor vessel water level. To provide redundancy, a minimum of two low pressure ECCS injection/spray subsystems are required to be OPERABLE in MODES 4 and 5.

The low pressure ECCS subsystems satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO Two low pressure ECCS injection/spray subsystems are required to be OPERABLE. The low pressure ECCS injection/spray subsystems consist of two CS subsystems and two LPCI subsystems. Each CS subsystem consists of two motor driven pumps, piping, and valves to transfer water from the suppression pool or condensate storage tank (CST) to the reactor pressure vessel (RPV). Each LPCI subsystem consists of two motor driven pumps, piping, and valves to transfer water from the suppression pool to the RPV. In MODES 4 and 5, the RHR System cross tie valves are not required to be open provided action is taken to assure that OPERABLE LPCI subsystems are capable of injection to the reactor vessel. Management of gas voids is important to ECCS injection/spray subsystem OPERABILITY.

INSERT NEW TS
3.5.2 BASES

ECCS - Shutdown
B 3.5.2

BASES

LCO (continued)

One LPCI subsystem may be aligned for decay heat removal and considered OPERABLE for the ECCS function, if it can be manually realigned (remote or local) to the LPCI mode and is not otherwise inoperable. Because of low pressure and low temperature conditions in MODES 4 and 5, sufficient time will be available to manually align and initiate LPCI subsystem operation to provide core cooling prior to postulated fuel uncover.

APPLICABILITY

OPERABILITY of the low pressure ECCS injection/spray subsystems is required in MODES 4 and 5 to ensure adequate coolant inventory and sufficient heat removal capability for the irradiated fuel in the core in case of an inadvertent draindown of the vessel. Requirements for ECCS OPERABILITY during MODES 1, 2, and 3 are discussed in the Applicability section of the Bases for LCO 3.5.1. ECCS subsystems are not required to be OPERABLE during MODE 5 with the spent fuel storage pool gates removed and the water level maintained at ≥ 20 ft 6 inches above the RPV flange. This provides sufficient coolant inventory to allow operator action to terminate the inventory loss prior to fuel uncover in case of an inadvertent draindown.

The Automatic Depressurization System is not required to be OPERABLE during MODES 4 and 5 because the RPV pressure is ≤ 150 psig, and the CS System and the LPCI subsystems can provide core cooling without any depressurization of the primary system.

The High Pressure Coolant Injection System is not required to be OPERABLE during MODES 4 and 5 since the low pressure ECCS injection/spray subsystems can provide sufficient flow to the vessel.

BASES

ACTIONS

A.1 and B.1

If any one required low pressure ECCS injection/spray subsystem is inoperable, the inoperable subsystem must be restored to OPERABLE status in 4 hours. In this Condition, the remaining OPERABLE subsystem can provide sufficient vessel flooding capability to recover from an inadvertent vessel draindown. However, overall system reliability is reduced because a single failure in the remaining OPERABLE subsystem concurrent with a vessel draindown could result in the ECCS not being able to perform its intended function. The 4 hour Completion Time for restoring the required low pressure ECCS injection/spray subsystem to OPERABLE status is based on engineering judgment that considered the remaining available subsystem and the low probability of a vessel draindown event.

With the inoperable subsystem not restored to OPERABLE status in the required Completion Time, action must be immediately initiated to suspend operations with a potential for draining the reactor vessel (OPDRVs) to minimize the probability of a vessel draindown and the subsequent potential for fission product release. Actions must continue until OPDRVs are suspended.

C.1, C.2, D.1, D.2, and D.3

With both of the required ECCS injection/spray subsystems inoperable, all coolant inventory makeup capability may be unavailable. Therefore, actions must immediately be initiated to suspend OPDRVs to minimize the probability of a vessel draindown and the subsequent potential for fission product release. Actions must continue until OPDRVs are suspended. One ECCS injection/spray subsystem must also be restored to OPERABLE status within 4 hours.

If at least one low pressure ECCS injection/spray subsystem is not restored to OPERABLE status within the 4 hour Completion Time, additional actions are required to minimize any potential fission product release to the environment. This includes ensuring secondary containment is OPERABLE; one standby gas treatment subsystem is OPERABLE; and secondary containment isolation capability (i.e., one isolation valve and associated instrumentation are OPERABLE or other acceptable administrative controls to assure isolation capability) in each associated penetration flow path not isolated that is assumed to be isolated to mitigate

BASES

ACTIONS (continued)

radioactivity releases. OPERABILITY may be verified by an administrative check, or by examining logs or other information, to determine whether the components are out of service for maintenance or other reasons. It is not necessary to perform the Surveillances needed to demonstrate the OPERABILITY of the components. If, however, any required component is inoperable, then it must be restored to OPERABLE status. In this case, the Surveillance may need to be performed to restore the component to OPERABLE status. Actions must continue until all required components are OPERABLE.

The 4 hour Completion Time to restore at least one low pressure ECCS injection/spray subsystem to OPERABLE status ensures that prompt action will be taken to provide the required cooling capacity or to initiate actions to place the plant in a condition that minimizes any potential fission product release to the environment.

SURVEILLANCE REQUIREMENTS

SR 3.5.2.1 and SR 3.5.2.2

The minimum water level indication of -66 inches (9 ft 0 inches actual level) required for the suppression pool is periodically verified to ensure that the suppression pool will provide adequate net positive suction head (NPSH) for the CS System and LPCI subsystem pumps, recirculation volume, and vortex prevention. With the suppression pool water level less than the required limit, all ECCS injection/spray subsystems are inoperable unless they are aligned to an OPERABLE CST.

When suppression pool level is < -66 inches, the CS System is considered OPERABLE only if it can take suction from the CST, and the CST water level is sufficient to provide the required NPSH for the CS pump. Therefore, a verification that either the suppression pool water level is \geq -66 inches or that CS is aligned to take suction from the CST and the CST contains \geq 300,000 gallons of water, equivalent to 19 ft plus margin to preclude vortex formation, ensures that the CS System can supply at least 150,000 gallons of makeup water to the RPV. The CS suction is uncovered at the 150,000 gallon level. However, as noted, only one required CS subsystem may take credit for the CST option during OPDRVs. During OPDRVs, the volume in the CST may not

INSERT NEW TS
3.5.2 BASES

ECCS - Shutdown
B 3.5.2

BASES

SURVEILLANCE REQUIREMENTS (continued)

provide adequate makeup if the RPV were completely drained. Therefore, only one CS subsystem is allowed to use the CST. This ensures the other required ECCS subsystem has adequate makeup volume.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.5.2.3

The LPCI System injection valves, recirculation pump discharge valves, and LPCI cross-tie valve are powered from the LPCI swing bus, which must remain energized to support OPERABILITY of any required LPCI subsystem. Therefore, verification of proper voltage and correct breaker alignment to the swing bus is required. The correct breaker alignment ensures the appropriate electrical power sources are available, and the appropriate voltage is available to the swing bus, including verification that the swing bus is energized. The verification of proper voltage availability ensures that the required voltage is readily available for critical system loads connected to this bus. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.5.2.4, SR 3.5.2.6, and SR 3.5.2.7

The Bases provided for SR 3.5.1.3, SR 3.5.1.8, and SR 3.5.1.11 are applicable to SR 3.5.2.4, SR 3.5.2.6, and SR 3.5.2.7, respectively.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.5.2.5

Verifying the correct alignment for manual, power operated, and automatic valves in the ECCS flow paths provides assurance that the proper flow paths will exist for ECCS operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position, since these valves were verified to be in the correct position prior to locking, sealing, or securing. A valve that receives an initiation signal is allowed to be in a nonaccident position provided the valve will automatically reposition in the proper stroke time. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of potentially being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

In MODES 4 and 5, the RHR System may operate in the shutdown cooling mode to remove decay heat and sensible heat from the reactor. Therefore, RHR valves that are required for LPCI subsystem operation may be aligned for decay heat removal. This SR has been modified by two Notes. Note 1 allows one or both LPCI subsystems of the RHR System to be considered OPERABLE for the ECCS function if all the required valves in the LPCI flow path can be manually realigned (remote or local) to allow injection into the RPV, and the system is not otherwise inoperable. This will ensure adequate core cooling if an inadvertent RPV draindown should occur.

Note 2 exempts system vent flow paths opened under administrative control. The administrative control should be proceduralized and include stationing a dedicated individual at the system vent flow path who is in continuous communication with the operators in the control room. This individual will have a method to rapidly close the system vent flow path if directed.

REFERENCES

1. UFSAR, Section 6.3.2.

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS), RPV WATER INVENTORY CONTROL, AND REACTOR CORE ISOLATION COOLING (RCIC) SYSTEM**B 3.5.2 Reactor Pressure Vessel (RPV) Water Inventory Control****BASES**

BACKGROUND	<p>The RPV contains penetrations below the top of the active fuel (TAF) that have the potential to drain the reactor coolant inventory to below the TAF. If the water level should drop below the TAF, the ability to remove decay heat is reduced, which could lead to elevated cladding temperatures and clad perforation. Safety Limit 2.1.1.3 requires the RPV water level to be above the top of the active irradiated fuel at all times to prevent such elevated cladding temperatures.</p>
APPLICABLE SAFETY ANALYSES	<p>With the unit in MODE 4 or 5, RPV water inventory control is not required to mitigate any events or accidents evaluated in the safety analyses. RPV water inventory control is required in MODES 4 and 5 to protect Safety Limit 2.1.1.3 and the fuel cladding barrier to prevent the release of radioactive material to the environment should an unexpected draining event occur.</p> <p>A double-ended guillotine break of the Reactor Coolant System (RCS) is not postulated in MODES 4 and 5 due to the reduced RCS pressure, reduced piping stresses, and ductile piping systems. Instead, an event is considered in which single operator error or initiating event allows draining of the RPV water inventory through a single penetration flow path with the highest flow rate, or the sum of the drain rates through multiple penetration flow paths susceptible to a common mode failure (e.g., seismic event, loss of normal power, single human error). It is assumed, based on engineering judgment, that while in MODES 4 and 5, one low pressure ECCS injection/spray subsystem can maintain adequate reactor vessel water level.</p> <p>As discussed in References 1, 2, 3, 4, and 5, operating experience has shown RPV water inventory to be significant to public health and safety. Therefore, RPV Water Inventory Control satisfies Criterion 4 of 10 CFR 50.36(c)(2)(ii).</p>
LCO	<p>The RPV water level must be controlled in MODES 4 and 5 to ensure that if an unexpected draining event should occur, the reactor coolant water level remains above the top of the active irradiated fuel as required by Safety Limit 2.1.1.3.</p> <p>The Limiting Condition for Operation (LCO) requires the DRAIN TIME of RPV water inventory to the TAF to be ≥ 36 hours. A DRAIN TIME of 36 hours is considered reasonable to identify and initiate action to mitigate unexpected draining of reactor coolant. An event that could cause loss of RPV water inventory and result in the RPV water level reaching the TAF in</p>

BASES

LCO (continued)

greater than 36 hours does not represent a significant challenge to Safety Limit 2.1.1.3 and can be managed as part of normal plant operation.

One low pressure ECCS injection/spray subsystem is required to be OPERABLE and capable of being manually started to provide defense-in-depth should an unexpected draining event occur. A low pressure ECCS injection/spray subsystem consists of either one Core Spray (CS) subsystem or one Low Pressure Coolant Injection (LPCI) subsystem. Each CS subsystem consists of one motor driven pump, piping, and valves to transfer water from the suppression pool or condensate storage tank (CST) to the RPV. Each LPCI subsystem consists of one motor driven pump, piping, and valves to transfer water from the suppression pool to the RPV. In MODES 4 and 5, the RHR System cross tie valve is not required to be closed.

The LCO is modified by a Note which allows a required LPCI subsystem to be considered OPERABLE during alignment and operation for decay heat removal if capable of being manually realigned (remote or local) to the LPCI mode and is not otherwise inoperable. Alignment and operation for decay heat removal includes when the required RHR pump is not operating or when the system is realigned from or to the RHR shutdown cooling mode. This allowance is necessary since the RHR System may be required to operate in the shutdown cooling mode to remove decay heat and sensible heat from the reactor. Because of the restrictions on DRAIN TIME, sufficient time will be available following an unexpected draining event to manually align and initiate LPCI subsystem operation to maintain RPV water inventory prior to the RPV water level reaching the TAF. Management of gas voids is important to ECCS injection/spray subsystem OPERABILITY.

APPLICABILITY

RPV water inventory control is required in MODES 4 and 5. Requirements on water inventory control in other MODES are contained in LCOs in Section 3.3, Instrumentation, and other LCOs in Section 3.5, ECCS, RPV Water Inventory Control, and RCIC. RPV water inventory control is required to protect Safety Limit 2.1.1.3 which is applicable whenever irradiated fuel is in the reactor vessel.

BASES

ACTIONS

A.1 and B.1

If the required low pressure ECCS injection/spray subsystem is inoperable, it must be restored to OPERABLE status within 4 hours. In this Condition, the LCO controls on DRAIN TIME minimize the possibility that an unexpected draining event could necessitate the use of the ECCS injection/spray subsystem, however the defense-in-depth provided by the ECCS injection/spray subsystem is lost. The 4 hour Completion Time for restoring the required low pressure ECCS injection/spray subsystem to OPERABLE status is based on engineering judgment that considers the LCO controls on DRAIN TIME and the low probability of an unexpected draining event that would result in loss of RPV water inventory.

If the inoperable ECCS injection/spray subsystem is not restored to OPERABLE status within the required Completion Time, action must be initiated immediately to establish a method of water injection capable of operating without offsite electrical power. The method of water injection includes the necessary instrumentation and controls, water sources, and pumps and valves needed to add water to the RPV or refueling cavity should an unexpected draining event occur. The method of water injection may be manually initiated and may consist of one or more systems or subsystems, and must be able to access water inventory capable of maintaining the RPV water level above the TAF for ≥ 36 hours. If recirculation of injected water would occur, it may be credited in determining the necessary water volume.

C.1, C.2, and C.3

With the DRAIN TIME less than 36 hours but greater than or equal to 8 hours, compensatory measures should be taken to ensure the ability to implement mitigating actions should an unexpected draining event occur. Should a draining event lower the reactor coolant level to below the TAF, there is potential for damage to the reactor fuel cladding and release of radioactive material. Additional actions are taken to ensure that radioactive material will be contained, diluted, and processed prior to being released to the environment.

The secondary containment provides a controlled volume in which fission products can be contained, diluted, and processed prior to release to the environment. Required Action C.1 requires verification of the capability to establish the secondary containment boundary in less than the DRAIN TIME. The required verification confirms actions to establish the secondary containment boundary are preplanned and necessary materials are available. The secondary containment boundary is considered established when one Standby Gas Treatment (SGT) subsystem is capable of maintaining a negative pressure in the secondary containment with respect to the environment.

BASES

ACTIONS (continued)

Verification that the secondary containment boundary can be established must be performed within 4 hours. The required verification is an administrative activity and does not require manipulation or testing of equipment.

Secondary containment penetration flow paths form a part of the secondary containment boundary. Required Action C.2 requires verification of the capability to isolate each secondary containment penetration flow path in less than the DRAIN TIME. The required verification confirms actions to isolate the secondary containment penetration flow paths are preplanned and necessary materials are available. Power operated valves are not required to receive automatic isolation signals if they can be closed manually within the required time. Verification that the secondary containment penetration flow paths can be isolated must be performed within 4 hours. The required verification is an administrative activity and does not require manipulation or testing of equipment.

One SGT subsystem is capable of maintaining the secondary containment at a negative pressure with respect to the environment and filter gaseous releases. Required Action C.3 requires verification of the capability to place one SGT subsystem in operation in less than the DRAIN TIME. The required verification confirms actions to place a SGT subsystem in operation are preplanned and necessary materials are available. Verification that a SGT subsystem can be placed in operation must be performed within 4 hours. The required verification is an administrative activity and does not require manipulation or testing of equipment.

D.1, D.2, D.3, and D.4

With the DRAIN TIME less than 8 hours, mitigating actions are implemented in case an unexpected draining event should occur. Note that if the DRAIN TIME is less than 1 hour, Required Action E.1 is also applicable.

Required Action D.1 requires immediate action to establish an additional method of water injection augmenting the ECCS injection/spray subsystem required by the LCO. The additional method of water injection includes the necessary instrumentation and controls, water sources, and pumps and valves needed to add water to the RPV or refueling cavity should an unexpected draining event occur. The Note to Required Action D.1 states that either the ECCS injection/spray subsystem or the additional method of water injection must be capable of operating without offsite electrical power. The additional method of water injection may be manually initiated and may consist of one or more systems or subsystems. The additional method of water injection must be able to

BASES

ACTIONS (continued)

access water inventory capable of being injected to maintain the RPV water level above the TAF for ≥ 36 hours. The additional method of water injection and the ECCS injection/spray subsystem may share all or part of the same water sources. If recirculation of injected water would occur, it may be credited in determining the required water volume.

Should a draining event lower the reactor coolant level to below the TAF, there is potential for damage to the reactor fuel cladding and release of radioactive material. Additional actions are taken to ensure that radioactive material will be contained, diluted, and processed prior to being released to the environment.

The secondary containment provides a control volume in which fission products can be contained, diluted, and processed prior to release to the environment. Required Action D.2 requires that actions be immediately initiated to establish the secondary containment boundary. With the secondary containment boundary established, one SGT subsystem is capable of maintaining a negative pressure in the secondary containment with respect to the environment.

The secondary containment penetrations form a part of the secondary containment boundary. Required Action D.3 requires that actions be immediately initiated to verify that each secondary containment penetration flow path is isolated or to verify that it can be manually isolated from the control room.

One SGT subsystem is capable of maintaining the secondary containment at a negative pressure with respect to the environment and filter gaseous releases. Required Action D.4 requires that actions be immediately initiated to verify that at least one SGT subsystem is capable of being placed in operation. The required verification is an administrative activity and does not require manipulation or testing of equipment.

E.1

If the Required Actions and associated Completion Times of Conditions C or D are not met or if the DRAIN TIME is less than 1 hour, actions must be initiated immediately to restore the DRAIN TIME to ≥ 36 hours. In this condition, there may be insufficient time to respond to an unexpected draining event to prevent the RPV water inventory from reaching the TAF. Note that Required Actions D.1, D.2, D.3, and D.4 are also applicable when DRAIN TIME is less than 1 hour.

BASES

SURVEILLANCE
REQUIREMENTSSR 3.5.2.1

This Surveillance verifies that the DRAIN TIME of RPV water inventory to the TAF is ≥ 36 hours. The period of 36 hours is considered reasonable to identify and initiate action to mitigate draining of reactor coolant. Loss of RPV water inventory that would result in the RPV water level reaching the TAF in greater than 36 hours does not represent a significant challenge to Safety Limit 2.1.1.3 and can be managed as part of normal plant operation.

The definition of DRAIN TIME states that realistic cross-sectional areas and drain rates are used in the calculation. A realistic drain rate may be determined using a single, step-wise, or integrated calculation considering the changing RPV water level during a draining event. For a Control Rod RPV penetration flow path with the Control Rod Drive Mechanism removed and not replaced with a blank flange, the realistic cross-sectional area is based on the control rod blade seated in the control rod guide tube. If the control rod blade will be raised from the penetration to adjust or verify seating of the blade, the exposed cross-sectional area of the RPV penetration flow path is used.

The definition of DRAIN TIME excludes from the calculation those penetration flow paths connected to an intact closed system, or isolated by manual or automatic valves that are locked, sealed, or otherwise secured in the closed position, blank flanges, or other devices that prevent flow of reactor coolant through the penetration flow paths. A blank flange or other bolted device must be connected with a sufficient number of bolts to prevent draining in the event of an Operating Basis Earthquake. Normal or expected leakage from closed systems or past isolation devices is permitted. Determination that a system is intact and closed or isolated must consider the status of branch lines and ongoing plant maintenance and testing activities.

The Residual Heat Removal (RHR) Shutdown Cooling System is only considered an intact closed system when misalignment issues (Reference 6) have been precluded by functional valve interlocks or by isolation devices, such that redirection of RPV water out of an RHR subsystem is precluded. Further, RHR Shutdown Cooling System is only considered an intact closed system if its controls have not been transferred to Remote Shutdown, which disables the interlocks and isolation signals.

The exclusion of penetration flow paths from the determination of DRAIN TIME must consider the potential effects of a single operator error or initiating event on items supporting maintenance and testing (rigging, scaffolding, temporary shielding, piping plugs, snubber removal, freeze seals, etc.). If failure of such items could result and would cause a draining event from a closed system or between the RPV and the isolation device, the penetration flow path may not be excluded from the DRAIN TIME calculation.

BASES

SURVEILLANCE REQUIREMENTS (continued)

Surveillance Requirement 3.0.1 requires SRs to be met between performances. Therefore, any changes in plant conditions that would change the DRAIN TIME requires that a new DRAIN TIME be determined.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.5.2.2 and SR 3.5.2.3

The minimum water level of -66 inches (9 ft 0 inches actual level) required for the suppression pool is periodically verified to ensure that the suppression pool will provide adequate net positive suction head (NPSH) for the CS subsystem or LPCI subsystem pump, recirculation volume, and vortex prevention. With the suppression pool water level less than the required limit, the required ECCS injection/spray subsystem is inoperable unless aligned to an OPERABLE CST.

When the suppression pool level is < -66 inches, the required CS System is OPERABLE only if it can take suction from the CST, and the CST water level is sufficient to provide the required NPSH for the CS pump.

Therefore, a verification that either the suppression pool water level is \geq -66 inches or that a required CS subsystem is aligned to take suction from the CST and the CST contains \geq 300,000 gallons of water, equivalent to 19 ft, ensures that the CS subsystem can supply at least 150,000 gallons of makeup water to the RPV. The CS suction is uncovered at the 150,000 gallon level.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.5.2.4

The LPCI System injection valves and recirculation pump discharge valves are powered from the LPCI swing bus, which must remain energized to support OPERABILITY of any required LPCI subsystem. Therefore, verification of proper voltage and correct breaker alignment to the swing bus is required. The correct breaker alignment ensures the appropriate electrical power sources are available, and the appropriate voltage is available to the swing bus, including verification that the swing bus is energized. The verification of proper voltage availability ensures that the required voltage is readily available for critical system loads connected to this bus.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.5.2.5

The Bases provided for SR 3.5.1.3 is applicable to SR 3.5.2.5.

SR 3.5.2.6

Verifying the correct alignment for manual, power operated, and automatic valves in the required ECCS subsystem flow path provides assurance that the proper flow paths will be available for ECCS operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position, since these valves were verified to be in the correct position prior to locking, sealing, or securing. A valve that receives an initiation signal is allowed to be in a nonaccident position provided the valve will automatically reposition in the proper stroke time. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of potentially being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

The Note exempts system vent flow paths opened under administrative control. The administrative control should be proceduralized and include stationing a dedicated individual at the system vent flow path who is in continuous communication with the operators in the control room. This individual will have a method to rapidly close the system vent flow path if directed.

SR 3.5.2.7

Verifying that the required ECCS injection/spray subsystem can be manually started and operate for at least 10 minutes demonstrates that the subsystem is available to mitigate a draining event. Testing the ECCS injection/spray subsystem through the recirculation line is necessary to avoid overfilling the refueling cavity. The minimum operating time of 10 minutes was based on engineering judgement.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.5.2.8

Verifying that each valve credited for automatically isolating a penetration flow path actuates to the isolation position on an actual or simulated RPV water level isolation signal is required to prevent RPV water inventory from dropping below the TAF should an unexpected draining event occur.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.5.2.9

The required ECCS subsystem is required to actuate on a manual initiation signal. This Surveillance verifies that a manual initiation signal will cause the required CS subsystems or LPCI subsystem to start and operate as designed, including pump startup and actuation of all automatic valves to their required positions.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

This SR is modified by a Note that excludes vessel injection/spray during the Surveillance. Since all active components are testable and full flow can be demonstrated by recirculation through the test line, coolant injection into the RPV is not required during the Surveillance.

REFERENCES

1. Information Notice 84-81 "Inadvertent Reduction in Primary Coolant Inventory in Boiling Water Reactors During Shutdown and Startup," November 1984.
2. Information Notice 86-74, "Reduction of Reactor Coolant Inventory Because of Misalignment of RHR Valves," August 1986.
3. Generic Letter 92-04, "Resolution of the Issues Related to Reactor Vessel Water Level Instrumentation in BWRs Pursuant to 10 CFR 50.54(f)," August 1992.
4. NRC Bulletin 93-03, "Resolution of Issues Related to Reactor Vessel Water Level Instrumentation in BWRs," May 1993.
5. Information Notice 94-52, "Inadvertent Containment Spray and Reactor Vessel Draindown at Millstone 1," July 1994.
6. General Electric Service Information Letter No. 388, "RHR Valve Misalignment During Shutdown Cooling Operation for BWR 3/4/5/6," February 1983.

**, RPV WATER INVENTORY
CONTROL,**

RCIC System
B 3.5.3

**B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS) AND REACTOR CORE ISOLATION
COOLING (RCIC) SYSTEM**

B 3.5.3 RCIC System

BASES

BACKGROUND

The RCIC System is not part of the ECCS; however, the RCIC System is included with the ECCS section because of their similar functions.

The RCIC System is designed to operate either automatically or manually following reactor pressure vessel (RPV) isolation accompanied by a loss of coolant flow from the feedwater system to provide adequate core cooling and control of the RPV water level. Under these conditions, the High Pressure Coolant Injection (HPCI) and RCIC systems perform similar functions. The RCIC System design requirements ensure that the criteria of Reference 1 are satisfied.

The RCIC System (Ref. 2) consists of a steam driven turbine pump unit, piping, and valves to provide steam to the turbine, as well as piping and valves to transfer water from the suction source to the core via the feedwater system line, where the coolant is distributed within the RPV through the feedwater sparger. Suction piping is provided from the condensate storage tank (CST) and the suppression pool. Pump suction is normally aligned to the CST to minimize injection of suppression pool water into the RPV. However, if the CST water supply is low, an automatic transfer to the suppression pool water source ensures a water supply for continuous operation of the RCIC System. The steam supply to the turbine is piped from a main steam line upstream of the associated inboard main steam line isolation valve.

The RCIC System is designed to provide core cooling for a wide range of reactor pressures 150 psig to 1120 psig. Upon receipt of an initiation signal, the RCIC turbine accelerates to a specified speed. As the RCIC flow increases, the turbine control valve is automatically adjusted to maintain design flow. Exhaust steam from the RCIC turbine is discharged to the suppression pool. A full flow test line is provided to route water from and to the CST to allow testing of the RCIC System during normal operation without injecting water into the RPV.

BASES

BACKGROUND (continued)

The RCIC pump is provided with a minimum flow bypass line, which discharges to the suppression pool. The valve in this line automatically opens to prevent pump damage due to overheating when other discharge line valves are closed. To ensure rapid delivery of water to the RPV and to minimize water hammer effects, the RCIC System discharge piping is kept full of water. The RCIC System is normally aligned to the CST. The height of water in the CST is sufficient to maintain the piping full of water up to the first isolation valve. The relative height of the feedwater line connection for RCIC is such that the water in the feedwater lines keeps the remaining portion of the RCIC discharge line full of water. Therefore, RCIC does not require a "keep fill" system.

APPLICABLE
SAFETY ANALYSES

The function of the RCIC System is to respond to transient events by providing makeup coolant to the reactor. The RCIC System is not an Engineered Safety Feature System and no credit is taken in the safety analyses for RCIC System operation. Based on its contribution to the reduction of overall plant risk, however, the system is included in the Technical Specifications, as required by 10 CFR 50.36(c)(2)(ii).

LCO

The OPERABILITY of the RCIC System provides adequate core cooling such that actuation of any of the low pressure ECCS subsystems is not required in the event of RPV isolation accompanied by a loss of feedwater flow. The RCIC System has sufficient capacity for maintaining RPV inventory during an isolation event. Management of gas voids is important to RCIC System OPERABILITY.

APPLICABILITY

The RCIC System is required to be OPERABLE during MODE 1, and MODES 2 and 3 with reactor steam dome pressure > 150 psig, since RCIC is the primary non-ECCS water source for core cooling when the reactor is isolated and pressurized. In MODES 2 and 3 with reactor steam dome pressure ≤ 150 psig, and in MODES 4 and 5, RCIC is not required to be OPERABLE since the low pressure ECCS injection/spray subsystems can provide sufficient flow to the RPV.

the low pressure ECCS injection/spray subsystems can provide sufficient flow to the RPV. In

RPV water inventory control is required by LCO 3.5.2, "RPV Water Level Inventory Control."

BASES

LCO (continued)

or open under administrative controls. Normally closed automatic PCIVs, are required to have isolation times within limits and actuate on an automatic isolation signal. These passive isolation valves and devices are those listed in Reference 2.

Purge valves with resilient seals, secondary containment bypass valves, MSIVs, and hydrostatically tested valves must meet leakage rate requirements in addition to the other PCIV leakage rates which are addressed by LCO 3.6.1.1, "Primary Containment," as Type B or C testing.

This LCO provides assurance that the PCIVs will perform their designed safety functions to minimize the loss of reactor coolant inventory and establish the primary containment boundary during accidents.

APPLICABILITY

In MODES 1, 2, and 3, ^{when} a DBA could cause a release of radioactive material to primary containment. In MODES 4 and 5, the probability and consequences of these events are reduced due to the pressure and temperature limitations of these MODES. Therefore, ~~most~~ PCIVs are not required to be OPERABLE in MODES 4 and 5. Certain valves, however, are required to be OPERABLE ^{the} to prevent inadvertent reactor vessel draindown. These valves are those whose associated instrumentation is required to be OPERABLE per LCO 3.3.6.1, "Primary Containment Isolation Instrumentation." (This does not include the valves that isolate the associated instrumentation.)

ACTIONS

The ACTIONS are modified by a Note allowing penetration flow path(s) to be unisolated intermittently under administrative controls. These controls consist of stationing a dedicated operator at the controls of the valve, who is in continuous communication with the control room. In this way, the penetration can be rapidly isolated when a need for primary containment isolation is indicated.

BASES

ACTIONS (continued)

power conditions in an orderly manner and without challenging plant systems.

F.1

If any Required Action and associated Completion Time cannot be met, the unit must be placed in a condition in which the LCO does not apply. ~~Action must be immediately initiated to isolate the RHR Shutdown Cooling System. However, if the shutdown cooling function is needed to provide core cooling, these Required Actions allow the penetration flow path to remain unisolated provided action is immediately initiated to restore the valve to OPERABLE status or to isolate the RHR Shutdown Cooling System (i.e., provide alternate decay heat removal capabilities so the penetration flow path can be isolated).~~ Actions must continue until the valve is restored to OPERABLE status ~~or the RHR Shutdown Cooling System is isolated.~~

SURVEILLANCE
REQUIREMENTS

SR 3.6.1.3.1

This SR ensures that the drywell and suppression chamber purge system isolation valves (6 inch, 10 inch, 20 inch, and 24 inch) and the containment pressure control valves (1 inch) are closed as required or, if open, open for an allowable reason. If a purge or containment pressure control valve is open in violation of this SR, the valve is considered inoperable. If the inoperable valve is not otherwise known to have excessive leakage when closed, it is not considered to have leakage outside of limits. Primary containment purge and containment pressure control valves are only required to be closed in MODES 1, 2, and 3 (i.e., no isolation instrumentation functions of LCO 3.3.6.1 are required to be OPERABLE for isolation of these valves outside of MODES 1, 2, and 3). If a LOCA inside primary containment occurs in these MODES, the purge valves may not be capable of closing before the pressure pulse affects systems downstream of the purge valves. At other times (e.g., during handling of irradiated fuel), pressurization concerns are not present and the purge and containment pressure control valves are allowed to be open. The SR is modified by a Note stating that the SR is not required to be met when the purge or containment pressure control valves are open for the stated reasons. The Note states that these

BASES

APPLICABLE
SAFETY ANALYSES

Initial suppression pool water level affects suppression pool temperature response calculations, calculated drywell pressure during vent clearing for a DBA, calculated pool swell loads for a DBA LOCA, and calculated loads due to SRV discharges. Suppression pool water level must be maintained within the limits specified so that the safety analysis of Reference 1 remains valid.

Suppression pool water level satisfies Criteria 2 and 3 of 10 CFR 50.36(c)(2)(ii).

LCO

A limit that suppression pool water level be ≥ -2 inches and $\leq +2$ inches (as referenced from "zero" on the control room indicator) is required to ensure that the primary containment conditions assumed for the safety analyses are met. Either the high or low water level limits were used in the safety analyses, depending upon which is more conservative for a particular calculation.

APPLICABILITY

In MODES 1, 2, and 3, a DBA would cause significant loads on the primary containment. In MODES 4 and 5, the probability and consequences of these events are reduced due to the pressure and temperature limitations in these MODES. The requirements for maintaining suppression pool water level within limits in MODE 4 or 5 is addressed in LCO 3.5.2, "~~ECCS-Shutdown.~~"

RPV Water Inventory Control

ACTIONS

A.1

With suppression pool water level outside the limits, the conditions assumed for the safety analyses are not met. If water level is below the minimum level, the pressure suppression function still exists as long as main vents are covered, HPCI and RCIC turbine exhausts are covered, and SRV T-quenchers are covered. If suppression pool water level is above the maximum level, protection against overpressurization still exists due to the margin in the peak containment pressure analysis and the capability of the

BASES

APPLICABLE SAFETY ANALYSES (continued)

Handling new (non-irradiated) fuel bundles over the open reactor core or the spent fuel pool is subject to the same requirements of handling recently irradiated fuel, as long as any fuel in the core or fuel pool is recently irradiated. The secondary containment performs no active function in response to each of these limiting events; however, its leak tightness is required to ensure that the release of radioactive materials from the primary containment is restricted to those leakage paths and associated leakage rates assumed in the accident analysis and that fission products entrapped within the secondary containment structure will be treated by the SGT System prior to discharge to the environment.

Secondary containment satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

An OPERABLE secondary containment provides a control volume into which fission products that bypass or leak from primary containment, or are released from the reactor coolant pressure boundary components located in secondary containment, can be diluted and processed prior to release to the environment. For the secondary containment to be considered OPERABLE, it must have adequate leak tightness to ensure that the required vacuum can be established and maintained.

APPLICABILITY

In MODES 1, 2, and 3, a LOCA could lead to a fission product release to primary containment that leaks to secondary containment. Therefore, secondary containment OPERABILITY is required during the same operating conditions that require primary containment OPERABILITY.

In MODES 4 and 5, the probability and consequences of the LOCA are reduced due to the pressure and temperature limitations in these MODES. Therefore, maintaining secondary containment OPERABLE is not required in MODE 4 or 5 to ensure a control volume, except for other situations for which significant releases of radioactive material can be postulated, such as ~~during operations with a potential for draining the reactor vessel (OPDRVs) or during movement~~

BASES

ACTIONS (continued)

Remaining in the Applicability of the LCO is acceptable because the plant risk in MODE 3 is similar to or lower than the risk in MODE 4 (Ref. 3), because the time spent in MODE 3 to perform the necessary repairs to restore the system to OPERABLE status will be short. However, voluntary entry into MODE 4 may be made as it is also an acceptable low-risk state.

Required Action C.1 is modified by a Note that states that LCO 3.0.4.a is not applicable when entering MODE 3. This Note prohibits the use of LCO 3.0.4.a to enter MODE 3 during startup with the LCO not met. However, there is no restriction on the use of LCO 3.0.4.b, if applicable, because LCO 3.0.4.b requires performance of a risk assessment addressing inoperable systems and components, consideration of the results, determination of the acceptability of entering MODE 3, and establishment of risk management actions, if appropriate. LCO 3.0.4 is not applicable to, and the Note does not preclude, changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS or that are part of a shutdown of the unit.

The allowed Completion Time is reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

D.1 and D.2

Movement of recently irradiated fuel assemblies in the secondary containment ~~and OPDRVs~~ can be postulated to cause significant fission product release to the secondary containment. In such cases, the secondary containment is the only barrier to release of fission products to the environment. Therefore, movement of recently irradiated fuel assemblies must be immediately suspended if the secondary containment is inoperable.

Suspension of these activities shall not preclude completing an action that involves moving a component to a safe position. ~~Also, action must be immediately initiated to suspend OPDRVs to minimize the probability of a vessel draindown and subsequent potential for fission product release. Actions must continue until OPDRVs are suspended.~~

BASES

ACTIONS (continued)

The Required Actions ~~have~~ ^{has} been modified by a Note stating that LCO 3.0.3 is not applicable. If moving recently irradiated fuel assemblies while in MODE 4 or 5, LCO 3.0.3 would not specify any action. If moving recently irradiated fuel assemblies while in MODE 1, 2, or 3, the fuel movement is independent of reactor operations. Therefore, in either case, inability to suspend movement of recently irradiated fuel assemblies would not be a sufficient reason to require a reactor shutdown.

SURVEILLANCE
REQUIREMENTS

SR 3.6.4.1.1

This SR ensures that the secondary containment boundary is sufficiently leak tight to preclude exfiltration under expected wind conditions. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.6.4.1.2 and SR 3.6.4.1.3

Verifying that secondary containment equipment hatches, pressure relief doors, railroad bay access doors, and one access door in each access opening are closed ensures that the infiltration of outside air of such a magnitude as to prevent maintaining the desired negative pressure does not occur. Verifying that all such openings are closed provides adequate assurance that exfiltration from the secondary containment will not occur. In this application, the term "sealed" has no connotation of leak tightness. Maintaining secondary containment OPERABILITY requires verifying one door in each access opening is closed. An access opening contains one inner and one outer door. In some cases, secondary containment access openings are shared such that a secondary containment barrier may have multiple inner or multiple outer doors. The intent is not to breach the secondary containment at any time when secondary containment is required. This is achieved by maintaining the inner or outer portion of the barrier closed at all times. However,

BASES

APPLICABILITY (continued)

secondary containment. Therefore, the OPERABILITY of SCIVs is required.

In MODES 4 and 5, the probability and consequences of these events are reduced due to pressure and temperature limitations in these MODES. Therefore, maintaining SCIVs OPERABLE is not required in MODE 4 or 5, except for other situations under which significant radioactive releases can be postulated, such as ~~during operations with a potential for draining the reactor vessel (OPDRVs) or~~ during movement of recently irradiated fuel assemblies in the secondary containment. Moving recently irradiated fuel assemblies in the secondary containment may also occur in MODES 1, 2, and 3. Due to radioactive decay, SCIVs are only required to be OPERABLE during fuel handling involving recently irradiated fuel. "Recently irradiated fuel" is fuel that has occupied part of a critical reactor core within the previous 6.3 days. Handling new (non-irradiated) fuel bundles over the open reactor core or the spent fuel pool is subject to the same requirements of handling recently irradiated fuel, as long as any fuel in the core or fuel pool is recently irradiated.

ACTIONS

The ACTIONS are modified by three Notes. The first Note allows penetration flow paths to be unisolated intermittently under administrative controls. These controls consist of stationing a dedicated operator, who is in continuous communication with the control room, at the controls of the isolation device. In this way, the penetration can be rapidly isolated when a need for secondary containment isolation is indicated.

The second Note provides clarification that for the purpose of this LCO separate Condition entry is allowed for each penetration flow path. This is acceptable, since the Required Actions for each Condition provide appropriate compensatory actions for each inoperable SCIV. Complying with the Required Actions may allow for continued operation, and subsequent inoperable SCIVs are governed by subsequent Condition entry and application of associated Required Actions.

BASES

ACTIONS (continued)

devices that are locked, sealed, or otherwise secured in position and allows these devices to be verified closed by use of administrative means. Allowing verification by administrative means is considered acceptable, since the function of locking, sealing, or securing components is to ensure that these devices are not inadvertently repositioned.

B.1

With two SCIVs in one or more penetration flow paths inoperable, the affected penetration flow path must be isolated within 4 hours. The method of isolation must include the use of, at least one isolation barrier that cannot be adversely affected by a single active failure. Isolation barriers that meet this criterion are a closed and de-activated automatic valve, a closed manual valve, and a blind flange. The 4 hour Completion Time is reasonable considering the time required to isolate the penetration and the probability of a DBA, which requires the SCIVs to close, occurring during this short time, is very low.

The Condition has been modified by a Note stating that Condition B is only applicable to penetration flow paths with two isolation valves. This clarifies that only Condition A is entered if one SCIV is inoperable in each of two penetrations.

C.1 and C.2

If any Required Action and associated Completion Time cannot be met, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

~~D.1 and D.2~~

If any Required Action and associated Completion Time are not met, the plant must be placed in a condition in which the LCO does not apply. If applicable, the movement of recently irradiated fuel assemblies in the secondary

BASES

ACTIONS (continued)

containment must be immediately suspended. Suspension of these activities shall not preclude completion of movement of a component to a safe position. ~~Also, if applicable, actions must be immediately initiated to suspend OPDRVs in order to minimize the probability of a vessel draindown and the subsequent potential for fission product release. Actions must continue until OPDRVs are suspended.~~

has

The Required Actions ~~have~~ been modified by a Note stating that LCO 3.0.3 is not applicable. If moving recently irradiated fuel assemblies while in MODE 4 or 5, LCO 3.0.3 would not specify any action. If moving fuel while in MODE 1, 2, or 3, the fuel movement is independent of reactor operations. Therefore, in either case, inability to suspend movement of recently irradiated fuel assemblies would not be a sufficient reason to require a reactor shutdown.

Insert
single line

SURVEILLANCE REQUIREMENTS

SR 3.6.4.2.1

This SR verifies that each secondary containment manual isolation valve and blind flange that is not locked, sealed, or otherwise secured and is required to be closed during accident conditions is closed. The SR helps to ensure that post accident leakage of radioactive fluids or gases outside of the secondary containment boundary is within design limits. This SR does not require any testing or valve manipulation. Rather, it involves verification that those SCIVs in secondary containment that are capable of being mispositioned are in the correct position.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program. This SR does not apply to valves that are locked, sealed, or otherwise secured in the closed position since these were verified to be in the correct position upon locking, sealing, or securing.

Two Notes have been added to this SR. The first Note applies to valves and blind flanges located in high radiation areas and allows them to be verified by use of administrative controls. Allowing verification by administrative controls is considered acceptable, since access to these areas is typically restricted during

BASES

LCO (continued)

subsystems ensures operation of at least one SGT subsystem in the event of a single active failure.

APPLICABILITY

In MODES 1, 2, and 3, a DBA could lead to a fission product release to primary containment that leaks to secondary containment. Therefore, SGT System OPERABILITY is required during these MODES.

In MODES 4 and 5, the probability and consequences of these events are reduced due to the pressure and temperature limitations in these MODES. Therefore, maintaining the SGT System in OPERABLE status is not required in MODE 4 or 5, except for other situations under which significant releases of radioactive material can be postulated, such as during ~~operations with a potential for draining the reactor vessel (OPDRVs) or during~~ movement of recently irradiated fuel assemblies in the secondary containment. Due to radioactive decay, the SGT System is only required to be OPERABLE during fuel handling involving recently irradiated fuel. "Recently irradiated fuel" is fuel that has occupied part of a critical reactor core within the previous 6.3 days. Handling new (non-irradiated) fuel bundles over the open reactor core or the spent fuel pool is subject to the same requirements of handling recently irradiated fuel, as long as any fuel in the core or fuel pool is recently irradiated.

ACTIONS

A.1

With one SGT subsystem inoperable, the inoperable subsystem must be restored to OPERABLE status in 7 days. In this Condition, the remaining OPERABLE SGT subsystem is adequate to perform the required radioactivity release control function. However, the overall system reliability is reduced because a single failure in the OPERABLE subsystem could result in the radioactivity release control function not being adequately performed. The 7 day Completion Time is based on consideration of such factors as the

BASES

C.1 ~~C.2.1~~ and C.2 ~~2~~

During movement of recently irradiated fuel assemblies, in the secondary containment, ~~or during OPDRVs~~, when Required Action A.1 cannot be completed within the required Completion Time, the OPERABLE SGT subsystem should immediately be placed in operation. This action ensures that the remaining subsystem is OPERABLE, that no failures that could prevent automatic actuation have occurred, and that any other failure would be readily detected.

An alternative to Required Action C.1 is to immediately suspend activities that represent a potential for releasing a significant amount of radioactive material to the secondary containment, thus placing the plant in a condition that minimizes risk. If applicable, movement of recently irradiated fuel assemblies must immediately be suspended. Suspension of these activities must not preclude completion of movement of a component to a safe position. ~~Also, if applicable, actions must immediately be initiated to suspend OPDRVs in order to minimize the probability of a vessel draindown and subsequent potential for fission product release. Actions must continue until OPDRVs are suspended.~~

The Required Actions of Condition C have been modified by a Note stating that LCO 3.0.3 is not applicable. If moving recently irradiated fuel assemblies while in MODE 4 or 5, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, or 3, the fuel movement is independent of reactor operations.

Therefore, in either case, inability to suspend movement of recently irradiated fuel assemblies would not be a sufficient reason to require a reactor shutdown.

D.1

If both SGT subsystems are inoperable in MODE 1, 2, or 3, the SGT System may not be capable of supporting the required radioactivity release control function. Therefore, the plant must be brought to a MODE in which overall plant risk is minimized. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours.

BASES

ACTIONS (continued)

Remaining in the Applicability of the LCO is acceptable because the plant risk in MODE 3 is similar to or lower than the risk in MODE 4 (Ref. 3) and because the time spent in MODE 3 to perform the necessary repairs to restore the system to OPERABLE status will be short. However, voluntary entry into MODE 4 may be made as it is also an acceptable low-risk state.

Required Action D.1 is modified by a Note that states that LCO 3.0.4.a is not applicable when entering MODE 3. This Note prohibits the use of LCO 3.0.4.a to enter MODE 3 during startup with the LCO not met. However, there is no restriction on the use of LCO 3.0.4.b, if applicable, because LCO 3.0.4.b requires performance of a risk assessment addressing inoperable systems and components, consideration of the results, determination of the acceptability of entering MODE 3, and establishment of risk management actions, if appropriate. LCO 3.0.4 is not applicable to, and the Note does not preclude, changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS or that are part of a shutdown of the unit.

The allowed Completion Time is reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

E.1 and E.2

When two SGT subsystems are inoperable, if applicable, movement of recently irradiated fuel assemblies in secondary containment must immediately be suspended. Suspension of these activities shall not preclude completion of movement of a component to a safe position. ~~Also, if applicable, actions must immediately be initiated to suspend OPDRVs in order to minimize the probability of a vessel draindown and subsequent potential for fission product release. Actions must continue until OPDRVs are suspended.~~

has

The Required Actions ~~have~~ been modified by a Note stating that LCO 3.0.3 is not applicable. If moving irradiated fuel assemblies while in MODE 4 or 5, LCO 3.0.3 would not specify any action. If moving recently irradiated fuel assemblies while in MODE 1, 2, or 3, the fuel movement is independent of reactor operations. Therefore, in either case, inability to suspend movement of recently irradiated fuel assemblies would not be a sufficient reason to require a reactor shutdown.

BASES

LCO (continued)

Non-redundant components required to be OPERABLE include:

- a. Emergency recirculation air filter train;
- b. Emergency makeup air filter train; and
- c. Ductwork and other system structures needed to form the necessary air flow paths.

In order for the CREF subsystems to be considered OPERABLE, the CRE boundary must be maintained such that the CRE occupant dose from a large radioactive release does not exceed the calculated dose in the licensing basis consequence analyses for DBAs, and that CRE occupants are protected from hazardous chemicals and smoke.

The LCO is modified by a note allowing the CRE boundary to be opened intermittently under administrative controls. This note only applies to openings in the CRE boundary that can be rapidly restored to the design condition such as doors, hatches, floor plugs and access panels. For entry and exit through doors, the administrative control of the opening is performed by the person(s) entering or exiting the area. For other openings, these controls should be proceduralized and consist of stationing a dedicated individual at the opening who is in continuous communication with the Operators in the CRE. This individual will have a method to rapidly close the opening and to restore the CRE boundary to a condition equivalent to the design condition when a need for CRE isolation is indicated.

APPLICABILITY

In MODES 1, 2, and 3, the CREF System must be OPERABLE to ensure that the CRE will remain habitable during and following a DBA, since the DBA could lead to a fission product release.

In MODES 4 and 5, the probability and consequences of a DBA are reduced because of the pressure and temperature limitations in these MODES. Therefore, maintaining the CREF System OPERABLE is not required in MODE 4 or 5, except during ~~for the following situations under which significant radioactive releases can be postulated:~~

- ~~a. During operations with a potential for draining the reactor vessel (OPDRVs); and~~

BASES

APPLICABILITY (Continued)

- ~~b.~~ During movement of recently irradiated fuel assemblies in the secondary containment. Due to radioactive decay, the CREF System is only required to be OPERABLE during fuel handling involving recently irradiated fuel. "Recently irradiated fuel" is fuel that has occupied part of a critical reactor core within the previous 6.3 days. Handling new (non-irradiated) fuel bundles over the open reactor core or the spent fuel pool is subject to the same requirements of handling recently irradiated fuel, as long as any fuel in the core or fuel pool is recently irradiated.

ACTIONS

A.1

With one CREF subsystem inoperable, for reasons other than an inoperable CRE boundary, the inoperable CREF subsystem must be restored to OPERABLE status within 7 days. With the unit in this condition, the remaining OPERABLE CREF subsystem is adequate to perform the CRE occupant protection function. However, the overall reliability is reduced because a failure in the OPERABLE subsystem could result in loss of the CREF System function. The 7 day Completion Time is based on the low probability of a DBA occurring during this time period, and that the remaining subsystem can provide the required capabilities.

B.1, B.2 and B.3

If the unfiltered inleakage of potentially contaminated air past the CRE boundary and into the CRE can result in CRE occupant radiological dose greater than the calculated dose of the licensing basis analyses of DBA consequences (allowed to be up to 5 rem TEDE), or inadequate protection of CRE occupants from hazardous chemicals or smoke, the CRE boundary is inoperable. Actions must be taken to restore an OPERABLE CRE boundary within 90 days.

During the period that the CRE boundary is considered inoperable, action must be initiated to implement mitigating actions to lessen the effect on CRE occupants from the potential hazards of a radiological or chemical event or a challenge from smoke. Actions must be taken within 24 hours to verify that in the event of a DBA, the mitigating actions will ensure that CRE occupant radiological exposures will not exceed the calculated dose of the licensing basis

BASES

ACTIONS (continued)

management actions, if appropriate. LCO 3.0.4 is not applicable to, and the Note does not preclude, changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS or that are part of a shutdown of the unit.

The allowed Completion Time is reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

D.1, ~~D.2.1~~ and D.2.~~2~~

The Required Actions of Condition D are modified by a Note indicating that LCO 3.0.3 does not apply. If moving recently irradiated fuel assemblies while in MODE 1, 2, or 3, the fuel movement is independent of reactor operations. Therefore, inability to suspend movement of recently irradiated fuel assemblies is not sufficient reason to require a reactor shutdown.

During movement of recently irradiated fuel assemblies in the secondary containment ~~or during OPDRVs~~, if the inoperable CREF subsystem cannot be restored to OPERABLE status within the required Completion Time, the OPERABLE CREF subsystem may be placed in the recirculation mode. This action ensures that this remaining subsystem is OPERABLE, that no failures that would prevent automatic actuation will occur, and that any active failure will be readily detected.

An alternative to Required Action D.1 is to immediately suspend activities that present a potential for releasing radioactivity that might require isolation of the CRE. This places the unit in a condition that minimizes the accident risk.

If applicable, movement of recently irradiated fuel assemblies in the secondary containment must be suspended immediately. Suspension of these activities shall not preclude completion of movement of a component to a safe position. ~~Also, if applicable, actions must be initiated immediately to suspend OPDRVs to minimize the probability of a vessel draindown and the subsequent potential for fission product release. Actions must continue until the OPDRVs are suspended.~~

BASES

ACTIONS (continued)

A Note is applied to Required Action D.2.2. This Note allows these Required Actions to not be required when the system charcoal filter train filter media cannot provide the required efficiency or is being replaced. Dose calculations have shown that the CREF system is not needed during the activities that would otherwise be suspended by these Required Actions.

E.1

If both CREF subsystems or a non-redundant component or portion of the CREF System are inoperable in MODE 1, 2, or 3 for reasons other than an inoperable CRE boundary (i.e., Condition B), the CREF System may not be capable of performing the intended function. Therefore, the plant must be brought to a MODE in which overall plant risk is minimized. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours.

Remaining in the Applicability of the LCO is acceptable because the plant risk in MODE 3 is similar to or lower than the risk in MODE 4 (Ref. 7) and because the time spent in MODE 3 to perform the necessary repairs to restore the system to OPERABLE status will be short. However, voluntary entry into MODE 4 may be made as it is also an acceptable low-risk state.

Required Action E.1 is modified by a Note that states that LCO 3.0.4.a is not applicable when entering MODE 3. This Note prohibits the use of LCO 3.0.4.a to enter MODE 3 during startup with the LCO not met. However, there is no restriction on the use of LCO 3.0.4.b, if applicable, because LCO 3.0.4.b requires performance of a risk assessment addressing inoperable systems and components, consideration of the results, determination of the acceptability of entering MODE 3, and establishment of risk management actions, if appropriate. LCO 3.0.4 is not applicable to, and the Note does not preclude, changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS or that are part of a shutdown of the unit.

The allowed Completion Time is reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

BASES

ACTIONS (continued)

F.1 ~~and F.2~~

is

1

The Required Actions of Condition F are modified by a Note indicating that LCO 3.0.3 does not apply. If moving recently irradiated fuel assemblies while in MODE 1, 2, or 3, the fuel movement is independent of reactor operations. Therefore, inability to suspend movement of recently irradiated fuel assemblies is not sufficient reason to require a reactor shutdown.

During movement of recently irradiated fuel assemblies in the secondary containment ~~or during OPDRVs~~, with two CREF subsystems or a non-redundant component or portion of the CREF System inoperable, or with one or more CREF subsystems inoperable due to an inoperable CRE boundary, action must be taken immediately to suspend activities that present a potential for releasing radioactivity that might require isolation of the CRE. This places the unit in a condition that minimizes the accident risk.

If applicable, movement of recently irradiated fuel assemblies in the secondary containment must be suspended immediately. Suspension of these activities shall not preclude completion of movement of a component to a safe position. ~~If applicable, actions must be initiated immediately to suspend OPDRVs to minimize the probability of a vessel draindown and subsequent potential for fission product release. Actions must continue until the OPDRVs are suspended.~~

~~A Note is applied to Required Action F.2. This Note allows these Required Actions to not be required when the system charcoal filter train filter media cannot provide the required efficiency or is being replaced. Dose calculations have shown that the CREF system is not needed during the activities that would otherwise be suspended by these Required Actions.~~

BASES

APPLICABLE SAFETY ANALYSES (continued)

equipment heat loads and personnel occupancy requirements to ensure equipment OPERABILITY.

The Control Center AC System satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

Two independent and redundant subsystems of the Control Center AC System are required to be OPERABLE to ensure that at least one is available, assuming a single active failure disables the other subsystem. Total system failure could result in the equipment operating temperature exceeding limits.

High air temperatures and humidity caused by loss of or degradation of the Control Center AC system can also impact control room operator performance.

The Control Center AC System is considered OPERABLE when the individual components necessary to maintain the control center temperature are OPERABLE in both subsystems. These components include the cooling coils, fans, chiller, heating coils, ductwork, dampers, and associated instrumentation and controls. The non-redundant ductwork that supplies recirculated air to air-conditioning units and returns the cooled air to the control room is part of the Control Room Emergency Filtration System (LCO 3.7.3).

APPLICABILITY

In MODE 1, 2, or 3, the Control Center AC System must be OPERABLE to ensure that the control room temperature will not exceed equipment OPERABILITY limits following control room isolation.

In MODES 4 and 5, the probability and consequences of a Design Basis Accident are reduced due to the pressure and temperature limitations in these MODES. Therefore, maintaining the Control Center AC System OPERABLE is not required in MODE 4 or 5, ~~except for the following situations under which significant radioactive releases can be postulated:~~

during

BASES

APPLICABILITY (continued)

- ~~a. During operations with a potential for draining the reactor vessel (OPDRVs), and~~
- ~~b. During movement of recently irradiated fuel assemblies in the secondary containment. Due to radioactive decay, the Control Center AC System is only required to be OPERABLE during fuel handling involving recently irradiated fuel. "Recently irradiated fuel" is fuel that has occupied part of a critical reactor core within the previous 6.3 days. Handling new (non-irradiated) fuel bundles over the open reactor core or the spent fuel pool is subject to the same requirements of handling recently irradiated fuel, as long as any fuel in the core or fuel pool is recently irradiated.~~

ACTIONS

A.1

With one control center AC subsystem inoperable, the inoperable control center AC subsystem must be restored to OPERABLE status within 30 days. With the unit in this condition, the remaining OPERABLE control center AC subsystem is adequate to perform the control center air conditioning function. However, the overall reliability is reduced because a single failure in the OPERABLE subsystem could result in loss of the control center air conditioning function. The 30 day Completion Time is based on the low probability of an event occurring requiring control room isolation, the consideration that the remaining subsystem can provide the required protection, and the availability of alternate safety and nonsafety cooling methods.

B.1 and B.2

If both Control Center AC subsystems are inoperable, the Control Center AC System may not be capable of performing its intended function. Therefore, the control room area temperature is required to be monitored to ensure that temperature is being maintained low enough that equipment in

BASES

ACTIONS (continued)

D.1, ~~D.2.1~~ and D.2.2

The Required Actions of Condition D are modified by a Note indicating that LCO 3.0.3 does not apply. If moving recently irradiated fuel assemblies while in MODE 1, 2, or 3, the fuel movement is independent of reactor operations. Therefore, inability to suspend movement of recently irradiated fuel assemblies is not sufficient reason to require a reactor shutdown.

During movement of recently irradiated fuel assemblies in the secondary containment ~~or during OPDRVs~~, if Required Action A.1 cannot be completed within the required Completion Time, the OPERABLE control center AC subsystem may be placed immediately in operation. This action ensures that the remaining subsystem is OPERABLE, that no failures that would prevent actuation will occur, and that any active failure will be readily detected.

An alternative to Required Action D.1 is to immediately suspend activities that present a potential for releasing radioactivity that might require isolation of the control room. This places the unit in a condition that minimizes risk.

If applicable, movement of recently irradiated fuel assemblies in the secondary containment must be suspended immediately. Suspension of these activities shall not preclude completion of movement of a component to a safe position. ~~Also, if applicable, actions must be initiated immediately to suspend OPDRVs to minimize the probability of a vessel draindown and subsequent potential for fission product release. Actions must continue until the OPDRVs are suspended.~~

BASES

ACTIONS (continued)

E.1 and E.2

is

The Required Actions of Condition E are modified by a Note indicating that LCO 3.0.3 does not apply. If moving recently irradiated fuel assemblies while in MODE 1, 2, or 3, the fuel movement is independent of reactor operations. Therefore, inability to suspend movement of recently irradiated fuel assemblies is not a sufficient reason to require a reactor shutdown.

During movement of recently irradiated fuel assemblies in the secondary containment ~~or during OPDRVs~~, if Required Actions B.1 and B.2 cannot be met within the required Completion Times, action must be taken to immediately suspend activities that present a potential for releasing radioactivity that might require isolation of the control room. This places the unit in a condition that minimizes risk.

If applicable, handling of recently irradiated fuel in the secondary containment must be suspended immediately. Suspension of these activities shall not preclude completion of movement of a component to a safe position. ~~Also, if applicable, actions must be initiated immediately to suspend OPDRVs to minimize the probability of a vessel draindown and subsequent potential for fission product release. Actions must continue until the OPDRVs are suspended.~~

Insert single line

SR 3.7.4.1

SURVEILLANCE
REQUIREMENTS

This SR verifies that the heat removal capability of the system is sufficient to remove the control room heat load. The SR consists of a verification of the control room temperature. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

REFERENCES

1. UFSAR, Section 6.4.
2. NEDC-32988-A, Revision 2, Technical Justification to Support Risk-Informed Modification to Selected Required End States for BWR Plants, December 2002.
3. UFSAR, Section 9.4.1.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.2 AC Sources - Shutdown

BASES

BACKGROUND	A description of the AC sources is provided in the Bases for LCO 3.8.1, "AC Sources-Operating."
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APPLICABLE SAFETY ANALYSES	<p>The OPERABILITY of the minimum AC sources during MODES 4 and 5 and during movement of recently irradiated fuel assemblies ensures that:</p> <ul style="list-style-type: none">a. The facility can be maintained in the shutdown or refueling condition for extended periods;b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; andc. Adequate AC electrical power is provided to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident involving recently irradiated fuel. Due to radioactive decay, AC electrical power is only required to mitigate fuel handling accidents involving recently irradiated fuel. "Recently irradiated fuel" is fuel that has occupied part of a critical reactor core within the previous 6.3 days. Handling new (non-irradiated) fuel bundles over the open reactor core or the spent fuel pool is subject to the same requirements of handling recently irradiated fuel, as long as any fuel in the core or fuel pool is recently irradiated.
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In general, when the unit is shut down the Technical Specifications requirements ensure that the unit has the capability to mitigate the consequences of postulated accidents. However, assuming a single failure and concurrent loss of all offsite or loss of all onsite power is not required. The rationale for this is based on the fact that many Design Basis Accidents (DBAs) that are analyzed in MODES 1, 2, and 3 have no specific analyses in MODES 4 and 5. Worst case bounding events are deemed not

BASES

LCO

One offsite circuit capable of supplying the onsite Class 1E power distribution subsystem(s) of LCO 3.8.8, "Distribution Systems-Shutdown," ensures that all required loads are capable of being powered from offsite power. An OPERABLE Division of onsite power, consisting of two EDGs associated with Distribution System Engineered Safety Feature (ESF) buses required OPERABLE by LCO 3.8.8, ensures that a diverse power source is available for providing electrical power support assuming a loss of the offsite circuit. Together, OPERABILITY of the required offsite circuit and EDGs ensures the availability of sufficient AC sources to operate the plant in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents involving recently irradiated fuel ~~and reactor vessel draindown~~).

The qualified offsite circuit(s) must be capable of maintaining rated frequency and voltage while connected to their respective ESF bus(es), and of accepting required loads during an accident. Qualified offsite circuits are those that are described in the UFSAR and are part of the licensing basis for the unit. The offsite circuit consists of incoming breakers and disconnect to the station service 64 or 65 transformer, and the respective circuit path including feeder breakers to all 4.16 kV ESF buses required by LCO 3.8.8.

The required EDGs must be capable of starting, accelerating to rated speed and voltage, connecting to their respective ESF buses on detection of bus undervoltage, and accepting required loads. This sequence must be accomplished within 10 seconds. Each EDG must also be capable of accepting required loads within the assumed loading sequence intervals, and must continue to operate until offsite power can be restored to the ESF buses. These capabilities are required to be met from a variety of initial conditions such as EDG in standby with engine hot and EDG in standby with engine at ambient conditions.

Proper sequencing of loads, including tripping of nonessential loads, is a required function for EDG OPERABILITY.

It is acceptable for divisions to be cross tied during shutdown conditions, permitting a single offsite power circuit to supply all required divisions.

BASES

that provide core cooling

APPLICABILITY

The AC sources are required to be OPERABLE in MODES 4 and 5 and during movement of recently irradiated fuel assemblies in the secondary containment to provide assurance that:

- a. ~~Systems providing adequate coolant inventory makeup are available for the irradiated fuel assemblies in the core in case of an inadvertent draindown of the reactor vessel;~~
- b. Systems needed to mitigate a fuel handling accident involving recently irradiated fuel are available. "Recently irradiated fuel" is fuel that has occupied part of a critical reactor core within the previous 6.3 days. Handling new (non-irradiated) fuel bundles over the open reactor core or the spent fuel pool is subject to the same requirements of handling recently irradiated fuel, as long as any fuel in the core or fuel pool is recently irradiated.
- c. Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and
- d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition or refueling condition.

AC power requirements for MODES 1, 2, and 3 are covered in LCO 3.8.1.

ACTIONS

LCO 3.0.3 is not applicable while in MODE 4 or 5. However, since irradiated fuel assembly movement can occur in MODE 1, 2, or 3, the ACTIONS have been modified by a Note stating that LCO 3.0.3 is not applicable. If moving irradiated fuel while in MODE 4 or 5, LCO 3.0.3 would not specify any action. If moving fuel assemblies while in MODE 1, 2, or 3, the fuel movement is independent of reactor operations. Therefore, in either case, inability to suspend movement of irradiated fuel assemblies would not be sufficient reason to require a reactor shutdown.

A.1

An offsite circuit is considered inoperable if it is not

BASES

ACTIONS (continued)

available to one required ESF division. If two or more ESF 4.16 kV buses are required per LCO 3.8.8, one division with offsite power available may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS, recently irradiated fuel movement, and operations with a potential for draining the reactor vessel. By the allowance of the option to declare required features inoperable with no offsite power available, appropriate restrictions can be implemented in accordance with the affected required feature(s) LCOs' ACTIONS.

A.2.1, A.2.2, A.2.3, A.2.4, B.1, B.2, B.3, and B.4

With the offsite circuit not available to all required divisions, the option still exists to declare all required features inoperable. Since this option may involve undesired administrative efforts, the allowance for sufficiently conservative actions is made. With one or both required EDGs inoperable, the minimum required diversity of AC power sources is not available. It is, therefore, required to suspend CORE ALTERATIONS, movement of recently irradiated fuel assemblies in the secondary containment, and activities that could result in inadvertent draining of the reactor vessel.

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required AC sources and to continue this action until restoration is accomplished in order to provide the necessary AC power to the plant safety systems.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required AC electrical power sources should be completed as quickly as possible in order to minimize the time during which the plant safety systems may be without sufficient power.

Pursuant to LCO 3.0.6, the Distribution System ACTIONS would not be entered even if all AC sources to it are inoperable, resulting in de-energization. Therefore, the Required Actions of Condition A have been modified by a Note to indicate that when Condition A is entered with no AC power to any required ESF bus, ACTIONS for LCO 3.8.8 must be

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.5 DC Sources-Shutdown

BASES

BACKGROUND A description of the DC sources is provided in the Bases for LCO 3.8.4, "DC Sources-Operating."

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident and transient analyses in the UFSAR, Chapter 6 (Ref. 1) and Chapter 15 (Ref. 2), assume that Engineered Safety Feature systems are OPERABLE. The DC electrical power system provides normal and emergency DC electrical power for the emergency diesel generators (EDGs), emergency auxiliaries, and control and switching during all MODES of operation.

The OPERABILITY of the DC subsystems is consistent with the initial assumptions of the accident analyses and the requirements for the supported systems' OPERABILITY.

The OPERABILITY of the minimum DC electrical power sources during MODES 4 and 5 and during movement of recently irradiated fuel assemblies ensures that:

- a. The facility can be maintained in the shutdown or refueling condition for extended periods;
- b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and
- c. Adequate DC electrical power is provided to mitigate events postulated during shutdown, such as ~~an inadvertent draindown of the vessel or~~ a fuel handling accident involving recently irradiated fuel. Due to radioactive decay, DC electrical power is only required to mitigate fuel handling accidents involving recently irradiated fuel. "Recently irradiated fuel" is fuel that has occupied part of a critical reactor core within the previous 6.3 days. Handling new (non-irradiated) fuel bundles over the open reactor core or the spent fuel pool is subject to the same requirements of handling recently irradiated.

BASES

APPLICABLE SAFETY ANALYSIS (Continued)

fuel, as long as any fuel in the core or fuel pool is recently irradiated.

The DC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

At least one DC electrical power subsystem consisting of two 130 VDC batteries in series, two battery chargers, and the corresponding control equipment and interconnecting cabling is required to be OPERABLE to support required DC distribution subsystems required OPERABLE by LCO 3.8.8, "Distribution Systems-Shutdown." In addition, when the redundant division of the Class 1E DC electrical power subsystem is required by LCO 3.8.8, the other DC source subsystem, consisting of either a battery or a battery charger, the corresponding control equipment and interconnecting cabling, is required to be OPERABLE. This ensures the availability of sufficient DC electrical power sources to operate the unit in a safe manner and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents involving recently irradiated fuel and inadvertent reactor vessel draindown).

APPLICABILITY

The DC electrical power sources required to be OPERABLE in MODES 4 and 5 and during movement of recently irradiated fuel assemblies in the secondary containment provide assurance that:

- a. Required features to provide ^{core cooling} ~~adequate coolant inventory~~ ~~makeup~~ are available for the irradiated fuel assemblies in the core in case of an inadvertent draindown of the reactor vessel;
- b. Required features needed to mitigate a fuel handling accident involving recently irradiated fuel are available. "Recently irradiated fuel" is fuel that has occupied part of a critical reactor core within the previous 6.3 days. Handling new (non-irradiated) fuel bundles over the open reactor core or the spent fuel pool is subject to the same requirements of handling recently irradiated fuel, as long as any fuel in the core or fuel pool is recently irradiated.

BASES

APPLICABILITY (Continued)

- c. Required features necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and
- d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition or refueling condition.

The DC electrical power requirements for MODES 1, 2, and 3 are covered in LCO 3.8.4.

ACTIONS

LCO 3.0.3 is not applicable while in MODE 4 or 5. However, since irradiated fuel assembly movement can occur in MODE 1, 2, or 3, the ACTIONS have been modified by a Note stating that LCO 3.0.3 is not applicable. If moving irradiated fuel while in MODE 4 or 5, LCO 3.0.3 would not specify any action. If moving fuel assemblies while in MODE 1, 2, or 3, the fuel movement is independent of reactor operations. Therefore, in either case, inability to suspend movement of irradiated fuel assemblies would not be sufficient reason to require a reactor shutdown.

A.1, A.2.1, A.2.2, A.2.3, and A.2.4

If more than one DC distribution subsystem is required according to LCO 3.8.8, the DC subsystems remaining OPERABLE with one or more DC power sources inoperable may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS, recently irradiated fuel movement, and operations with a potential for draining the reactor vessel. By allowance of the option to declare required features inoperable with associated DC power sources inoperable, appropriate restrictions are implemented in accordance with the affected system LCOs' ACTIONS. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of recently irradiated fuel assemblies, and any activities that could result in inadvertent draining of the reactor vessel).

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required DC electrical power

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.8 Distribution Systems-Shutdown

BASES

BACKGROUND	A description of the AC and DC electrical power distribution system is provided in the Bases for LCO 3.8.7, "Distribution Systems-Operating."
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APPLICABLE SAFETY ANALYSES	<p>The initial conditions of Design Basis Accident and transient analyses in the UFSAR, Chapter 6 (Ref. 1) and Chapter 15 (Ref. 2), assume Engineered Safety Feature (ESF) systems are OPERABLE. The AC and DC electrical power distribution systems are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System, and containment design limits are not exceeded.</p> <p>The OPERABILITY of the AC and DC electrical power distribution system is consistent with the initial assumptions of the accident analyses and the requirements for the supported systems' OPERABILITY.</p> <p>The OPERABILITY of the minimum AC and DC electrical power sources and associated power distribution subsystems during MODES 4 and 5, and during movement of recently irradiated fuel assemblies in the secondary containment ensures that:</p> <ul style="list-style-type: none">a. The facility can be maintained in the shutdown or refueling condition for extended periods;b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; andc. Adequate power is provided to mitigate events postulated during shutdown, such as an inadvertent draindown of the vessel or a fuel handling accident involving recently irradiated fuel. Due to radioactive decay, AC and DC electrical power is only required to mitigate fuel handling accidents involving recently irradiated fuel. "Recently irradiated fuel" is fuel that has occupied part of a critical reactor core within the previous 6.3 days.
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BASES

APPLICABLE SAFETY ANALYSIS (continued)

Handling new (non-irradiated) fuel bundles over the open reactor core or the spent fuel pool is subject to the same requirements of handling recently irradiated fuel, as long as any fuel in the core or fuel pool is recently irradiated.

The AC and DC electrical power distribution systems satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

Various combinations of subsystems, equipment, and components are required OPERABLE by other LCOs, depending on the specific plant condition. Implicit in those requirements is the required OPERABILITY of necessary support required features. This LCO explicitly requires energization of the portions of the electrical distribution system necessary to support OPERABILITY of Technical Specifications required systems, equipment, and components- both specifically addressed by their own LCO, and implicitly required by the definition of OPERABILITY.

In addition, during the shutdown conditions applicable to this LCO, cross-tie breakers between redundant safety related power distribution systems may be closed.

Maintaining these portions of the distribution system energized ensures the availability of sufficient power to operate the plant in a safe manner to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents involving recently irradiated fuel and inadvertent reactor vessel draindown).

APPLICABILITY

The AC and DC electrical power distribution subsystems required to be OPERABLE in MODES 4 and 5 and during movement of recently irradiated fuel assemblies in the secondary containment provide assurance that:

- that** **core cooling**
- a. Systems ~~to provide adequate coolant inventory makeup are available for the irradiated fuel in the core in case of an inadvertent draindown of the reactor vessel;~~

BASES

APPLICABILITY (continued)

- b. Systems needed to mitigate a fuel handling accident involving recently irradiated fuel are available. "Recently irradiated fuel" is fuel that has occupied part of a critical reactor core within the previous 6.3 days. Handling new (non-irradiated) fuel bundles over the open reactor core or the spent fuel pool is subject to the same requirements of handling recently irradiated fuel, as long as any fuel in the core or fuel pool is recently irradiated.
- c. Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and
- d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition or refueling condition.

The AC and DC electrical power distribution subsystem requirements for MODES 1, 2, and 3, are covered in LCO 3.8.7.

ACTIONS

LCO 3.0.3 is not applicable while in MODE 4 or 5. However, since irradiated fuel assembly movement can occur in MODE 1, 2, or 3, the ACTIONS have been modified by a Note stating that LCO 3.0.3 is not applicable. If moving irradiated fuel while in MODE 4 or 5, LCO 3.0.3 would not specify any action. If moving fuel assemblies while in MODE 1, 2, or 3, the fuel movement is independent of reactor operations. Therefore, in either case, inability to suspend movement of irradiated fuel assemblies would not be sufficient reason to require a reactor shutdown.

A.1, A.2.1, A.2.2, A.2.3, A.2.4, and A.2.5

Although redundant required features may require redundant divisions of electrical power distribution subsystems to be OPERABLE, one OPERABLE distribution subsystem division may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS, recently irradiated fuel movement, and operations with a potential for draining the reactor vessel. By allowing the option to declare

BASES

ACTIONS (continued)

required features associated with an inoperable distribution subsystem inoperable, appropriate restrictions are implemented in accordance with the affected distribution subsystem LCO's Required Actions. In many instances this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made, (i.e., to suspend CORE ALTERATIONS, movement of recently irradiated fuel assemblies in the secondary containment, ~~and any activities that could result in inadvertent draining of the reactor vessel~~). and

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required AC and DC electrical power distribution subsystems and to continue this action until restoration is accomplished in order to provide the necessary power to the plant safety systems.

Notwithstanding performance of the above conservative Required Actions, a required residual heat removal-shutdown cooling (RHR-SDC) subsystem may be inoperable. In this case, Required Actions A.2.1 through A.2.4 do not adequately address the concerns relating to coolant circulation and heat removal. Pursuant to LCO 3.0.6, the RHR-SDC ACTIONS would not be entered. Therefore, Required Action A.2.5 is provided to direct declaring RHR-SDC inoperable and not in operation, which results in taking the appropriate RHR-SDC ACTIONS.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required distribution subsystems should be completed as quickly as possible in order to minimize the time the plant safety systems may be without power.

SURVEILLANCE
REQUIREMENTS

SR 3.8.8.1

This Surveillance verifies that the AC and DC electrical power distribution subsystem is functioning properly, with the buses energized. The verification of proper voltage availability on the buses ensures that the required power is readily available for motive as well as control functions for critical system loads connected to these buses. The

BASES

APPLICABLE SAFETY ANALYSES (continued)

Emergency Core Cooling Systems. Since the hydrostatic or leak tests are performed nearly water solid, at low decay heat values, and near MODE 4 conditions, the stored energy in the reactor core will be very low. Under these conditions, the potential for failed fuel and a subsequent increase in coolant activity above the LCO 3.4.7, "RCS Specific Activity," limits are minimized. In addition, the secondary containment will be OPERABLE, in accordance with this Special Operations LCO, and will be capable of handling any airborne radioactivity or steam leaks that could occur during the performance of hydrostatic or leak testing. The required pressure testing conditions provide adequate assurance that the consequences of a steam leak will be conservatively bounded by the consequences of the postulated main steam line break outside of primary containment described in Reference 2. Therefore, these requirements will conservatively limit radiation releases to the environment.

unlikely

any

that could result in draining of the RPV

makeup

In the event of a large primary system leak, the reactor vessel would rapidly depressurize, allowing the low pressure core cooling systems to operate. The capability of the low pressure coolant injection and core spray subsystems, as required in MODE 4 by LCO 3.5.2, "ECCS - Shutdown," would be more than adequate to keep the core flooded under this low decay heat load condition. Small system leaks would be detected by leakage inspections before significant inventory loss occurred.

RPV water level above the TAF

RPV Water Inventory Control

For the purposes of this test, the protection provided by normally required MODE 4 applicable LCOs, in addition to the secondary containment requirements required to be met by this Special Operations LCO, will ensure acceptable consequences during normal hydrostatic test conditions and during postulated accident conditions.

As described in LCO 3.0.7, compliance with Special Operations LCOs is optional, and therefore, no criteria of 10 CFR 50.36(c)(2)(ii) apply. Special Operations LCOs provide flexibility to perform certain operations by appropriately modifying requirements of other LCOs. A discussion of the criteria satisfied for the other LCOs is provided in their respective Bases.