TSTF
TECHNICAL SPECIFICATIONS TASK FORCE
A JOINT OWNERS GROUP ACTIVITY

DATE

DRAFT

TSTF-19-08
PROJ0753

Attn: Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: Transmittal of TSTF-582, Revision 0, "RPV WIC Enhancements"

Enclosed for NRC review is TSTF-582, Revision 0, "RPV WIC Enhancements."

The following information is provided to assist the NRC staff in prioritizing their review of TSTF-582:

- Applicability: TSTF-582 is applicable to Boiling Water Reactor (BWR) plants that have adopted TSTF-542, "Reactor Pressure Vessel Water Inventory Control."
- Classification: TSTF-582 proposes improvements and corrections to the requirements in TSTF-542 based on industry experience.
- Specialized Resource Availability: TSTF-582 is a high priority change. The TSTF requests that TSTF-582 be reviewed within 12 months and be made available for adoption under the Consolidated Line Item Improvement Process (CLIIP).

The Technical Specifications Task Force should be billed for the review of the traveler.

Should you have any questions, please do not hesitate to contact us.

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Technical Specifications Task Force
Improved Standard Technical Specifications Change Traveler

RPV WIC Enhancements

NUREGs Affected: ☐ 1430 ☐ 1431 ☐ 1432 ☑ 1433 ☑ 1434 ☐ 2194

Classification: 1) Technical Change

Recommended for CLIIP?: Yes

Correction or Improvement: Improvement

NRC Fee Status: Not Exempt

Changes Marked on ISTS Rev: 4.0

See Attached.

Revision History

OG Revision 0 Revision Status: Active

Revision Proposed by: Licensing Committee

Revision Description:
Original Issue

Owners Group Review Information

Date Originated by OG: 07-May-19

Owners Group Comments:
(No Comments)

Owners Group Resolution: Approved Date: 10-Jun-19

TSTF Review Information

TSTF Received Date: 18-Jun-19 Date Distributed for Review: 18-Jun-19

TSTF Comments:
(No Comments)

TSTF Resolution: Approved Date: 02-Jul-19

Affected Technical Specifications

1.1	Definitions Change Description: "Drain Time"
Bkgnd 3.3.5.2B Bases	Reactor Pressure Vessel Water Inventory Control Instrumentation
Bkgnd 3.3.5.2A Bases	Reactor Pressure Vessel Water Inventory Control Instrumentation
LCO 3.3.5.2A	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Table 3.3.5.2-1

LCO 3.3.5.2B	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Table 3.3.5.2-1
LCO 3.3.5.2B Bases	Reactor Pressure Vessel Water Inventory Control Instrumentation
LCO 3.3.5.2A Bases	Reactor Pressure Vessel Water Inventory Control Instrumentation
Action 3.3.5.2B.A	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Deleted
Action 3.3.5.2A.A	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Deleted
Action 3.3.5.2A.A Bases	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Deleted
Action 3.3.5.2B.A Bases	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Deleted
Action 3.3.5.2A.B	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Renamed A
Action 3.3.5.2B.B	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Renamed A
Action 3.3.5.2A.B Bases	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Renamed A
Action 3.3.5.2B.B Bases	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Renamed A
Action 3.3.5.2B.C	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Deleted
Action 3.3.5.2A.C	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Deleted
Action 3.3.5.2A.C Bases	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Deleted
Action 3.3.5.2B.C Bases	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Deleted

Action 3.3.5.2B.D	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Deleted
Action 3.3.5.2A.D	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Deleted
Action 3.3.5.2A.D Bases	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Deleted
Action 3.3.5.2B.D Bases	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Deleted
Action 3.3.5.2A.E	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Deleted
Action 3.3.5.2B.E	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Deleted
Action 3.3.5.2A.E Bases	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Deleted
Action 3.3.5.2B.E Bases	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Deleted
SR 3.3.5.2B.3	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Deleted
SR 3.3.5.2A.3	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Deleted
SR 3.3.5.2B.3 Bases	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Deleted
SR 3.3.5.2A.3 Bases	Reactor Pressure Vessel Water Inventory Control Instrumentation Change Description: Deleted
Action 3.3.6.1B.J Bases	Primary Containment Isolation instrumentation
Action 3.3.6.1A.J Bases	Primary Containment Isolation instrumentation
S/A 3.5.2 Bases	RPV Water Inventory Control
LCO 3.5.2 Bases	RPV Water Inventory Control
Appl. 3.5.2 Bases	RPV Water Inventory Control

Action 3.5.2.C	Reactor Pressure Vessel Water Inventory Control	
Action 3.5.2.D	Reactor Pressure Vessel Water Inventory Control	
Action 3.5.2.D	Reactor Pressure Vessel Water Inventory Control	
Action 3.5.2.D Bases	Reactor Pressure Vessel Water Inventory Control	
SR 3.5.2.1 Bases	RPV Water Inventory Control	
SR 3.5.2.4 Bases	RPV Water Inventory Control	
SR 3.5.2.5	Reactor Pressure Vessel Water Inventory Control Change Description: Deleted	
SR 3.5.2.5 Bases	Reactor Pressure Vessel Water Inventory Control Change Description: Deleted	
SR 3.5.2.6	Reactor Pressure Vessel Water Inventory Control Change Description: Renamed SR 3.5.2.5	
SR 3.5.2.6 Bases	Reactor Pressure Vessel Water Inventory Control Change Description: Renamed SR 3.5.2.5	
SR 3.5.2.7	Reactor Pressure Vessel Water Inventory Control Change Description: Renamed SR 3.5.2.6	
SR 3.5.2.7 Bases	Reactor Pressure Vessel Water Inventory Control Change Description: Renamed SR 3.5.2.6	
SR 3.5.2.8	Reactor Pressure Vessel Water Inventory Control Change Description: Deleted	
SR 3.5.2.8 Bases	Reactor Pressure Vessel Water Inventory Control Change Description: Deleted	
SR 3.5.3.5 Bases	RCIC System	
SR 3.8.2.1	AC Sources - Shutdown	
SR 3.8.2.1 Bases	AC Sources - Shutdown	
SR 3.5.2.2	Reactor Pressure Vessel Water Inventory Control	NUREG(s)- 1433 Only
SR 3.5.2.2 Bases	Reactor Pressure Vessel Water Inventory Control	NUREG(s)- 1433 Only
Appl. 3.6.1.3	PCIVs	NUREG(s)- 1433 Only
Appl. 3.6.1.3 Bases	PCIVs	NUREG(s)- 1433 Only
Action 3.6.1.3.F	PCIVs	NUREG(s)- 1433 Only
Action 3.6.1.3.F Bases	PCIVs	NUREG(s)- 1433 Only

Action 3.6.1.3.G	PCIVs	NUREG(s)- 1433 Only
	Change Description: Deleted	
Action 3.6.1.3.G Bases	PCIVs	NUREG(s)- 1433 Only
	Change Description: Deleted	
Action 3.6.1.3.H	PCIVs	NUREG(s)- 1433 Only
	Change Description: Deleted	
Action 3.6.1.3.H Bases	PCIVs	NUREG(s)- 1433 Only
	Change Description: Deleted	
SR 3.6.1.3.1	PCIVs	NUREG(s)- 1433 Only
SR 3.6.1.3.1 Bases	PCIVs	NUREG(s)- 1433 Only
SR 3.6.1.3.2	PCIVs	NUREG(s)- 1433 Only
SR 3.6.1.3.2 Bases	PCIVs	NUREG(s)- 1433 Only
SR 3.6.1.3.7	PCIVs	NUREG(s)- 1433 Only
SR 3.6.1.3.7 Bases	PCIVs	NUREG(s)- 1433 Only
SR 3.6.1.3.12	PCIVs	NUREG(s)- 1433 Only
SR 3.6.1.3.12 Bases	PCIVs	NUREG(s)- 1433 Only
SR 3.6.1.3.13	PCIVs	NUREG(s)- 1433 Only
SR 3.6.1.3.13 Bases	PCIVs	NUREG(s)- 1433 Only
SR 3.6.1.3.14	PCIVs	NUREG(s)- 1433 Only
SR 3.6.1.3.14 Bases	PCIVs	NUREG(s)- 1433 Only
SR 3.6.1.3.15	PCIVs	NUREG(s)- 1433 Only
SR 3.6.1.3.15 Bases	PCIVs	NUREG(s)- 1433 Only
Action 3.3.5.2B.F	Reactor Pressure Vessel Water Inventory Control Instrumentation	NUREG(s)- 1434 Only
	Change Description: Deleted	
Action 3.3.5.2A.F	Reactor Pressure Vessel Water Inventory Control Instrumentation	NUREG(s)- 1434 Only
	Change Description: Deleted	
Action 3.3.5.2B.F Bases	Reactor Pressure Vessel Water Inventory Control Instrumentation	NUREG(s)- 1434 Only
	Change Description: Deleted	

Action 3.3.5.2A.F Bases	Reactor Pressure Vessel Water Inventory Control Instrumentation	NUREG(s)- 1434 Only
	Change Description: Deleted	
Action 3.3.5.2B.G	Reactor Pressure Vessel Water Inventory Control Instrumentation	NUREG(s)- 1434 Only
	Change Description: Deleted	
Action 3.3.5.2A.G	Reactor Pressure Vessel Water Inventory Control Instrumentation	NUREG(s)- 1434 Only
	Change Description: Deleted	
Action 3.3.5.2B.G Bases	Reactor Pressure Vessel Water Inventory Control Instrumentation	NUREG(s)- 1434 Only
	Change Description: Deleted	
Action 3.3.5.2A.G Bases	Reactor Pressure Vessel Water Inventory Control Instrumentation	NUREG(s)- 1434 Only
	Change Description: Deleted	
Action 3.3.6.1A.J	Primary Containment Isolation instrumentation	NUREG(s)- 1434 Only
Action 3.3.6.1B.J	Primary Containment Isolation instrumentation	NUREG(s)- 1434 Only
Action 3.5.1	ECCS - Operating	NUREG(s)- 1434 Only
Action 3.5.1.B	ECCS - Operating	NUREG(s)- 1434 Only

1. SUMMARY DESCRIPTION

The Technical Specifications (TS) related to Reactor Pressure Vessel Water Inventory Control (RPV WIC) are revised to incorporate operating experience and to correct errors and omissions in TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control." The proposed change modifies NUREG-1433, "Standard Technical Specifications - General Electric BWR/4 Plants," and NUREG-1434, "Standard Technical Specifications, General Electric BWR/6 Plants" (the STS).[1]

2. DETAILED DESCRIPTION

2.1. TSTF-542 History

Technical Specifications Task Force (TSTF) Traveler TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control," was approved by the NRC on December 20, 2016. The existing requirements in the Technical Specifications (TS) related to "operations with a potential for draining the reactor vessel" (OPDRVs) were replaced with new requirements on Reactor Pressure Vessel Water Inventory Control (RPV WIC) to protect Safety Limit 2.1.1.3, which requires reactor pressure vessel (RPV) water level to be greater than the top of the active irradiated fuel.

TSTF-542, Revision 2, addressed issues raised by the NRC in a non-cited violation of a boiling water reactor (BWR) plant for making procedure changes that interpreted the term OPDRV. Subsequently, the NRC staff learned that other BWR licensees made similar changes to their plant procedures to interpret the plain language meaning of OPDRV in a way that restricts the applicability of OPDRV TS requirements. In 2011 through 2013, the NRC and the industry held several meetings to understand the NRC's concerns. In December 2013, the TSTF submitted TSTF-542, Revision 0, "Reactor Pressure Vessel Water Inventory Control," for NRC review. In October 2014, the NRC provided comments on the traveler that resulted in a significant revision. Revision 1 was submitted for review in September 2015. The NRC provided additional comments in December 2015 and the TSTF submitted Revision 2 in March 2016. The NRC approved TSTF-542, Revision 2, in December 2016.

TSTF-542, Revision 2, represented a significant change to the TS and to the execution of outages. Seventeen specifications in the STS were affected, two new specifications and a new definition were created, and the underlying safety basis of the requirements was revised. Every BWR plant not scheduled for permanent shutdown has submitted a license amendment to adopt TSTF-542 and as of early 2019, all but one of the license amendment requests had been approved by the NRC. At least six sites have conducted refueling outages under the TSTF-542 requirements.

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[1] NUREG-1433 is based on the BWR/4 plant design, but is also representative of the BWR/2, BWR/3, and, in this case, BWR/5 designs. NUREG-1434 is based on the BWR/6 plant design, and is representative, in some cases, of the BWR/5 design.

2.2. Current Technical Specifications Requirements

The requirements implemented in TSTF-542 are principally located in:

- Section 1.1, "Definitions," the defined term "Drain Time;"
- TS 3.5.2, "Reactor Pressure Vessel (RPV) Water Inventory Control;" and
- TS 3.3.5.2, "Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation."

Drain Time is the time it would take for the water inventory in and above the RPV to drain to the top of the active fuel (TAF) seated in the RPV assuming the water inventory above the TAF is divided by the limiting drain rate. 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. Exceptions are provided for certain penetration flow paths, such as those that will isolate automatically on low water level, those that are locked closed or closed with a blank flange, those that are connected to a closed system, or those that can be closed by an operator dedicated to that task.

TS 3.5.2 requires the Drain Time to be greater than or equal to 36 hours, and for one low pressure Emergency Core Cooling System (ECCS) subsystem to be operable. If the Drain Time is less than 36 hours, there are a set of increasingly more restrictive actions that must be taken to ensure that the plant staff and the public are protected should a draining event occur.

TS 3.3.5.2 requires the instrumentation functions needed to satisfy the requirements of TS 3.5.2 to be operable. There are two types of required instruments: those related to isolation of a penetration flow path on low water level in the RPV, and those functions that are needed to permit manual initiation of the required ECCS subsystem using the ECCS instrumentation.

2.3. Reason for the Proposed Change

During the development of plant-specific license amendments to adopt TSTF-542 and during use of the TS requirements during refueling outages, several improvements, errors, or omissions were discovered. The proposed change can be divided into:

- Improvements;
- Corrections; and
- TS Bases Changes

These changes serve a number of purposes, such as making the technical requirements consistent across the BWR fleet, revising overly restrictive or impractical requirements, including or correcting changes by TSTF-542, and addressing issues with multiple-unit sites that share a secondary containment.

TSTF-542, Revision 2, has not yet been incorporated into a revision of NUREG-1433 and NUREG-1434. Therefore, all changes in the TSTF-542, Revision 2, TS and Bases files were incorporated and used as the basis for the changes in this traveler.

2.4. Description of the Proposed Change

Improvements

1. TS 3.5.2 and TS 3.3.5.2 are revised to eliminate the requirement for a manual ECCS initiation signal to start the required ECCS injection/spray subsystem, and to instead rely on manual valve alignment and pump start. TS 3.5.2 Surveillance Requirements (SRs) related to manual initiation using the ECCS signal (such as verifying automatic alignment of valves on an initiation signal) are eliminated. Related to this change, the TS 3.3.5.2 functions, Surveillance Requirements, and Actions that only support manual initiation using an ECCS signal (including interlocks and minimum flow instruments) are eliminated.

2. The Drain Time definition is revised to delete the examples of common mode failure mechanisms which are duplicated in the TS 3.5.2 Bases. Seismic events are no longer considered a common mode failure mechanism. This change also affects the TS 3.3.5.2 Bases and the SR 3.5.2.1 Bases, which elaborate on various aspects of calculating Drain Time.

3. The Drain Time Definition exception from considering the Drain Time for penetration flow paths isolated with manual or automatic valves that are that are "locked, sealed, or otherwise secured" is revised to apply the exception for manual or automatic valves that are "closed and administratively controlled."

4. The Actions of TS 3.3.5.2 are revised to permit placing an inoperable isolation channel in trip as an alternative to declaring the associated penetration flow path incapable of automatic isolation.

5. SR 3.5.2.6, which requires operating the low pressure ECCS subsystem for at least 10 minutes through the recirculation line, is modified by adding two Notes. The first Note replaces the existing SR requirement that the ECCS subsystem be run through the recirculation line with a Note that states that operation may be through the test return line. The second Note permits crediting normal operation of the low pressure ECCS subsystem for performance of the SR.

6. Some BWR plants share secondary containment structures between units. The TS 3.5.2 Actions are revised to include bracketed (i.e., optional) provisions for these plants to recognize that an operable secondary containment and operable secondary containment isolation valves satisfy the Required Actions.

7. Some BWR plant designs contain additional isolation instrumentation functions based on low RPV water level that could be credited when calculating Drain Time. A Reviewer's Note is added to the BWR/4 TS 3.3.5.2 Bases stating that additional isolation functions can be included, and a variation description is added to the model application for licensees to describe any additional isolation functions added to the TS.

Corrections

8. TS 3.8.2, "AC Sources - Shutdown," SR 3.8.2.1, is revised to not require SRs that test automatic diesel generator start to be met in Modes 4 and 5. Automatic ECCS initiation in Modes 4 and 5 was eliminated in TSTF-542. This was an oversight in TSTF-542.

9. In BWR/6 STS 3.3.6.1, "Primary Containment Isolation Instrumentation," Required Action J.2 is deleted. This action is no longer applicable after adoption of TSTF-542. The BWR/6 Bases are revised to reflect this change. Required Action J.2 was removed from BWR/4 STS 3.3.6.1 in TSTF-542, but the Bases were not revised. The BWR/4 STS 3.3.6.1 Bases, Required Action J.2 title and discussion is removed. These changes were accidental omissions from the TSTF-542 markups.

10. The BWR/4 Applicability of TS 3.6.1.3, "Primary Containment Isolation Valves (PCIVS)," is revised to delete the phrase, "When associated instrumentation is required to be OPERABLE per LCO 3.3.6.1, "Primary Containment Isolation Instrumentation." This makes TS 3.6.1.3 only applicable in Modes 1, 2, and 3. Condition H, which is only applicable in Modes 4 and 5, and Condition G, which is only applicable during movement of irradiated fuel in the secondary containment, are deleted. Notes stating that the SR is only required to be met in Modes 1, 2, and 3 on SR 3.6.1.3.1, SR 3.6.1.3.2, SR 3.6.1.3.7, SR 3.6.1.3.12, SR 3.6.1.3.13, SR 3.6.1.3.14, and SR 3.6.1.3.15 are deleted.

11. Various TS editorial corrections are made.

    - TS 3.3.5.2, Required Action B.2, (now A.2.2) requires calculating Drain Time with a Completion Time of "immediately." The Required Action is revised to state, "Initiate action to calculate Drain Time."
    - In the BWR/6 STS, TS 3.5.1 Actions Note, the first use of the acronym "HPCS" is defined and the definition is removed from Condition B.
    - In the BWR/4 and BWR/6 STS 3.5.2, the first use of the acronym "SGT" is defined in Required Action C.3 and the acronym "SGT" is used in Required Action D.4.
    - In the BWR/4 STS, a redundant definition of "LPCI" in SR 3.5.2.2 is eliminated.

TS Bases Corrections

12. The proposed change includes changes to the TS Bases that are not related to a change to the TS.

    - The BWR/6 STS 3.3.5.2, Function 4.a, "Applicable Safety Analysis, LCO, and Applicability" Bases section is corrected to state that Group 3 valves are isolated, not Group 11 valves.
    - The BWR/4 STS 3.3.5.2, Function 4.a, second paragraph in "Applicable Safety Analysis, LCO, and Applicability," Bases section is corrected to state "Reactor Vessel Water Level - Low Low, Level 2" instead of "Reactor Vessel Water Level - Low, Level 2.
    - The BWR/4 and BWR/6 STS 3.5.2 "Applicability" discussion is revised to add quotation marks surrounding the titles for Section 3.3 and Section 3.5. The title of Section 3.5 is also corrected in one location.

- The SR 3.5.3.5 Bases is revised to reference LCO 3.3.5.3 instead of LCO 3.3.5.2.
- The Applicable Safety Analyses Bases section in TS 3.3.5.2 and TS 3.5.2 is revised to refer to "considered" events instead of "postulated" events to be consistent with the other affected Bases and the TSTF-542 justification. The term "postulated" is typically used to refer to design basis accidents.

The regulation at Title 10 of the Code of Federal Regulations (10 CFR), Part 50.36, states, "A summary statement of the bases or reasons for such specifications, other than those covering administrative controls, shall also be included in the application, but shall not become part of the technical specifications." A licensee may make changes to the TS Bases without prior NRC review and approval in accordance with the Technical Specifications Bases Control Program. The proposed TS Bases changes are consistent with the proposed TS changes and provide the purpose for each requirement in the specification consistent with the Commission's Final Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors, dated July 2, 1993 (58 FR 39132). Therefore, the Bases changes are provided for information and approval of the Bases is not requested.

A model application is attached. The model may be used by licensees desiring to adopt the traveler following NRC approval.

3. TECHNICAL EVALUATION

1. Manual ECCS Initiation

LCO 3.5.2 requires one [BWR/4 only: low pressure] ECCS injection/spray subsystem to be operable. The Bases state that the 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.

The justification for TSTF-542 states that the ECCS injection/spray subsystem is manually initiated using the ECCS manual initiation signal. TS 3.3.5.2 requires the necessary instrumentation and logic to be operable to support manual initiation of the ECCS subsystem using the ECCS, such as permissives, bypasses, and the manual initiation function.

During the plant-specific implementation of TSTF-542, it was determined that a number of BWR plants did not have an ECCS manual initiation signal as assumed in the traveler. These plants proposed a variation on TSTF-542 that credited manual starting of pumps and manual valve alignment to permit the required ECCS injection/spray subsystem to inject into the RPV. These plants represent 18 of the 32 units (56%) that submitted amendment requests to adopt TSTF-542. The plants are:

- Browns Ferry Units 1, 2, and 3
- Brunswick Units 1 and 2
- Cooper Unit 1
- Dresden Units 2 and 3
- Duane Arnold Unit 1
- Fitzpatrick Unit 1

- Hatch Units 1 and 2
- LaSalle Units 1 and 2
- Monticello Unit 1
- Nine Mile Point Unit 1
- Quad Cities Units 1 and 2

All of these plants used the justification that if the manual operation of the required ECCS injection/spray subsystem is needed to add water to the RPV, it is a relatively simple evolution that involves the manipulation of a small number of components by licensed operators in the control room and is described in plant procedures. Manual operation is acceptable because a draining event is a slow evolution and there is adequate time to take the necessary actions to manually align and start an ECCS injection/spray subsystem.

This NRC-accepted, plant-specific alternative to credit manual alignment and pump start is equally applicable to the BWR plants that have the ECCS manual initiation capability. Applying this alternative to the remainder of the BWR fleet has many advantages, such as eliminating the requirement for portions of the ECCS logic, permissives, and bypasses to remain operable during Modes 4 and 5 (facilitating maintenance and testing). Applying the alternative to the remainder of the BWR fleet has no adverse safety consequences as the ECCS injection/spray subsystem can still provide the defense-in-depth function assumed in TSTF-542. The TSTF-582 model application contains a verification that states:

> [LICENSEE] verifies that the required ECCS injection/spray subsystem can be aligned and the pump started using relatively simple evolutions involving the manipulation of a small number of components. These actions can be performed in a short time (less than the minimum Drain Time of 1 hour) from the control room following plant procedures.

The LCO 3.5.2 Bases are revised to state that an operable ECCS injection/spray subsystem must be capable of being aligned and started from the control room in less than one hour.

This change to crediting manual alignment and pump start of the required ECCS injection/spray subsystem results in a number of supporting changes:

The TS 3.3.5.2 functions that only support ECCS manual initiation via the ECCS instrumentation are removed. These are:

<u>BWR/4 STS (NUREG-1433)</u>

1. Core Spray System
    a. Reactor Steam Dome Pressure - Low (Injection Permissive)
    b. Core Spray Pump Discharge Flow - Low (Bypass)
    c. Manual Initiation

2. Low Pressure Coolant Injection (LPCI) System
    a. Reactor Steam Dome Pressure - Low (Injection Permissive)
    b. Low Pressure Coolant Injection Pump Discharge Flow - Low (Bypass)
    c. Manual Initiation

BWR/6 STS (NUREG-1434)

1. Low Pressure Coolant Injection-A (LPCI) and Low Pressure Core Spray (LPCS) Subsystems
    a. Reactor Steam Dome Pressure - Low (Injection Permissive)
    b. [LPCS Pump Discharge Flow - Low (Bypass)]
    c. [LPCI Pump A Discharge Flow - Low (Bypass)]
    d. Manual Initiation

2. LPCI B and LPCI C Subsystems
    a. Reactor Steam Dome Pressure - Low (Injection Permissive)
    b. [LPCI Pump B and LPCI Pump C Discharge Flow - Low (Bypass)]
    c. Manual Initiation

3. High Pressure Core Spray (HPCS) System
    a. Reactor Vessel Water Level - High, Level 8
    b. Condensate Storage Tank Level - Low
    c. [HPCS Pump Discharge Pressure - High (Bypass)]
    d. [HPCS System Flow Rate - Low (Bypass)]
    e. Manual Initiation

BWR/4 Functions 1.a and 2.a, Core Spray System and Low Pressure Coolant Injection (LPCI) System Reactor Steam Dome Pressure - Low (Injection Permissive)

The low reactor steam dome pressure signals are used as permissives for the low pressure ECCS injection/spray subsystem manual initiation 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. In Modes 4 and 5, the reactor steam dome pressure will be below the ECCS maximum design pressure. Therefore, the functions are not necessary to ensure the required ECCS subsystem can inject into the RPV.

BWR/4 Functions 1.b and 2.b, Core Spray System and Low Pressure Coolant Injection (LPCI) System Core Spray Pump Discharge Flow - Low (Bypass)

The minimum flow instruments protect the associated low pressure ECCS pump from overheating when the pump is operating, and the associated injection valve is not fully open. The minimum flow line valve is opened when low flow is sensed, and the valve is automatically closed when the flow rate is adequate to protect the pump. Under the proposed change, the ECCS pump is started manually by the operator after aligning the valves needed to inject into the RPV. Therefore, the automatic minimum flow protection is not needed.

BWR/4 Functions 1.c and 2.c, Core Spray System and Low Pressure Coolant Injection (LPCI) System Core Spray Manual Initiation

The Manual Initiation push button channels introduce signals into the appropriate ECCS logic to provide manual initiation capability. Under the proposed change, the ECCS is aligned and started by the operators from the control room. Therefore, the manual initiation function is not needed.

BWR/6 Functions 1.a and 2.a, Low Pressure Core Spray and Low Pressure Coolant Injection Systems Reactor Steam Dome Pressure - Low (Injection Permissive)

The low reactor steam dome pressure signals are used as permissives for the low pressure ECCS injection/spray subsystem manual initiation 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. In Modes 4 and 5, the reactor steam dome pressure will be below the ECCS maximum design pressure. Therefore, the functions are not necessary to ensure the required ECCS subsystem can inject into the RPV.

BWR/6 Functions 1.b, 1.c, and 2.b, Low Pressure Core Spray and Low Pressure Coolant Injection Systems Low Pressure Coolant Injection and Low Pressure Core Spray Pump Discharge Flow - Low (Bypass)

The minimum flow instruments protect the associated low pressure ECCS pump from overheating when the pump is operating, and the associated injection valve is not fully open. The minimum flow line valve is opened when low flow is sensed, and the valve is automatically closed when the flow rate is adequate to protect the pump. Under the proposed change, the ECCS pump is started manually by the operator after aligning the valves needed to inject into the RPV. Therefore, the automatic minimum flow protection is not needed.

BWR/6 Functions 1.d and 2.c, Low Pressure Core Spray and Low Pressure Coolant Injection Systems Manual Initiation

The Manual Initiation push button channels introduce signals into the appropriate ECCS logic to provide manual initiation capability. Under the proposed change, the ECCS is aligned and started by the operators from the control room. Therefore, the manual initiation function is not needed.

BWR/6 Function 3.a, High Pressure Core Spray System Reactor Vessel Water Level - High, Level 8

The high RPV water level Level 8 signal is used to close the HPCS injection valve to prevent overflow into the main steam lines (MSLs). Under the proposed change, the ECCS pump is started and controlled manually by the operator. Therefore, automatic protection to prevent overflow into the MSLs is not needed.

BWR/6 Function 3.b, High Pressure Core Spray System Condensate Storage Tank (CST) 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 HPCS and the CST are open and water for HPCS 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 valve automatically opens, and then the CST suction valve automatically closes. This ensures that an adequate supply of makeup water is available to the HPCS pump. Under the proposed change, the ECCS subsystem is aligned and started manually by the operator in the control room, including selecting the water source for HPCS. Therefore, this automatic swap-over to the suppression pool is not needed.

BWR/6 Function 3.c and 3.d, High Pressure Core Spray System HPCS Pump Discharge Pressure - High (Bypass) and HPCS System Flow Rate - Low (Bypass)

The minimum flow instruments are provided to protect the HPCS pump from overheating when the pump is operating, and the associated injection valve is not fully open. The minimum flow line valve is opened when low flow and high pump discharge pressure are sensed, and the valve is automatically closed when the flow rate is adequate to protect the pump, or the discharge pressure is low (indicating the HPCS pump is not operating). Under the proposed change, the ECCS pump is started manually by the operator after aligning the valves needed to inject into the RPV. Therefore, the automatic minimum flow protection is not needed.

BWR/6 Function 3.e, BWR/6 High Pressure Core Spray System Manual Initiation

The Manual Initiation push button channel introduces a signal into the HPCS logic to provide manual initiation capability. Under the proposed change, the ECCS is aligned and started by the operators from the control room. Therefore, the manual initiation function is not needed.

In summary, the safety features provided by these instrumentation functions are not needed in Modes 4 and 5 when crediting manual alignment and pump start of the required ECCS injection/spray subsystem. If any of these functions are needed to satisfy manual alignment and pump start from the control room, the function may be maintained available or bypassed to permit manual operation, but there is no specified safety function being performed that would require the functions to be operable.

The proposed change makes the treatment of instrumentation for the required ECCS injection/spray subsystem consistent with the treatment of Residual Heat Removal (RHR) in Modes 4 and 5. Similar to the proposed treatment of the defense-in-depth ECCS subsystem, RHR is manually aligned and controlled by the operator in the control room. The Bases for RHR state that an operable RHR shutdown cooling subsystem consists of an RHR pump, a heat exchanger, valves, piping, instruments, and controls to ensure an operable flow path. The RHR TS describe the required functional capability of the system, but not the specific instruments and controls needed by the operator to accomplish the function.

Removal of the requirement for these functions to be operable eliminates the need for BWR/4 STS 3.3.5.2 Actions C, D, and E, and BWR/6 STS 3.3.5.2, Actions C, D, E, F, and G, which are only applicable when these functions are inoperable. Since only Condition B is applicable when a channel is inoperable, Condition A and the reference to applicable Conditions in Table 3.3.5.1-1 are no longer needed. SR 3.3.5.2.3, which requires a Logic System Functional Test of the ECCS manual initiation function, is no longer necessary. Because all remaining SRs are applicable to the remaining functions, the "Surveillance Requirements" column of Table 3.3.5.1-1 is no longer needed and is removed.

Crediting manual alignment and initiation of the required ECCS injection/spray subsystem also affects some TS 3.5.2 Surveillances. SR 3.5.2.6 requires verification that each manual, power operated, and automatic valve in the required ECCS injection/spray subsystem flow path that is not locked, sealed, or otherwise secured in position is in the correct position. SR 3.5.2.8 requires verification that the ECCS injection/spray subsystem actuates on a manual initiation signal.

SR 3.6.2.6, which requires operating the required ECCS injection/spray subsystem for at least 10 minutes, now performs the same function as SR 3.5.2.5 and SR 3.5.2.8, in that it verifies the ability to manually align and operate the required ECCS injection/spray subsystem. Therefore, SR 3.5.2.5 and SR 3.5.2.8 are eliminated, and the subsequent SRs are renumbered. The elimination of SR 3.5.2.8 is applicable to those plants that took a variation from TSTF-542 to not credit a manual initiation signal.

2. Common Mode Failure

The Drain Time definition states (emphasis added):

> 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.)*.

The TSTF-542, Revision 2, justification states (emphasis added):

> In developing the requirements, no additional single failure or operator error beyond the initiating event is considered. This is consistent with other TS applicable during shutdown, such as TS 3.8.2, "AC Sources - Shutdown", which requires a single offsite and onsite power source and do not require redundant features to address a limiting single failure. Consistent with TS 3.8.2, a loss of offsite power is considered. *In addition, common mode failures (i.e., single initiating events that affect more than one RPV penetration flow path) are considered when appropriate.*

The TSTF-542 justification, TS Bases, and the NRC Safety Evaluation for TSTF-542 do not provide additional discussion on what constitutes a common mode failure or discuss the examples of a common mode failure included in the definition.

During implementation of TSTF-542 at licensee's sites, it was determined that considering a seismic event to be a common mode failure mechanism during Modes 4 and 5 is inconsistent with existing NRC-approved guidance. NUMARC 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Revision 4, dated December 2010, Section 11.3.6, "Assessment Methods for Shutdown Conditions," states:

> The scope of initiators to be considered in the assessment for shutdown conditions is limited to internal events.

and

> Maintenance activities that do not necessarily remove the SSC from service may still impact plant configuration and impact key safety functions. Examples could include:
>
> - A valve manipulation that involves the potential for a single failure to create a drain down path affecting the inventory control key safety function
> - A switchyard circuit breaker operation that involves the potential for a single failure to affect availability of AC power.

Regulatory Guide 1.160, Revision 4, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," August 2018. Section 1.8, "Scope of Initiators to be Considered for Shutdown Conditions," states:

> NUMARC 93-01 provides guidance to licensees on the scope of hazard groups to be considered for the 10 CFR 50.65(a)(4) assessment provision during shutdown conditions. Section 11.3.6 "Assessment of Methods for Shutdown Conditions" of NUMARC 93-01 states to licensees that they should consider section 4.0 of NUMARC 91-06, "Guidelines for Industry Actions to Assess Shutdown Management," when developing an assessment process that meets 10 CFR 50.65(a)(4). Paragraph 5 of section 11.3.6 states that weather, external flooding, and other external impacts need to be considered if such conditions are imminent or have a high probability of occurring during the planned out-of-service duration.

Even in high seismicity areas, an earthquake is not a high probability event. Further, the probability of a seismic event during a refueling outage (less than one month during an 18- or 24-month fuel cycle) is at least an order of magnitude less than the annual probability. Therefore, NUMARC 93-01 and Regulatory Guide 1.160 support considering loss of normal power or a single human error as potential common mode failure mechanisms, but do not support considering a seismic event as a potential common mode failure mechanism.

In order to facilitate additional clarification of common mode failure mechanisms that may be identified in future use of the TS requirements, the examples of a common mode failure are deleted from the TS definition and the TS 3.3.5.2 Bases and retained in the TS 3.5.2 Bases.

The Bases are revised to eliminate discussion of seismic events and snubbers, and to state that the maintenance controls described in NUMARC 93-01, the controls described in NUMARC 91-06 to prevent a loss of inventory, and the licensee commitments to NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants," are sufficient to prevent a failure related to maintenance and testing that could result in a draining event. This Bases change reflects the application of currently applied, NRC-endorsed controls to the RPV WIC requirements.

3. Locked Valves

The Drain Time definition states that one reason for excluding penetration flow paths from the Drain Time calculation is that the penetration flow path is isolated by manual or automatic valves that are locked, sealed, or otherwise secured in the closed position. The TSTF-542 justification states, "These actions preclude creating a drain path due to a single initiating event. Valves are locked, sealed, or otherwise secured under the licensee's administrative program for securing valves for the purpose of ensuring that a single operator error cannot open the valves."

The SR 3.5.2.1 Bases, in discussing the determination of Drain Time, states, "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 definition requirement that manual valves be "locked, sealed, or otherwise secured," and the Bases statement that the calculation must consider branch lines created an unintended burden. Penetration flow paths may be connected to systems, such as RHR and Reactor Water Cleanup, that have tens or hundreds of manual valves,

such as vents, drains, and sample connections. These manual valves are normally closed and are controlled under the licensee's administrative processes, such as system operating procedures.

NRC Inspection Manual Part 9900 guidance on "Locked or Otherwise Secured Components" (STS_SURV.TG) states that a locked manual valve should be physically restrained from moving, but that a sealed manual valve which will provide evidence of unauthorized manipulation is acceptable (e.g., cable secured by means of a lead seal). It specifically states that a tag or similar device does not meet the intent.

The current definition requirement that closed manual or automatic valves must be locked, sealed, or otherwise secured cannot be practically implemented in a large population of valves and can lead to unnecessary radiation dose to meet the definition, as well as foreign material control concerns in the drywell.

The definition is revised to require that excluded penetration flow paths be isolated by manual or automatic valves that are closed and administratively controlled. Such administrative controls are the accepted method to control system configuration during the dynamic conditions of a refueling outage and contain provisions that satisfy the intent of preventing a single human error from initiating a draining event.

4. Isolation Functions Actions

The BWR/4 STS and BWR/6 STS 3.3.5.2 functions:

RHR System Isolation

a. Reactor Vessel Water Level - Low, Level 3

Reactor Water Cleanup (RWCU) System Isolation

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

serve to isolate the subject systems from the RPV on low water level to terminate a draining event before the water level reaches the Top of Active Fuel (TAF). Both functions require two channels in one trip system to be operable and are required to be operable when automatic isolation of the associated penetration flow path(s) is credited as an exclusion when calculating Drain Time. If a channel is inoperable, Action A requires immediately declaring the associated penetration flow path(s) incapable of automatic isolation and initiation of action to recalculate Drain Time.

Both of these functions actuate on a two-out-of-two logic. If a channel is placed in the tripped condition, the remaining operable channel will isolate the associated penetration flow path if needed. If both channels are in trip, the penetration flow path will be automatically isolated, fulfilling the safety function. Therefore, a new Required Action A.1 is added to TS 3.3.5.2 that requires initiating action immediately to place the channel in trip. This Required Action is joined by a logical "OR" as an alternative to the existing Required Actions.

The Completion Time of "Immediately" was chosen for Required Action A.1 to be consistent with the existing Required Actions. Joining unequal Completion Times with an "OR" logical connector is discouraged as it has the undesired effect of permitting the use of the longer Completion Time for any of the joined Required Actions.

5. Operating ECCS Subsystem Satisfies SR 3.5.2.6

SR 3.5.2.6 requires operating the required ECCS subsystem for at least 10 minutes through the recirculation line. As described in the SR Bases, the purpose of the SR is to demonstrate that the subsystem is available to mitigate an event. One of the low pressure ECCS subsystems that can satisfy the LCO requirement is Residual Heat Removal (RHR) Shutdown Cooling. One RHR Shutdown Cooling subsystem is typically in operation when in Mode 4 or Mode 5, which demonstrates that it is capable of injecting water into the RPV to mitigate an event.

The proposed change removes the phrase "through the recirculation line" from the SR and adds two notes. The first Note states that operation may be through the "test return line." The term "test return line" is more generic than "recirculation line," but otherwise provides the same intent. The second note states that credit may be taken for normal system operation to satisfy the SR. This Note permits crediting the normal operation of an RHR Shutdown Cooling subsystem to satisfy the SR. The revised SR continues to ensure the ECCS injection/spray subsystem can inject water into the RPV if needed for defense-in-depth, while eliminating unnecessary testing.

6. Provide Optional Required Actions for Sites with Shared Secondary Containment

TS 3.5.2, Condition D, which applies when Drain Time is < 8 hours, requires immediate action to isolate each [secondary] containment penetration flow path or verification that it can be manually isolated from the control room. At some BWR sites, the secondary containment is shared between units and the secondary containment and the secondary containment isolation valves (SCIVs) may be required to be operable per TS 3.6.4.1 and TS 3.6.4.2 for the operating unit while TS 3.5.2 is applicable for a shutdown unit. To accommodate this design, a bracketed (i.e., optional) change is made to Required Action D.3 which states, "Initiate action to isolate each [secondary] containment penetration flow path or verify it can be *[automatically or]* manually isolated from the control room." This acknowledges that at sites with a shared secondary containment, the SCIVs may close automatically and eliminates a requirement to verify that the SCIVs can only be manually isolated from the control room. Automatic closure of the SCIVs provides protection equivalent to manual isolation of the SCIVs from the control room.

The TS Bases are revised to include a Reviewer's Note and optional Bases stating that Required Actions C.1, C.2, and C.3, and Required Actions D.2, D.3, and D.4 are satisfied by secondary containment, SCIVs, and Standby Gas Treatment systems that are operable per TS 3.6.4.1, TS 3.6.4.2, and TS 3.6.4.3.

7. Provide Option for Additional Isolation Functions

BWR/4 TS 3.3.5.2, "RPV Water Inventory Control Instrumentation, Table 3.3.5.1, lists two isolation functions, RHR System Isolation, and Reactor Water Cleanup (RWCU) System Isolation. However, some older BWR plant designs contain additional isolation instrumentation

functions based on low RPV water level. Licensees should be able to credit those functions for automatic isolation when calculating Drain Time. A Reviewer's Note is added to the BWR/4 TS 3.3.5.2, "Applicable Safety Analysis, LCO, and Applicability," Bases stating that additional plant- or design- specific isolation instrumentation functions initiated by low RPV water level may be included in the TS 3.3.5.2 required Functions and credited when calculating DRAIN TIME. A variation description is added to the model application for licensees to describe any additional isolation functions added to the TS. Existing Action B, SR 3.3.5.2.1 and SR 3.3.5.2.2, which are applicable to the existing isolation functions, are also applicable to these additional isolation functions.

8. Correct Automatic Start Requirement for Diesel Generators

The ECCS injection/spray subsystem required to be operable by LCO 3.5.2 must be capable of being manually started as defense-in-depth against an unexpected draining event. The changes in TSTF-542 did not assume automatic actuation of the ECCS subsystem. TS 3.5.2, Required Action D.1 requires an additional method of water injection and that the required ECCS injection/spray subsystem or additional method of water injection shall be capable of operating without offsite electrical power. However, LCO 3.5.2 does not assume that the onsite electrical power source will start automatically on an ECCS or loss of power signal.

LCO 3.8.2, "AC Sources - Shutdown," requires one offsite circuit and one diesel generator to be operable in Modes 4 and 5. SR 3.8.2.1 lists the TS 3.8.1, "AC Sources - Operating," SRs that are applicable in Modes 4 and 5. In an oversight in TSTF-542, the TS 3.8.1 SRs that test automatic start and loading of a diesel generator on an ECCS or loss of offsite power signal were not excluded from SR 3.8.2.1. The following additional TS 3.8.1 SRs are proposed to not be applicable in Modes 4 and 5:

- SR 3.8.1.11,
- SR 3.8.1.12,
- SR 3.8.1.13, and
- SR 3.8.1.19

All of these SRs test the ability of the diesel generator to start on a loss of offsite power signal or ECCS initiation signal. These SRs are added to the list of TS 3.8.1 SRs that are not required to be met under SR 3.8.2.1. The revised SR states:

> For AC sources required to be OPERABLE the SRs of Specification 3.8.1, except SR 3.8.1.8, SR 3.8.1.11, SR 3.8.1.12, SR 3.8.1.13, SR 3.8.1.17, SR 3.8.1.19, and SR 3.8.1.20, are applicable.

Existing SR 3.8.2.1, Note 2, states that SR 3.8.1.12 and 3.8.1.19 are not required to be met when the associated ECCS subsystem(s) are not required to be operable. This Note is deleted since SR 3.8.1.12 and SR 3.8.1.19 are no longer required to be met under the revised SR.

Existing SR 3.8.2.1, Note 1, lists TS 3.8.1 SRs that are not required to be performed. The Note is revised to reflect the SRs that are no longer required to be met. The Note label is made singular and the number "1." is removed from the retained Note.

9. Delete BWR/6 STS Required Action J.2

TSTF-542 revised the BWR/4 and BWR/6 STS 3.3.6.1, "Primary Containment Isolation Instrumentation," to relocate all functions applicable in Modes 4 and 5 to TS 3.3.5.2, "Reactor Pressure Vessel Water Inventory Control Instrumentation." The BWR/4 STS 3.3.6.1, Required Action J.2, "Initiate action to isolate the Residual Heat Removal (RHR) Shutdown Cooling System," was deleted as it is only applicable in Modes 4 and 5. However, the BWR/6 STS 3.3.6.1, Required Action J.2, was not deleted in TSTF-542, Revision 2.

The BWR/6 STS 3.3.6.1, Required Action J.2, is deleted. This action is no longer applicable after adoption of TSTF-542. This was an accidental omission in the TSTF-542 BWR/6 STS markups.

In a related change, the BWR/4 STS 3.6.1.3, Condition J, Bases are revised. The Bases title is changed from "J.1 and J.2" to "J.1" and the discussion of Required Action J.2 is deleted. This was an omission in the TSTF-542 BWR/4 STS change that deleted Required Action J.2.

10. Correct the TS 3.6.1.3 Applicability and Related Changes

The Applicability of TS 3.6.1.3, "Primary Containment Isolation Valves (PCIVs)," is Modes 1, 2, and 3, and when the associated instrumentation is required to be operable per LCO 3.3.6.1, "Primary Containment Isolation Instrumentation." TSTF-542 revised the BWR/4 Table 3.3.6.1-1, Function 6.b, "Shutdown Cooling Isolation, Reactor Vessel Water Level - Low, Level 3," to relocate the Modes 4 and 5 applicability to TS 3.3.5.2. As a result, all instruments required by LCO 3.3.6.1 are applicable in Modes 1, 2, or 3. This effectively makes the TS 3.6.1.3 Applicability Modes 1, 2, and 3 for BWR/4 plants. For BWR/6 plants, certain Table 3.3.6.1 functions may be applicable in Modes 4 and 5, so the Applicability was not changed.

The Applicability of the BWR/4 TS 3.6.1.3 is revised to remove the phrase, "When associated instrumentation is required to be OPERABLE per LCO 3.3.6.1, "Primary Containment Isolation Instrumentation," as the phrase no longer has any effect and the TS 3.6.1.3 is only applicable in Modes 1, 2, and 3. Condition H, which is only applicable in Modes 4 and 5, and Condition G, which is only applicable during movement of irradiated fuel in the secondary containment, are deleted. BWR/4 STS SR 3.6.1.3.1, SR 3.6.1.3.2, SR 3.6.1.3.7, SR 3.6.1.3.12, SR 3.6.1.3.13, SR 3.6.1.3.14, and SR 3.6.1.3.15 contain Notes stating that the SR is only required to be met in Modes 1, 2, and 3. These Notes are no longer needed and are deleted. This change does not affect the application of the TS following adoption of TSTF-542.

11. Editorial Corrections to the TS

TS 3.3.5,2, "RPV Water Inventory Control Instrumentation," Required Action B.2, states, "Calculate DRAIN TIME," with a Completion Time of "Immediately."

TSTF-GG-05-01, "Writer's Guide for Plant-Specific Improved Technical Specifications," (the Writer's Guide) Section 4.1.6.j, states:

> It is desired to accomplish an action without delay (given the potential surrounding circumstances), but the time necessary to complete the action may vary widely based on a number of unknowns, it may be inappropriate to require the completion of the action within a specific time. In this case the acceptable presentation is for the Required Action to state "Initiate action to...," and state its Completion Time as "Immediately."

In order to be consistent with the Writer's Guide and similar Required Actions in the TS, Required Action B.2 (now Required Action A.2.2) is revised to state, "Initiate action to calculate DRAIN TIME." This corrects an error in TSTF-542.

The Writer's Guide, Section 3.2.2a, states,

> Upon the first reference in each Specification or Bases to a phrase for which an abbreviation is desired to be used (except as allowed in Writer's Guide Section 3.2.2.b below), use the full phrase followed by the acronym or initialism set off by parentheses. Use the abbreviation alone on all subsequent references in that Specification or Bases.

In order to be consistent with the Writer's Guide, the following changes are made:

- The BWR/6 STS 3.5.1 Actions Note is revised to define the acronym "HPCS" at its first use and the definition is removed from Condition B. This error existed prior to TSTF-542.
- The BWR/4 and BWR/6 STS 3.5.2, the acronym "SGT" is introduced for "Standby Gas Treatment," and the acronym is used in Required Action D.4.
- In BWR/4 SR 3.5.2.2, the definition for the acronym "LPCI" is deleted. The acronym "LCPI" is defined in the LCO 3.5.2 Note.

12. Bases Corrections

The following Bases corrections are made:

- The BWR/6 STS 3.3.5.2, Function 4.a "Reactor Vessel Water Level - Low, Level 3," the "Applicable Safety Analysis, LCO, and Applicability" Bases section, is corrected to state that the function isolates the Group 3 valves instead of the Group 11 valves. The change is consistent with the previous function description in TS 3.3.6.1, Function 5.c

- The BWR/4 STS 3.3.5.2, Function 4.a, second paragraph of the "Applicable Safety Analysis, LCO, and Applicability," Bases section is corrected to state the function name as "Reactor Vessel Water Level - Low Low, Level 2" instead of "Reactor Vessel Water Level - Low, Level 2." The function name is stated correctly in the TS and in the Function description in the Bases.

- The STS 3.5.2 "Applicability" discussion is revised to add quotation marks surrounding the titles for TS Section 3.3 and Section 3.5. The title of Section 3.5 is also corrected in one location.

- The SR 3.5.3.5 Bases are revised to reference LCO 3.3.5.3 instead of LCO 3.3.5.2. TSTF-542 renumbered TS 3.3.5.2 to TS 3.3.5.3 and this Bases reference was not updated.

These changes correct Bases errors in TSTF-542 and do not change the intent or application of the associated TS.

4. REGULATORY EVALUATION

Section IV, "The Commission Policy," of the "Final Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors" (58 Federal Register 39132), dated July 22, 1993, states in part:

> The purpose of Technical Specifications is to impose those conditions or limitations upon reactor operation necessary to obviate the possibility of an abnormal situation or event giving rise to an immediate threat to the public health and safety by identifying those features that are of controlling importance to safety and establishing on them certain conditions of operation which cannot be changed without prior Commission approval.
>
> …[T]he Commission will also entertain requests to adopt portions of the improved STS, even if the licensee does not adopt all STS improvements.
>
> …The Commission encourages all licensees who submit Technical Specification related submittals based on this Policy Statement to emphasize human factors principles.
>
> …In accordance with this Policy Statement, improved STS have been developed and will be maintained for [BWR designs]. The Commission encourages licensees to use the improved STS as the basis for plant-specific Technical Specifications.
>
> …[I]t is the Commission intent that the wording and Bases of the improved STS be used … to the extent practicable.

As described in the Commission's "Final Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors," recommendations were made by NRC and industry task groups for new STS that include greater emphasis on human factors principles in order to add clarity and understanding to the text of the STS, and provide improvements to the Bases of STS, which provides the purpose for each requirement in the specification. Improved vendor-specific STS were developed and issued by the NRC in September 1992.

The regulation at Title 10 of the Code of Federal Regulations (10 CFR) Section 50.36(a)(1) requires an applicant for an operating license to include in the application proposed TS in accordance with the requirements of 10 CFR 50.36. The applicant must include in the application a "summary statement of the bases or reasons for such specifications, other than those covering administrative controls…." However, per 10 CFR 50.36(a)(1), these technical specification bases "shall not become part of the technical specifications." The Final Policy Statement provides the following description of the scope and the purpose of the Technical Specification Bases:

> Appropriate Surveillance Requirements and Actions should be retained for each LCO [limiting condition for operation] which remains or is included in the Technical Specifications. Each LCO, Action, and Surveillance Requirement should have supporting Bases. The Bases should at a minimum address the following questions and cite references to appropriate licensing documentation (e.g., FSAR, Topical Report) to support the Bases.
>
> 1. What is the justification for the Technical Specification, i.e., which Policy Statement criterion requires it to be in the Technical Specifications?
>
> 2. What are the Bases for each LCO, i.e., why was it determined to be the lowest functional capability or performance level for the system or component in question necessary for safe operation of the facility and, what are the reasons for the Applicability of the LCO?
>
> 3. What are the Bases for each Action, i.e., why should this remedial action be taken if the associated LCO cannot be met; how does this Action relate to other Actions associated with the LCO; and what justifies continued operation of the system or component at the reduced state from the state specified in the LCO for the allowed time period?
>
> 4. What are the Bases for each Safety Limit?
>
> 5. What are the Bases for each Surveillance Requirement and Surveillance Frequency; i.e., what specific functional requirement is the surveillance designed to verify? Why is this surveillance necessary at the specified frequency to assure that the system or component function is maintained, that facility operation will be within the Safety Limits, and that the LCO will be met?
>
> Note: In answering these questions the Bases for each number (e.g., Allowable Value, Response Time, Completion Time, Surveillance Frequency), state, condition, and definition (e.g., operability) should be clearly specified. As an example, a number might be based on engineering judgment, past experience, or PSA [probabilistic safety assessment] insights; but this should be clearly stated.

Additionally, 10 CFR 50.36(b) requires:

> Each license authorizing operation of a … utilization facility … will include technical specifications. The technical specifications will be derived from the analyses and evaluation included in the safety analysis report, and amendments thereto, submitted pursuant to [10 CFR] 50.34 ["Contents of applications; technical information"]. The Commission may include such additional technical specifications as the Commission finds appropriate.

The categories of items required to be in the TS are provided in 10 CFR 50.36(c). As required by 10 CFR 50.36(c)(2)(i), the TS will include LCOs, which are the lowest functional capability or performance levels of equipment required for safe operation of the facility. Per 10 CFR

50.36(c)(2)(i), when an LCO of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the TS until the condition can be met.

The regulation at 10 CFR 50.36(c)(3) requires TS to include items in the category of SRs, which are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the LCOs will be met.

Per 10 CFR 50.90, whenever a holder of a license desires to amend the license, application for an amendment must be filed with the Commission, fully describing the changes desired, and following as far as applicable, the form prescribed for original applications.

Per 10 CFR 50.92(a), in determining whether an amendment to a license will be issued to the applicant, the Commission will be guided by the considerations which govern the issuance of initial licenses to the extent applicable and appropriate.

The NRC staff's guidance for the review of TS is in Chapter 16, "Technical Specifications," of NUREG-0800, Revision 3, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants" (SRP), dated March 2010 (ADAMS Accession No. ML100351425). As described therein, as part of the regulatory standardization effort, the NRC staff has prepared STS for each of the light-water reactor nuclear designs.

In conclusion, based on the considerations discussed above, the proposed revision does not alter the current manner of operation and (1) there is reasonable assurance that the health and safety of the public will not be endangered by continued operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the approval of the proposed change will not be inimical to the common defense and security or to the health and safety of the public.

5. REFERENCES

1. Letter from Alexander Klein, NRC, to the Technical Specifications Task Force, Final Safety Evaluation of Technical Specifications Task Force Traveler TSTF-542, Revision 2, 'Reactor Pressure Vessel Water Inventory Control,' dated December 20, 2016 (ADAMS Accession No. ML16343B066).

Model Application

[DATE] 10 CFR 50.90

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

DOCKET NO.PLANT NAME
50-[xxx]
SUBJECT: Application to Revise Technical Specifications to Adopt TSTF-582, "Reactor Pressure Vessel Water Inventory Control (RPV WIC) Enhancements"

Pursuant to 10 CFR 50.90, [LICENSEE] is submitting a request for an amendment to the Technical Specifications (TS) for [PLANT NAME, UNIT NOS.].

[LICENSEE] requests adoption of TSTF 582, "Reactor Pressure Vessel Water Inventory Control (RPV WIC) Enhancements." The Technical Specifications (TS) related to RPV WIC are revised to incorporate operating experience and to correct errors and omissions in TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control."

The enclosure provides a description and assessment of the proposed changes. Attachment 1 provides the existing TS pages marked to show the proposed changes. Attachment 2 provides revised (clean) TS pages. Attachment 3 provides the existing TS Bases pages marked to show revised text associated with the proposed TS changes and is provided for information only.

[[LICENSEE] requests that the amendment be reviewed under the Consolidated Line Item Improvement Process (CLIIP).] Approval of the proposed amendment is requested by [date]. Once approved, the amendment shall be implemented within [ ] days.

There are no regulatory commitments made in this submittal.

In accordance with 10 CFR 50.91, a copy of this application, with attachments, is being provided to the designated [STATE] Official.

[In accordance with 10 CFR 50.30(b), a license amendment request must be executed in a signed original under oath or affirmation. This can be accomplished by attaching a notarized affidavit confirming the signature authority of the signatory, or by including the following statement in the cover letter: "I declare under penalty of perjury that the foregoing is true and correct. Executed on (date)." The alternative statement is pursuant to 28 USC 1746. It does not require notarization.]

If you should have any questions regarding this submittal, please contact [NAME, TELEPHONE NUMBER].

Sincerely,

[Name, Title]

Enclosure: Description and Assessment

Attachments:
1. Proposed Technical Specification Changes (Mark-Up)
2. Revised Technical Specification Pages
3. Proposed Technical Specification Bases Changes (Mark-Up) – For Information Only

[The attachments are to be provided by the licensee and are not included in the model application.]

cc: NRC Project Manager
NRC Regional Office
NRC Resident Inspector
State Contact

ENCLOSURE

DESCRIPTION AND ASSESSMENT

1.0 DESCRIPTION

[LICENSEE] requests adoption of TSTF 582, "Reactor Pressure Vessel Water Inventory Control (RPV WIC) Enhancements." The Technical Specifications (TS) related to RPV WIC are revised to incorporate operating experience and to correct errors and omissions in TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control."

2.0 ASSESSMENT

2.1 Applicability of Safety Evaluation

[LICENSEE] has reviewed the safety evaluation for TSTF-582 provided to the Technical Specifications Task Force in a letter dated [DATE]. This review included a review of the NRC staff's evaluation, as well as the information provided in TSTF-582. [As described herein,] [LICENSEE] has concluded that the justifications presented in TSTF-582 and the safety evaluation prepared by the NRC staff are applicable to [PLANT, UNIT NOS.] and justify this amendment for the incorporation of the changes to the [PLANT] TS.

[LICENSEE] verifies that the required ECCS injection/spray subsystem can be aligned and the pump started using relatively simple evolutions involving the manipulation of a small number of components. These actions can be performed in a short time (less than the minimum Drain Time of 1 hour) from the control room following plant procedures.

2.2 Optional Changes and Variations

[LICENSEE is not proposing any variations from the TS changes described in TSTF-582 or the applicable parts of the NRC staff's safety evaluation dated [DATE].] [LICENSEE is proposing the following variations from the TS changes described in TSTF-582 or the applicable parts of the NRC staff's safety evaluation: describe the variations]

[The [PLANT] TS utilize different [numbering][and][titles] than the Standard Technical Specifications on which TSTF-582 was based. Specifically, [describe differences between the plant-specific TS numbering and/or titles and the TSTF-582 numbering and titles.] These differences are administrative and do not affect the applicability of TSTF-582 to the [PLANT] TS.]

[The [PLANT] TS contain requirements that differ from the Standard Technical Specifications on which TSTF-582 was based but are encompassed in the TSTF-582 justification. [Describe differences and why TSTF-582 is still applicable.]]

[Changes in TSTF-582 were incorporated in the [PLANT] TS as variations during adoption of TSTF-542. Therefore, the TSTF-582 changes are not needed. Other changes were added as variations during adoption of TSTF-542 which have been superseded by the requirements in

TSTF-582. These plant-specific changes are replaced in lieu of the TSTF-582 generic requirements. [Describe differences.]]

[The [PLANT] design contains additional isolation instrumentation functions based on low RPV water level that should be able to be credited when calculating Drain Time. Those functions are [describe the functions.] These functions have been added to Table 3.3.5.2 as Functions [3 and 4].]

3.0 REGULATORY ANALYSIS

3.1 No Significant Hazards Consideration Analysis

[LICENSEE] requests adoption of TSTF 582, "Reactor Pressure Vessel Water Inventory Control (RPV WIC) Enhancements. The Technical Specifications (TS) related to RPV WIC are revised to incorporate operating experience and to correct errors and omissions that were incorporated into the plant TS when adopting TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control." TSTF-582 includes the following changes to the technical specifications (TS):

1. The TS are revised to eliminate the requirement for a manual ECCS initiation signal to start the required ECCS injection/spray subsystem, and to instead rely on manual valve alignment and pump start.
2. The Drain Time definition is revised to move the examples of common mode failure mechanisms to the Bases and seismic events are no longer considered a common mode failure mechanism.
3. The Drain Time definition exception from considering the Drain Time for penetration flow paths isolated with manual or automatic valves that are that are "locked, sealed, or otherwise secured" is revised to apply the exception for manual or automatic valves that are "closed and administratively controlled."
4. The TS are revised to permit placing an inoperable isolation channel in trip as an alternative to declaring the associated penetration flow path incapable of automatic isolation.
5. A Surveillance Requirement (SR) that requires operating the required Emergency Core Cooling System (ECCS) injection/spray subsystem for at least 10 minutes through the recirculation line, is modified to permit crediting normal operation of the system to satisfy the SR and to permit operation through the test return line.
6. [[PLANT, Units X and X] share secondary containment structures between units. The TS Actions are revised to recognize that an operable secondary containment and operable secondary containment isolation valves satisfy the Required Actions.]
7. [The [PLANT] design contains additional isolation instrumentation functions based on low RPV water level that could be credited when calculating Drain Time. Those functions are added to the required functions in TS 3.3.5.2.]
8. TS 3.8.2, "AC Sources - Shutdown," SR 3.8.2.1, is revised to not require SRs that test the ability of the automatic diesel generator to start in Modes 4 and 5. Automatic ECCS initiation in Modes 4 and 5 was eliminated in TSTF-542. This was an oversight in TSTF-542.

9. [TS 3.3.6.1, "Primary Containment Isolation Instrumentation," Required Action J.2 is deleted. This action is no longer applicable after adoption of TSTF-542. This was an accidental omission in TSTF-542. This change is made for clarity and has no effect on the application of the TS.]
10. [The Applicability of TS 3.6.1.3, "Primary Containment Isolation Valves (PCIVs)," is revised to delete the phrase, "When associated instrumentation is required to be OPERABLE per LCO 3.3.6.1, 'Primary Containment Isolation Instrumentation'." This makes TS 3.6.1.3 only applicable Modes 1, 2, and 3. Following adoption of TSTF-542, no functions in LCO 3.3.6.1 are applicable outside of Modes 1, 2, or 3. The Actions and SRs are revised to reflect this change. These changes are made for clarity and have no effect on the application of the TS.]
11. The TS are revised to use wording and to define acronyms in a manner consistent with the remainder of the TS. These changes are made for consistency and have no effect on the application of the TS.

[LICENSEE] has evaluated if 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 incorporates operating experience and corrects errors and omissions that were incorporated into the plant TS when adopting TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control." 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, revising the existing TS controls to prevent or mitigate such an event 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 and revised TS controls are not mitigating actions assumed in any accident previously evaluated.

   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 accident previously evaluated?

   Response: No

   The proposed change incorporates operating experience and corrects errors and omissions that were incorporated into the plant TS when adopting TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control." The event of concern under the current requirements and the proposed change is an unexpected draining event. The TS have contained requirements related to an unexpected draining event during shutdown for over 40 years and this event does not appear as an analyzed event in the Updated Final Safety

Analysis Report (UFSAR) for any plant or in the NRC's Standard Review Plan (NUREG-0800). Therefore, an unexpected draining event is not a new or different kind of accident not considered in the design and licensing bases that would have been considered a design basis accident in the UFSAR had it been previously identified.

None of the equipment affected by the proposed change has a design function described in the UFSAR to mitigate an unexpected draining event in Modes 4 or 5, although the equipment may be used for that purpose. Therefore, the proposed amendment will not change the design function of the affected equipment. The proposed change will effect the operation of certain equipment, such as the manual initiation function and related instrumentation to permit initiation of the required ECCS injection/spray subsystem, and the control of valves credited for preventing a draining event. However, these changes provide adequate protection to prevent or mitigate an unexpected draining event and do not create the possibility of a new or different kind of accident due to credible new failure mechanisms, malfunctions, or accident initiators not considered 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 accident previously evaluated.

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

Response: No

The proposed change incorporates operating experience and corrects errors and omissions that were incorporated into the plant TS when adopting TSTF-542, Revision 2, "Reactor Pressure Vessel Water Inventory Control."

The safety basis for the RPV WIC requirements is to protect Safety Limit 2.1.1.3. The proposed change does not affect any specific values that define a safety margin as established in the licensing basis. The proposed change does not affect a design basis or safety limit, or any controlling value for a parameter established in the UFSAR or the license. Therefore, the proposed change does not significantly reduce the margin of safety.

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

Based on the above, [LICENSEE] 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.

3.2 Conclusion

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission’s regulations, and (3)

the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

4.0 ENVIRONMENTAL EVALUATION

The proposed change does not 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 does not change an inspection or surveillance requirement. 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.

Technical Specifications and Bases Changes

1.1 Definitions

CORE ALTERATION	CORE ALTERATION shall be the movement of any fuel, sources, or reactivity control components, within the reactor vessel with the vessel head removed and fuel in the vessel. The following exceptions are not considered to be CORE ALTERATIONS: a. Movement of source range monitors, local power range monitors, intermediate range monitors, traversing incore probes, or special movable detectors (including undervessel replacement), and b. Control rod movement, provided there are no fuel assemblies in the associated core cell. Suspension of CORE ALTERATIONS shall not preclude completion of movement of a component to a safe position.
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 5.6.3. Plant operation within these limits is addressed in individual Specifications.
DOSE EQUIVALENT I-31	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" or those listed in Table E-7 of Regulatory Guide 1.109, Rev. 1, NRC, 1977, or ICRP 30, Supplement to Part 1, page 192-212, Table titled, "Committed Dose Equivalent in Target Organs or Tissues per Intake of Unit Activity"].
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~~

1.1 Definitions

DRAIN TIME (continued)

~~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 closed and administratively controlled ~~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;

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

3.3 INSTRUMENTATION

3.3.5.2A Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation (Without Setpoint Control Program)

LCO 3.3.5.2A The RPV Water Inventory Control instrumentation for each Function in Table 3.3.5.2-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.5.2-1.

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 3.3.5.2-1 for the channel.~~	~~Immediately~~
~~A~~B. One or more channels inoperable.~~As required by Required Action A.1 and referenced in Table 3.3.5.2-1.~~	A.1 Initiate action to place channel in trip. OR ~~A~~B.2.1 Declare associated penetration flow path(s) incapable of automatic isolation. AND ~~A~~B.2.2 Initiate action to c~~C~~alculate DRAIN TIME.	Immediately Immediately Immediately
~~C. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.~~	~~C.1 Place channel in trip.~~	~~1 hour~~
~~D. As required by Required~~	~~D.1 Restore channel to~~	~~24 hours~~

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~Action A.1 and referenced in Table 3.3.5.2-1.~~	~~OPERABLE status.~~	

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 3.3.5.2-1 to determine which SRs apply for each ~~ECCS~~ Function.

SURVEILLANCE		FREQUENCY
SR 3.3.5.2.1	Perform CHANNEL CHECK.	[12 hours OR In accordance with the Surveillance Frequency Control Program]
SR 3.3.5.2.2	Perform CHANNEL FUNCTIONAL TEST.	[[92] days OR In accordance with the Surveillance Frequency Control Program]
~~SR 3.3.5.2.3~~	~~Perform LOGIC SYSTEM FUNCTIONAL TEST.~~	~~[[18] months~~ ~~OR~~ ~~In accordance with the Surveillance Frequency Control Program]~~

Table 3.3.5.2-1 (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 3.3.5.2.1 SR 3.3.5.2.2~~	~~≤ [500] psig~~
~~b. Core Spray Pump Discharge Flow - Low (Bypass)~~	~~4, 5~~	~~[1 per pump(a)]~~	~~D~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~	~~≥ [ ] gpm and ≤ [ ] gpm]~~
~~c. Manual Initiation~~	~~4, 5~~	~~[1 per subsystem (a)]~~	~~D~~	~~SR 3.3.5.2.3~~	~~NA~~
~~2. Low Pressure Coolant Injection (LPCI) System~~					
~~a. Reactor Steam Dome Pressure - Low (Injection Permissive)~~	~~4, 5~~	~~[4]~~	~~C~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~	~~≤ [500] psig~~
~~b. Low Pressure Coolant Injection Pump Discharge Flow - Low (Bypass)~~	~~4, 5~~	~~[1 per pump(a)]~~	~~D~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~	~~≥ [ ] gpm and ≤ [ ] gpm]~~
~~c. Manual Initiation~~	~~4, 5~~	~~[1](a)~~	~~D~~	~~SR 3.3.5.2.3~~	~~NA~~
~~1~~3. RHR System Isolation					
a. Reactor Vessel Water Level - Low, Level 3	(~~a~~b)	[2 in one trip system]	~~B~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~	≥ [10] inches
~~2~~4. Reactor Water Cleanup (RWCU) System Isolation					
a. Reactor Vessel Water Level - Low Low, Level 2	(~~a~~b)	[2 in one trip system]	~~B~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~	≥ [-47] inches

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

3.3 INSTRUMENTATION

3.3.5.2B Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation (With Setpoint Control Program)

LCO 3.3.5.2B The RPV Water Inventory Control instrumentation for each Function in Table 3.3.5.2-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.5.2-1.

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 3.3.5.2-1 for the channel.~~	~~Immediately~~
~~A~~B. One or more channels inoperable.~~As required by Required Action A.1 and referenced in Table 3.3.5.2-1.~~	A.1 Initiate action to place channel in trip. OR ~~A~~B.2.1 Declare associated penetration flow path(s) incapable of automatic isolation. AND ~~A~~B.2.2 Initiate action to c~~C~~alculate DRAIN TIME.	Immediately Immediately Immediately
~~C. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.~~	~~C.1 Place channel in trip.~~	~~1 hour~~
~~D. As required by Required~~	~~D.1 Restore channel to~~	~~24 hours~~

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~Action A.1 and referenced in Table 3.3.5.2-1.~~	~~OPERABLE status.~~	

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 3.3.5.2-1 to determine which SRs apply for each ~~ECCS~~ Function.

SURVEILLANCE		FREQUENCY
SR 3.3.5.2.1	Perform CHANNEL CHECK.	[12 hours OR In accordance with the Surveillance Frequency Control Program]
SR 3.3.5.2.2	Perform CHANNEL FUNCTIONAL TEST.	[[92] days OR In accordance with the Surveillance Frequency Control Program]
~~SR 3.3.5.2.3~~	~~Perform LOGIC SYSTEM FUNCTIONAL TEST.~~	~~[[18] months~~ ~~OR~~ ~~In accordance with the Surveillance Frequency Control Program]~~

Table 3.3.5.2-1 (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~~
~~1. Core Spray System~~				
~~a. Reactor Steam Dome Pressure - Low (Injection Permissive)~~	~~4, 5~~	~~[4]~~	~~C~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~
~~b. Core Spray Pump Discharge Flow - Low (Bypass)~~	~~4, 5~~	~~[1 per pump(a)]~~	~~D~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~
~~c. Manual Initiation~~	~~4, 5~~	~~[1 per subsystem s(a)]~~	~~D~~	~~SR 3.3.5.2.3~~
~~2. Low Pressure Coolant Injection (LPCI) System~~				
~~a. Reactor Steam Dome Pressure - Low (Injection Permissive)~~	~~4, 5~~	~~[4]~~	~~C~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~
~~b. Low Pressure Coolant Injection Pump Discharge Flow - Low (Bypass)~~	~~4, 5~~	~~[1 per pump(a)]~~	~~D~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~
~~c. Manual Initiation~~	~~4, 5~~	~~[1](a)~~	~~D~~	~~SR 3.3.5.2.3~~
~~1~~3. RHR System Isolation				
a. Reactor Vessel Water Level - Low, Level 3	(~~a~~b)	[2 in one trip system]	~~B~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~
~~2~~4. Reactor Water Cleanup (RWCU) System Isolation				
a. Reactor Vessel Water Level - Low Low, Level 2	(~~a~~b)	[2 in one trip system]	~~B~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~

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

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

LCO 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

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. DRAIN TIME < 36 hours and ≥ 8 hours.	C.1	Verify [secondary] containment boundary is capable of being established in less than the DRAIN TIME.	4 hours
	AND		
	C.2	Verify each [secondary] containment penetration flow path is capable of being isolated in less than the DRAIN TIME.	4 hours
	AND		
	C.3	Verify one standby gas treatment (SGT) subsystem is capable of being placed in operation in less than the DRAIN TIME.	4 hours
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
	AND		
	D.2	Initiate action to establish [secondary] containment boundary.	Immediately
	AND		

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
	D.3 Initiate action to isolate each [secondary] containment penetration flow path or verify it can be [automatically or] manually isolated from the control room. AND D.4 Initiate action to verify one SGT ~~standby gas treatment~~ subsystem is capable of being placed in operation.	Immediately Immediately
E. Required Action and associated Completion Time of Condition C or D not met. OR 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.	[12 hours OR 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 ≥ [12 ft 2 inches].	[12 hours OR In accordance with the Surveillance Frequency Control Program]
SR 3.5.2.3	Verify, for a required Core Spray (CS) subsystem, the: a. Suppression pool water level is ≥ [12 ft 2 inches] or b. Condensate storage tank water level is ≥ [12 ft].	[12 hours OR In accordance with the Surveillance Frequency Control Program]

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.5.2.4	Verify, for the required ECCS injection/spray subsystem, the piping is filled with water from the pump discharge valve to the injection valve.	[31 days OR In accordance with the Surveillance Frequency Control Program]
~~SR 3.5.2.5~~	~~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.~~	~~[31 days~~ ~~OR~~ ~~In accordance with the Surveillance Frequency Control Program]~~

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.5.2.~~5~~6	----------NOTES---------- 1. Operation may be through the test return line. 2. Credit may be taken for normal system operation to satisfy this SR. --- Operate the required ECCS injection/spray subsystem ~~through the recirculation line~~ for ≥ 10 minutes.	[92 days OR In accordance with the Surveillance Frequency Control Program]
SR 3.5.2.~~6~~7	Verify each valve credited for automatically isolating a penetration flow path actuates to the isolation position on an actual or simulated isolation signal.	[[18] months OR In accordance with the Surveillance Frequency Control Program]
~~SR 3.5.2.8~~	~~NOTE~~ ~~Vessel injection/spray may be excluded.~~ ~~Verify the required ECCS injection/spray subsystem actuates on a manual initiation signal.~~	~~[[18] months~~ ~~OR~~ ~~In accordance with the Surveillance Frequency Control Program]~~

3.6 CONTAINMENT SYSTEMS

3.6.1.3 Primary Containment Isolation Valves (PCIVs)

LCO 3.6.1.3 Each PCIV, except reactor building-to-suppression chamber vacuum breakers, shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3~~.~~ ~~When associated instrumentation is required to be OPERABLE per LCO 3.3.6.1, "Primary Containment Isolation Instrumentation."~~

ACTIONS

----------NOTES----------

1. Penetration flow paths [except for purge valve 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 PCIVs.

4. Enter applicable Conditions and Required Actions of LCO 3.6.1.1, "Primary Containment," when PCIV leakage results in exceeding overall containment leakage rate acceptance criteria in MODES 1, 2, and 3.

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
	E.2 ----------NOTES---------- 1. Isolation devices in high radiation areas may be verified by use of administrative means. 2. Isolation devices that are locked, sealed, or otherwise secured may be verified by use of administrative means. ---------- Verify the affected penetration flow path is isolated. <u>AND</u>	Once per 31 days for isolation devices outside containment <u>AND</u> Prior to entering MODE 2 or 3 from MODE 4 if not performed within the previous 92 days for isolation devices inside containment
	E.3 Perform SR 3.6.1.3.7 for the resilient seal purge valves closed to comply with Required Action E.1.	Once per [92] days]
F. Required Action and associated Completion Time of Condition A, B, C, D, or E not met ~~in MODE 1, 2, or 3~~.	F.1 Be in MODE 3. <u>AND</u> F.2 Be in MODE 4.	12 hours 36 hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~G. [Required Action and associated Completion Time of Condition A, B, C, D, or E not met for PCIV(s) required to be OPERABLE during movement of [recently] irradiated fuel assemblies in [secondary] containment.~~	~~G.1 NOTE LCO 3.0.3 is not applicable.~~ ~~Suspend movement of [recently] irradiated fuel assemblies in [secondary] containment.~~	~~Immediately]~~
~~H. [Required Action and associated Completion Time of Condition A, B, C, D, or E not met for PCIV(s) required to be OPERABLE during MODE 4 or 5 .~~	~~H.1 Initiate action to restore valve(s) to OPERABLE status.~~	~~Immediately]~~

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.6.1.3.1 ~~----------NOTE----------~~ ~~[[Only required to be met in MODES 1, 2, and 3.]~~ ~~----------~~ Verify each [18] inch primary containment purge valve is sealed closed except for one purge valve in a penetration flow path while in Condition E of this LCO.	[31 days OR In accordance with the Surveillance Frequency Control Program]]
SR 3.6.1.3.2 ----------NOTE~~S~~---------- ~~[1. [Only required to be met in MODES 1, 2, and 3.]~~ ~~2.~~ Not required to be met when the [18] inch primary containment purge valves are open for inerting, de-inerting, pressure control, ALARA or air quality considerations for personnel entry, or Surveillances that require the valves to be open. ---------- Verify each [18] inch primary containment purge valve is closed.	[31 days OR In accordance with the Surveillance Frequency Control Program]]

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.6.1.3.7	~~NOTE~~ ~~[Only required to be met in MODES 1, 2 and 3.]~~ Perform leakage rate testing for each primary containment purge valve with resilient seals.	[184 days OR In accordance with the Surveillance Frequency Control Program] AND Once within 92 days after opening the valve
SR 3.6.1.3.8	Verify the isolation time of each MSIV is ≥ [2] seconds and ≤ [8] seconds.	[In accordance with the Inservice Testing Program OR [[18] months] OR In accordance with the Surveillance Frequency Control Program]

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.6.1.3.12	~~NOTE~~ ~~[[Only required to be met in MODES 1, 2, and 3.]~~	
	Verify the combined leakage rate for all secondary containment bypass leakage paths is ≤ [ ] L_a when pressurized to ≥ [ ] psig.	In accordance with the Primary Containment Leakage Rate Testing Program]
SR 3.6.1.3.13	~~NOTE~~ ~~[Only required to be met in MODES 1, 2, and 3.]~~	[In accordance with the Primary Containment Leakage Rate Testing Program]
	Verify leakage rate through each MSIV is ≤ [11.5] scfh when tested at ≥ [28.8] psig.	
SR 3.6.1.3.14	~~NOTE~~ ~~[Only required to be met in MODES 1, 2, and 3.]~~	
	Verify combined leakage rate through hydrostatically tested lines that penetrate the primary containment is within limits.	In accordance with the Primary Containment Leakage Rate Testing Program
SR 3.6.1.3.15	~~NOTE~~ ~~[[Only required to be met in MODES 1, 2, and 3.]~~	
	Verify each [ ] inch primary containment purge valve is blocked to restrict the valve from opening > [50]%.	[[18] months OR In accordance with the Surveillance Frequency Control Program]]

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
	B.3 Initiate action to restore required DG to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.2.1	----------NOTES---------- 1. The following SRs are not required to be performed: SR 3.8.1.3, SR 3.8.1.9, through SR 3.8.1.101, SR 3.8.1.143 through SR 3.8.16, and [SR 3.8.1.18], and SR 3.8.1.19. 2. SR 3.8.1.12 and SR 3.8.1.19 are not required to be met when associated ECCS subsystem(s) are not required to be OPERABLE per LCO 3.5.2, "ECCS-Shutdown." ---------- For AC sources required to be OPERABLE the SRs of Specification 3.8.1, except SR 3.8.1.8, SR 3.8.1.11, SR 3.8.1.12, SR 3.8.1.13, SR 3.8.1.17, SR 3.8.1.19, and SR 3.8.1.20, are applicable.	In accordance with applicable SRs

B 3.3 INSTRUMENTATION

B 3.3.5.2A Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation (Without Setpoint Control Program)

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.

BASES

BACKGROUND (continued)

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.~~

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~~ considered in MODES 4 and 5 due to the reduced RCS pressure, reduced piping stresses, and ductile piping systems. Instead, an event is ~~postulated~~ considered in which an ~~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.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

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.~~

~~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. Core Spray and Low Pressure Coolant Injection Pump Discharge Flow - Low (Bypass)~~

~~The minimum flow instruments are provided to protect the associated low pressure ECCS pump from overheating when the pump is operating and the associated injection valve is not fully open. The minimum flow line valve is opened when low flow is sensed, and the valve is automatically closed when the flow rate is adequate to protect the pump.~~

~~One flow transmitter per ECCS pump is used to detect the associated subsystems' flow rates. The logic is arranged such that each transmitter causes its associated minimum flow valve to open. The logic will close the minimum flow valve once the closure setpoint is exceeded. The LPCI minimum flow valves are time delayed such that the valves will not open for 10 seconds after the switches detect low flow. The time delay is~~

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

~~provided to limit reactor vessel inventory loss during the startup of the Residual Heat Removal (RHR) shutdown cooling mode.~~

~~The Pump Discharge Flow - Low Allowable Values are high enough to ensure that the pump flow rate is sufficient to protect the pump, yet low enough to ensure that the closure of the minimum flow valve is initiated to allow full flow into the core.~~

~~One channel of the Pump Discharge Flow - Low Function is required to be OPERABLE in MODES 4 and 5 when the associated Core Spray or LPCI pump is required to be OPERABLE by LCO 3.5.2 to ensure the pumps are capable of injecting into the Reactor Pressure Vessel when manually initiated.~~

~~1.c, 2.c. Manual Initiation~~

~~The Manual Initiation push button channels introduce signals into the appropriate ECCS logic to provide manual initiation capability. There is one push button for each of the CS and LPCI subsystems (i.e., two for CS and two for LPCI).~~

~~There is no Allowable Value for this Function since the channels are mechanically actuated based solely on the position of the push buttons. A channel of the Manual Initiation Function (one channel per subsystem) is required to be OPERABLE in MODES 4 and 5 when the associated ECCS subsystems are required to be OPERABLE per LCO 3.5.2.~~

---------- REVIEWER'S NOTE ----------
Additional plant- or design- specific isolation instrumentation functions initiated by low RPV water level may be included in the required Functions and credited when calculating DRAIN TIME.

RHR System Isolation

~~13~~.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 (all 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.

This Function isolates the Group 11 valves.

Reactor Water Cleanup (RWCU) System Isolation

24.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 Low, Level 2 Function are available, only two channels (all 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.

This Function isolates the Group 5 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 3.3.5.2-1. 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.~~

~~A~~B.1, A.2.1, and ~~A~~B.2.2

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 ~~A~~B.1 directs ~~an~~ immediate action to place the channel in trip. With the inoperable channel in the tripped condition, the remaining channel will isolate the penetration flow path on low water level. If both channels are inoperable and placed in trip, the penetration flow path will be isolated. Alternatively, Required Action A.2.1 requires ~~immediate declaration that~~ the associated penetration flow path(s) to be immediately declared ~~are~~ incapable of automatic isolation. Required Action ~~A~~B.2.2 directs initiating action to calculat~~eion of~~ DRAIN TIME. The calculation cannot credit automatic isolation of the affected penetration flow paths.

BASES

ACTIONS (continued)

~~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.~~

~~D.1~~

~~If a Core Spray or Low Pressure Coolant Injection Pump Discharge Flow - Low bypass function is inoperable, 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.~~

BASES

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 3.3.5.2-1.

SR 3.3.5.2.1

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 Frequency of 12 hours is based upon operating experience that demonstrates channel failure is rare.

OR

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

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]

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.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.5.2.2

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 Frequency of 92 days is based upon operating experience that demonstrates channel failure is rare.

OR

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

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]

~~SR 3.3.5.2.3~~

~~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 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 18 month Frequency.~~

~~OR~~

BASES

SURVEILLANCE REQUIREMENTS (continued)

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

~~---------- REVIEWER'S NOTE ----------~~
~~Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.~~
~~----------]~~

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.

B 3.3 INSTRUMENTATION

B 3.3.5.2B Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation (With Setpoint Control Program)

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 are identified and maintained in the Setpoint Control Program (SCP) controlled by 10 CFR 50.59.

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~~

BASES

BACKGROUND (continued)

~~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.~~

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~~ considered in MODES 4 and 5 due to the reduced RCS pressure, reduced piping stresses, and ductile piping systems. Instead, an event is ~~postulated~~ considered in which an ~~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.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

~~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.~~

~~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. Core Spray and Low Pressure Coolant Injection Pump Discharge Flow - Low (Bypass)~~

~~The minimum flow instruments are provided to protect the associated low pressure ECCS pump from overheating when the pump is operating and the associated injection valve is not fully open. The minimum flow line valve is opened when low flow is sensed, and the valve is automatically closed when the flow rate is adequate to protect the pump.~~

~~One flow transmitter per ECCS pump is used to detect the associated subsystems' flow rates. The logic is arranged such that each transmitter causes its associated minimum flow valve to open. The logic will close the minimum flow valve once the closure setpoint is exceeded. The LPCI minimum flow valves are time delayed such that the valves will not open for 10 seconds after the switches detect low flow. The time delay is provided to limit reactor vessel inventory loss during the startup of the Residual Heat Removal (RHR) shutdown cooling mode.~~

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

~~One channel of the Pump Discharge Flow - Low Function is required to be OPERABLE in MODES 4 and 5 when the associated Core Spray or LPCI pump is required to be OPERABLE by LCO 3.5.2 to ensure the pumps are capable of injecting into the Reactor Pressure Vessel when manually initiated.~~

~~1.c, 2.c. Manual Initiation~~

~~The Manual Initiation push button channels introduce signals into the appropriate ECCS logic to provide manual initiation capability. There is one push button for each of the CS and LPCI subsystems (i.e., two for CS and two for LPCI).~~

~~A channel of the Manual Initiation Function (one channel per subsystem) is required to be OPERABLE in MODES 4 and 5 when the associated ECCS subsystems are required to be OPERABLE per LCO 3.5.2.~~

---------- REVIEWER'S NOTE ----------
Additional plant- or design- specific isolation instrumentation functions initiated by low RPV water level may be included in the required Functions and credited when calculating DRAIN TIME.

RHR System Isolation

~~13~~.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 automatically isolated by RPV water level isolation instrumentation prior to the RPV water level being equal to the TAF. 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 two channels per trip system 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 (all 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 Function is only required to be OPERABLE when automatic isolation of the associated penetration flow path is credited in calculating DRAIN TIME.

This Function isolates the Group 11 valves.

Reactor Water Cleanup (RWCU) System Isolation

24.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 automatically isolated by RPV water level isolation instrumentation prior to the RPV water level being equal to the TAF. 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 is initiated from two channels per trip system 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 Low, Level 2 Function are available, only two channels (all in the same trip system) are required to be OPERABLE.

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.

This Function isolates the Group 5 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 3.3.5.2-1. 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.~~

~~A~~B.1, A.2.1, and ~~A~~B.2.2

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 ~~A~~B.1 directs ~~an~~ immediate action to place the channel in trip. With the inoperable channel in the tripped condition, the remaining channel will isolate the penetration flow path on low water level. If both channels are inoperable and placed in trip, the penetration flow path will be isolated. Alternatively, ~~declaration that~~ Required Action A.2.1 requires the associated penetration flow path(s) to be immediately declared ~~are~~ incapable of automatic isolation. Required Action ~~A~~B.2.2 directs initiating action to calculat~~eion of~~ DRAIN TIME. The calculation cannot credit automatic isolation of the affected penetration flow paths.

BASES

ACTIONS (continued)

~~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.~~

~~D.1~~

~~If a Core Spray or Low Pressure Coolant Injection Pump Discharge Flow - Low bypass function is inoperable, 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.~~

BASES

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 3.3.5.2-1.

SR 3.3.5.2.1

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 Frequency of 12 hours is based upon operating experience that demonstrates channel failure is rare.

OR

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

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]

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.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.5.2.2

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 Frequency of 92 days is based upon operating experience that demonstrates channel failure is rare.

OR

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

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]

~~SR 3.3.5.2.3~~

~~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 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 18 month Frequency.~~

~~OR~~

BASES

SURVEILLANCE REQUIREMENTS (continued)

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

~~---------- REVIEWER'S NOTE ----------~~
~~Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.~~
~~----------]~~

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

ACTIONS (continued)

I.1 and I.2

If the channel is not restored to OPERABLE status or placed in trip within the allowed Completion Time, the associated SLC subsystem(s) is declared inoperable or the RWCU System is isolated. Since this Function is required to ensure that the SLC System performs its intended function, sufficient remedial measures are provided by declaring the associated SLC subsystems inoperable or isolating the RWCU System.

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

----------REVIEWER'S NOTE----------
Certain Frequencies are based on approved topical reports. In order for a licensee to use these Frequencies, the licensee must justify the Frequencies as required by the staff SER for the topical report.

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 for up to 6 hours provided the associated Function maintains trip capability. Upon completion of the Surveillance, or expiration of the 6 hour 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

BASES

ACTIONS (continued)

I.1 and I.2

If the channel is not restored to OPERABLE status or placed in trip within the allowed Completion Time, the associated SLC subsystem(s) is declared inoperable or the RWCU System is isolated. Since this Function is required to ensure that the SLC System performs its intended function, sufficient remedial measures are provided by declaring the associated SLC subsystems inoperable or isolating the RWCU System.

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

----------REVIEWER'S NOTE----------
Certain Frequencies are based on approved topical reports. In order for a licensee to use these Frequencies, the licensee must justify the Frequencies as required by the staff SER for the topical report.

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 for up to 6 hours provided the associated Function maintains trip capability. Upon completion of the Surveillance, or expiration of the 6 hour 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

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

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.

APPLICABLE SAFETY ANALYSES

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.

A double-ended guillotine break of the Reactor Coolant System (RCS) is not considered ~~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 an ~~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 (an event that creates a drain path through multiple vessel penetrations located below top of active fuel, such as ~~e.g., seismic event,~~ loss of normal power, or a 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.

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).

LCO

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.

BASES

LCO (continued)

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 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 aligned and started from the control room to provide defense-in- depth should an unexpected draining event occur. OPERABILITY of the ECCS injection/spray subsystem includes any necessary valves, instrumentation, or controls needed to manually align and start the subsystem from the control room. 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.

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, ~~RCIC, and~~ RPV Water Inventory Control, and RCIC System." 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.

---------- REVIEWER'S NOTE ----------
The bracketed information applies to multiple unit sites with a shared secondary containment and recognizes that an OPERABLE secondary containment, secondary containment penetrations, and SGT subsystems satisfy Required Actions C.1, C.2, and C.3.)

[Required Actions C.1, C.2, and C.3 are considered to be met when [secondary] containment, [secondary] containment penetrations, and the Standby Gas Treatment System are OPERABLE in accordance with LCO 3.6.4.1, LCO 3.6.4.2, and LCO 3.6.4.3.]

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

---------- REVIEWER'S NOTE ----------
The bracketed information applies to multiple unit sites with a shared secondary containment and recognizes that an OPERABLE secondary containment, secondary containment penetrations, and SGT subsystems satisfy Required Actions 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 [automatically or] 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.

[Required Actions D.2, D.3, and D.4 are considered to be met when [secondary] containment, [secondary] containment penetrations, and the Standby Gas Treatment System are OPERABLE in accordance with LCO 3.6.4.1, LCO 3.6.4.2, and LCO 3.6.4.3.]

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 REQUIREMENTS

SR 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 closed and administratively controlled~~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~~.

BASES

SURVEILLANCE REQUIREMENTS (continued)

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 a single penetration flow path~~s~~, or multiple penetration flow paths susceptible to a common mode failure, from the determination of DRAIN TIME ~~must~~ should consider the ~~potential~~ effects of temporary alterations in support of maintenance ~~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 reasonable controls are implemented to prevent ~~If failure of~~ such ~~items~~ temporary alternations from ~~could result and would~~ causinge ~~e~~ a draining event from a closed system, or between the RPV and the isolation device, the effect of the temporary alterations on DRAIN TIME need not be considered. Reasonable controls include, but are not limited to, ~~the penetration flow path may not be excluded from the DRAIN TIME calculation.~~ controls consistent with the guidance in NUMARC 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Revision 4, NUMARC 91-06, "Guidelines for Industry Actions to Assess Shutdown Management," or commitments to NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants."

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 Frequency of 12 hours is sufficient in view of indications of RPV water level available to the operator .

OR

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

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]

SR 3.5.2.2 and SR 3.5.2.3

The minimum water level of [12 ft 2 inches] 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

BASES

SURVEILLANCE REQUIREMENTS (continued)

required ECCS injection/spray subsystem is inoperable unless aligned to an OPERABLE CST.

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 ≥ [12 ft 2 inches] or that a required CS subsystem is aligned to take suction from the CST and the CST contains ≥ [150,000] gallons of water, equivalent to [12] ft, ensures that the CS subsystem can supply at least [50,000] gallons of makeup water to the RPV. The CS suction is uncovered at the [100,000] gallon level.

[The 12 hour Frequency of these SRs was developed considering operating experience related to suppression pool and CST water level variations . Furthermore, the 12 hour Frequency is considered adequate in view of other indications available in the control room, including alarms, to alert the operator to an abnormal suppression pool or CST water level condition.

OR

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

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]

SR 3.5.2.4

The flow path piping has the potential to develop voids and pockets of entrained air. Maintaining the pump discharge lines of the required ECCS injection/spray subsystems full of water ensures that the ECCS subsystem will perform properly. This may also prevent a water hammer following an ECCS actuation~~initiation signal~~. One acceptable method of ensuring that the lines are full is to vent at the high points. [The 31 day Frequency is based on the gradual nature of void buildup in the ECCS piping, the procedural controls governing system operation, and operating experience.

OR

BASES

SURVEILLANCE REQUIREMENTS (continued)

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

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]

~~SR 3.5.2.5~~

~~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 31 day Frequency is appropriate because the valves are operated under procedural control and the probability of their being mispositioned during this time period is low.~~

~~OR~~

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

~~----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]~~

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.5.2.~~5~~6

Verifying that the required ECCS injection/spray subsystem can be manually aligned, and the pump started and operated for at least 10 minutes demonstrates that the subsystem is available to mitigate a draining event. This SR is modified by two Notes. Note 1 states that t~~T~~esting the ECCS injection/spray subsystem may be done through the test return ~~recirculation~~ line ~~is necessary~~ to avoid overfilling the refueling cavity. Note 2 states that credit for meeting the SR may be taken for normal system operation that satisfies the SR, such as using the RHR mode of LPCI for ≥ 10 minutes. The minimum operating time of 10 minutes was based on engineering judgement. [The performance frequency of 92 days is consistent with similar at-power testing required by SR 3.5.1.7.

OR

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

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]

SR 3.5.2.~~6~~7

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 [18] month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the Surveillance when performed at the [18] month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

OR

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

BASES

SURVEILLANCE REQUIREMENTS (continued)

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]

~~SR 3.5.2.8~~

~~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 [18] month Frequency is based on the need to perform the Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power.~~

~~Operating experience has shown that these components usually pass the SR when performed at the [18] month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.~~

~~OR~~

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

~~----------REVIEWER'S NOTE----------~~
~~Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.~~
~~----------]~~

~~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.~~

BASES

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.

BASES

SURVEILLANCE REQUIREMENTS (continued)

RCIC System will automatically restart on an RPV low water level (Level 2) signal received subsequent to an RPV high water level (Level 8) trip and that the suction is automatically transferred from the CST to the suppression pool. The LOGIC SYSTEM FUNCTIONAL TEST performed in LCO 3.3.5.~~3~~2 overlaps this Surveillance to provide complete testing of the assumed safety function.

[The 18 month Frequency is based on the need to perform the Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

OR

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

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]

This SR is modified by a Note that excludes vessel injection 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. 10 CFR 50, Appendix A, GDC 33.

2. FSAR, Section [5.5.6].

3. Memorandum from R.L. Baer (NRC) to V. Stello, Jr. (NRC), "Recommended Interim Revisions to LCOs for ECCS Components," December 1, 1975.

4. NEDC-32988-A, Revision 2, Technical Justification to Support Risk-Informed Modification to Selected Required End States for BWR Plants, December 2002.

BASES

APPLICABLE SAFETY ANALYSES (continued)

purge valve due to failure in the control circuit associated with each valve. The primary containment purge valve design precludes a single failure from compromising the primary containment boundary as long as the system is operated in accordance with this LCO.]

PCIVs satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

PCIVs form a part of the primary containment boundary. The PCIV safety function is related to minimizing the loss of reactor coolant inventory and establishing the primary containment boundary during a DBA.

The power operated, automatic isolation valves are required to have isolation times within limits and actuate on an automatic isolation signal. The [18] inch purge valves must be maintained sealed closed [or blocked to prevent full opening]. While the reactor building-to-suppression chamber vacuum breakers isolate primary containment penetrations, they are excluded from this Specification. Controls on their isolation function are adequately addressed in LCO 3.6.1.7, "Reactor Building-to-Suppression Chamber Vacuum Breakers." The valves covered by this LCO are listed with their associated stroke times in Reference 2.

The normally closed PCIVs are considered OPERABLE when manual valves are closed or open in accordance with appropriate administrative controls, automatic valves are de-activated and secured in their closed position, blind flanges are in place, and closed systems are intact. These passive isolation valves and devices are those listed in Reference 2.

Purge valves with resilient seals, secondary bypass valves, MSIVs, and hydrostatically tested valves must meet additional leakage rate requirements. Other PCIV leakage rates 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, 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 and the primary containment purge valves are not required to be sealed closed in MODES 4 and 5. ~~Certain valves, however, are required to be OPERABLE to prevent inadvertent reactor vessel draindown. These valves are those whose associated~~

BASES

APPLICABILITY (continued)

~~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) [except for purge valve 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. Due to the size of the primary containment purge line penetration and the fact that those penetrations exhaust directly from the containment atmosphere to the environment, the penetration flow path containing these valves is not allowed to be opened under administrative controls. A single purge valve in a penetration flow path may be opened to effect repairs to an inoperable valve, as allowed by SR 3.6.1.3.1.

A second Note has been added to provide 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 PCIV. Complying with the Required Actions may allow for continued operation, and subsequent inoperable PCIVs are governed by subsequent Condition entry and application of associated Required Actions.

The ACTIONS are modified by Notes 3 and 4. Note 3 ensures that appropriate remedial actions are taken, if necessary, if the affected system(s) are rendered inoperable by an inoperable PCIV (e.g., an Emergency Core Cooling System subsystem is inoperable due to a failed open test return valve). Note 4 ensures appropriate remedial actions are taken when the primary containment leakage limits are exceeded. Pursuant to LCO 3.0.6, these actions are not required even when the associated LCO is not met. Therefore, Notes 3 and 4 are added to require the proper actions be taken.

A.1 and A.2

----------REVIEWER'S NOTE----------
Adoption of a Completion Time greater than 4 hours requires implementation of the following commitment: "Each licensee requesting extended Completion Times for PCIVs must commit to enhancing its configuration risk management program (CRMP), including those implemented under 10 CFR 50.65(a)(4), the Maintenance Rule, to include a Large Early Release Fraction (LERF) methodology and assessment.

BASES

ACTIONS (continued)

following an accident, which are no longer capable of being automatically isolated, will be in the isolation position should an event occur. This Required Action does not require any testing or valve manipulation. Rather, it involves verification that those isolation devices outside containment and potentially capable of being mispositioned are in the correct position. For the isolation devices inside containment, the time period specified as "prior to entering MODE 2 or 3 from MODE 4 if not performed within the previous 92 days" is based on engineering judgment and is considered reasonable in view of the inaccessibility of the isolation devices and other administrative controls that will ensure that isolation device misalignment is an unlikely possibility.

For the containment purge valve with resilient seal that is isolated in accordance with Required Action E.1, SR 3.6.1.3.7 must be performed at least once every [ ] days. This provides assurance that degradation of the resilient seal is detected and confirms that the leakage rate of the containment purge valve does not increase during the time the penetration is isolated. The normal Frequency for SR 3.6.1.3.7 is 184 days. Since more reliance is placed on a single valve while in this Condition, it is prudent to perform the SR more often. Therefore, a Frequency of once per [ ] days was chosen and has been shown to be acceptable based on operating experience.

Required Action E.2 is modified by two Notes. Note 1 applies to isolation devices located in high radiation areas and allows these devices to be verified closed by use of administrative means. Allowing verification by administrative means is considered acceptable, since access to these areas is typically restricted. Note 2 applies to isolation 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.]

F.1 and F.2

If any Required Action and associated Completion Time cannot be met ~~in MODE 1, 2, or 3~~, 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.

BASES

ACTIONS (continued)

~~[G.1 and H.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. If applicable, movement of [recently] irradiated fuel assemblies must be immediately suspended. Suspension of these activities shall not preclude completion of movement of a component to a safe condition. Also, if applicable, action must be immediately initiated to restore the valve(s) to OPERABLE status. This allows RHR to remain in service while actions are being taken to restore the valve.~~]

SURVEILLANCE REQUIREMENTS

[SR 3.6.1.3.1

Each [18] inch primary containment purge valve is required to be verified sealed closed. This SR is designed to ensure that a gross breach of primary containment is not caused by an inadvertent or spurious opening of a primary containment purge valve. Detailed analysis of the purge valves failed to conclusively demonstrate their ability to close during a LOCA in time to limit offsite doses. Primary containment purge valves that are sealed closed must have motive power to the valve operator removed. This can be accomplished by de-energizing the source of electric power or removing the air supply to the valve operator. In this application, the term "sealed" has no connotation of leak tightness. [The 31 day Frequency is a result of an NRC initiative, Generic Issue B-24 (Ref. 5) related to primary containment purge valve use during unit operations.

OR

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

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]

BASES

SURVEILLANCE REQUIREMENTS (continued)

This SR allows a valve that is open under administrative controls to not meet the SR during the time the valve is open. Opening a purge valve under administrative controls is restricted to one valve in a penetration flow path at a given time (refer to discussion for Note 1 of the ACTIONS) in order to effect repairs to that valve. This allows one purge valve to be opened without resulting in a failure of the Surveillance and resultant entry into the ACTIONS for this purge valve, provided the stated restrictions are met. Condition E must be entered during this allowance, and the valve opened only as necessary for effecting repairs. Each purge valve in the penetration flow path may be alternately opened, provided one remains sealed closed, if necessary, to complete repairs on the penetration.

~~[The SR is modified by a Note stating that primary containment purge valves are only required to be sealed closed in 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 or the release of radioactive material will exceed limits prior to the closing of the purge valves. At other times when the purge valves are required to be capable of closing (e.g., during handling of [recently] irradiated fuel), pressurization concerns are not present and the purge valves are allowed to be open.]]~~

[SR 3.6.1.3.2

This SR ensures that the primary containment purge valves are closed as required or, if open, open for an allowable reason. If a purge 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. ~~[The SR is also modified by a Note (Note 1), stating that primary containment purge valves are only required to be closed in 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, or the release of radioactive material will exceed limits prior to the purge valves closing. At other times when the purge valves are required to be capable of closing (e.g., during handling of irradiated fuel), pressurization concerns are not present and the purge valves are allowed to be open.] ~~The SR is modified by a Note ~~(Note 2)~~ stating that the SR is not required to be met when the purge valves are open for the stated reasons. The Note states that these valves may be opened for inerting, de-inerting, pressure control, ALARA or air quality considerations for personnel entry, or Surveillances that require the valves to be open. The [18] inch purge valves are capable of closing in the environment following a LOCA. Therefore, these valves are allowed

BASES

SURVEILLANCE REQUIREMENTS (continued)

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

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------].

[SR 3.6.1.3.7

For primary containment purge valves with resilient seals, additional leakage rate testing beyond the test requirements of 10 CFR 50, Appendix J, Option [A][B] (Ref. 4), is required to ensure OPERABILITY. Operating experience has demonstrated that this type of seal has the potential to degrade in a shorter time period than do other seal types. [Based on this observation and the importance of maintaining this penetration leak tight (due to the direct path between primary containment and the environment), a Frequency of 184 days was established.

OR

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

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]

Additionally, this SR must be performed once within 92 days after opening the valve. The 92 day Frequency was chosen recognizing that cycling the valve could introduce additional seal degradation (beyond that which occurs to a valve that has not been opened). Thus, decreasing the interval is a prudent measure after a valve has been opened.

~~The SR is modified by a Note stating that the primary containment purge valves are only required to meet leakage rate testing requirements in MODES 1, 2, and 3. If a LOCA inside primary containment occurs in these MODES, purge valve leakage must be minimized to ensure offsite radiological release is within limits. At other times when the purge valves~~

BASES

SURVEILLANCE REQUIREMENTS (continued)

~~are required to be capable of closing (e.g., during handling of [recently] irradiated fuel), pressurization concerns are not present and the purge valves are not required to meet any specific leakage criteria.]~~

SR 3.6.1.3.8

Verifying that the isolation time of each MSIV is within the specified limits is required to demonstrate OPERABILITY. The isolation time test ensures that the MSIV will isolate in a time period that does not exceed the times assumed in the DBA analyses. This ensures that the calculated radiological consequences of these events remain within 10 CFR 100 limits.

----------REVIEWER'S NOTE----------
If the testing is within the scope of the licensee's Inservice Testing Program, the Frequency "In accordance with the Inservice Testing Program" should be used. Otherwise, the periodic Frequency of 18 months or the reference to the Surveillance Frequency Control Program should be used.

[The Frequency of this SR is [in accordance with the requirements of the Inservice Testing Program] [18 months

OR

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

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]].

SR 3.6.1.3.9

Automatic PCIVs close on a primary containment isolation signal to prevent leakage of radioactive material from primary containment following a DBA. This SR ensures that each automatic PCIV will actuate to its isolation position on a primary containment isolation signal. The LOGIC SYSTEM FUNCTIONAL TEST in SR 3.3.6.3.7 overlaps this SR to provide complete testing of the safety function. [The [18] month

BASES

SURVEILLANCE REQUIREMENTS (continued)

OR

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

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]

[SR 3.6.1.3.12

This SR ensures that the leakage rate of secondary containment bypass leakage paths is less than the specified leakage rate. This provides assurance that the assumptions in the radiological evaluations of Reference 8 are met. The leakage rate of each bypass leakage path is assumed to be the maximum pathway leakage (leakage through the worse of the two isolation valves) unless the penetration is isolated by use of one closed and de-activated automatic valve, closed manual valve, or blind flange. In this case, the leakage rate of the isolated bypass leakage path is assumed to be the actual pathway leakage through the isolation device. If both isolation valves in the penetration are closed, the actual leakage rate is the lesser leakage rate of the two valves. The Frequency is required by the Primary Containment Leakage Rate Testing Program. This SR simply imposes additional acceptance criteria. ~~[This SR is modified by a Note that states that these valves are only required to meet this leakage limit in MODES 1, 2, and 3. In the other conditions, the Reactor Coolant System is not pressurized and specific primary containment leakage limits are not required.]~~

[Bypass leakage is considered part of L_a.

----------REVIEWER'S NOTE----------
Unless specifically exempted.]]

SR 3.6.1.3.13

The analyses in References 1 and 8 are based on leakage that is less than the specified leakage rate. Leakage through each MSIV must be ≤ [11.5] scfh when tested at ≥ P_t ([28.8] psig). ~~A Note is added to this SR~~

BASES

SURVEILLANCE REQUIREMENTS (continued)

~~which states that these valves are only required to meet this leakage limit in MODES 1, 2, and 3. In the other conditions, the Reactor Coolant System is not pressurized and specific primary containment leakage limits are not required.~~ This ensures that MSIV leakage is properly accounted for in determining the overall primary containment leakage rate. The Frequency is required by the Primary Containment Leakage Rate Testing Program.

SR 3.6.1.3.14

Surveillance of hydrostatically tested lines provides assurance that the calculation assumptions of Reference 2 are met. The acceptance criteria for the combined leakage of all hydrostatically tested lines is [1.0 gpm times the total number of hydrostatically tested PCIVs] when tested at 1.1 P_a ([63.25] psig). The combined leakage rates must be demonstrated in accordance with the leakage rate test Frequency required by the Primary Containment Leakage Rate Testing Program.

~~[This SR has been modified by a Note that states that these valves are only required to meet the combined leakage rate in MODES 1, 2, and 3, since this is when the Reactor Coolant System is pressurized and primary containment is required. In some instances, the valves are required to be capable of automatically closing during MODES other than MODES 1, 2, and 3. However, specific leakage limits are not applicable in these other MODES or conditions.]~~

[SR 3.6.1.3.15

----------REVIEWER'S NOTE----------
This SR is only required for those plants with purge valves with resilient seals allowed to be open during [MODE 1, 2, 3, or 4] and having blocking devices that are not permanently installed on the valves.

Verifying each [ ] inch primary containment purge valve is blocked to restrict opening to ≤ [50]% is required to ensure that the valves can close under DBA conditions within the times assumed in the analysis of References 1 and 7. ~~[The SR is modified by a Note stating that this SR is only required to be met in MODES 1, 2, and 3.] If a LOCA occurs, the purge valves must close to maintain containment leakage within the values assumed in the accident analysis. At other times when purge valves are required to be capable of closing (e.g., during movement of irradiated fuel assemblies), pressurization concerns are not present, thus the purge valves can be fully open.~~ [The [18] month Frequency is

BASES

ACTIONS (continued)

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 3.8.10 must be immediately entered. This Note allows Condition A to provide requirements for the loss of the offsite circuit whether or not a division is de-energized. LCO 3.8.10 provides the appropriate restrictions for the situation involving a de-energized division.

SURVEILLANCE REQUIREMENTS

SR 3.8.2.1

SR 3.8.2.1 requires the SRs from LCO 3.8.1 that are necessary for ensuring the OPERABILITY of the AC sources in other than MODES 1, 2, and 3. SR 3.8.1.8 is not required to be met since only one offsite circuit is required to be OPERABLE. SR 3.8.1.11, SR 3.8.1.12, SR 3.8.1.13, and SR 3.8.1.19 are not required to be met because DG response on an offsite power or ECCS initiation signal is not required. SR 3.8.1.17 is not required to be met because the required OPERABLE DG(s) is not required to undergo periods of being synchronized to the offsite circuit. SR 3.8.1.20 is excepted because starting independence is not required with the DG(s) that is not required to be OPERABLE. Refer to the corresponding Bases for LCO 3.8.1 for a discussion of each SR.

This SR is modified by ~~two a~~ Note~~s~~ which precludes ~~. The reason for Note 1 is to preclude~~ requiring the OPERABLE DG(s) from being paralleled with the offsite power network or otherwise rendered inoperable during the performance of SRs, and to preclude deenergizing a required 4160 V ESF bus or disconnecting a required offsite circuit during performance of SRs. With limited AC sources available, a single event could compromise both the required circuit and the DG. It is the intent that these SRs must still be capable of being met, but actual performance is not required during

BASES

SURVEILLANCE REQUIREMENTS (continued)

periods when the DG and offsite circuit is required to be OPERABLE. ~~Note 2 states that SRs 3.8.1.12 and 3.8.1.19 are not required to be met when its associated ECCS subsystem(s) are not required to be OPERABLE. These SRs demonstrate the DG response to an ECCS signal (ether alone or in conjunction with a loss-of-power signal). This is consistent with the ECCS instrumentation requirements that do not require the ECCS signals when the ECCS System is not required to be OPERABLE .~~

REFERENCES None.

1.1 Definitions

CORE ALTERATION	CORE ALTERATION shall be the movement of any fuel, sources, or reactivity control components, within the reactor vessel with the vessel head removed and fuel in the vessel. The following exceptions are not considered to be CORE ALTERATIONS: a. Movement of source range monitors, local power range monitors, intermediate range monitors, traversing incore probes, or special movable detectors (including undervessel replacement), and b. Control rod movement, provided there are no fuel assemblies in the associated core cell. Suspension of CORE ALTERATIONS shall not preclude completion of movement of a component to a safe position.
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 5.6.3. 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" or those listed in Table E-7 of Regulatory Guide 1.109, Rev. 1, NRC, 1977, or ICRP 30, Supplement to Part 1, page 192-212, Table titled, "Committed Dose Equivalent in Target Organs or Tissues per Intake of Unit Activity"].
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~~

1.1 Definitions

DRAIN TIME (continued)

~~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 closed and administratively controlled ~~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;

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 is in continuous communication with the control room, is stationed at the controls, and is capable of closing the penetration flow path isolation devices 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

3.3 INSTRUMENTATION

3.3.5.2A Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation (Without Setpoint Control Program)

LCO 3.3.5.2A The RPV Water Inventory Control instrumentation for each Function in Table 3.3.5.2-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.5.2-1.

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 3.3.5.2-1 for the channel.~~	~~Immediately~~
~~A~~B. One or more channels inoperable.~~As required by Required Action A.1 and referenced in Table 3.3.5.2-1.~~	A.1 Initiate action to place channel in trip. OR ~~A~~B.2.1 Declare associated penetration flow path(s) incapable of automatic isolation. AND ~~A~~B.2.2 Initiate action to c~~C~~alculate DRAIN TIME.	Immediately Immediately Immediately
~~C. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.~~	~~C.1 Place channel in trip.~~	~~1 hour~~

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.	D.1 Declare HPCS system inoperable. OR D.2 Align the HPCS pump suction to the suppression pool.	1 hour 1 hour
E. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.	E.1 Declare HPCS system inoperable. AND E.2 Restore channel to OPERABLE status.	1 hour 24 hours
F. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.	F.1 Restore channel to OPERABLE status.	24 hours
G. Required Action and associated Completion Time of Condition C, D, E, or F not met.	G.1 Declare associated ECCS injection/spray subsystem inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

----------NOTE----------

Refer to Table 3.3.5.2-1 to determine which SRs apply for each ~~ECCS~~ Function.

SURVEILLANCE		FREQUENCY
SR 3.3.5.2.1	Perform CHANNEL CHECK.	[12 hours OR In accordance with the Surveillance Frequency Control Program]
SR 3.3.5.2.2	Perform CHANNEL FUNCTIONAL TEST.	[[92] days OR In accordance with the Surveillance Frequency Control Program]
~~SR 3.3.5.2.3~~	~~Perform LOGIC SYSTEM FUNCTIONAL TEST.~~	~~[[18] months~~ ~~OR~~ ~~In accordance with the Surveillance Frequency Control Program]~~

Table 3.3.5.2-1 (page 1 of 2)
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. Low Pressure Coolant Injection A (LPCI) and Low Pressure Core Spray (LPCS) Subsystems					
a. Reactor Steam Dome Pressure - Low (Injection Permissive)	4, 5	[3(a)]	C	SR 3.3.5.2.1 SR 3.3.5.2.2	≤ [534] psig
b. [LPCS Pump Discharge Flow - Low (Bypass)]	4, 5	[1 per pump(a)]	F	SR 3.3.5.2.1 SR 3.3.5.2.2	≥ [ ] gpm and ≤ [ ] gpm
c. [LPCI Pump A Discharge Flow - Low (Bypass)]	4, 5	[1 per pump(a)]	F	SR 3.3.5.2.1 SR 3.3.5.2.2	≥ [ ] gpm and ≤ [ ] gpm
d. Manual Initiation	4, 5	[1 per subsystem (a)]	F	SR 3.3.5.2.3	NA
2. LPCI B and LPCI C Subsystems					
a. Reactor Steam Dome Pressure - Low (Injection Permissive)	4, 5	[3(a)]	C	SR 3.3.5.2.1 SR 3.3.5.2.2	≤ [534] psig
b. [LPCI Pump B and LPCI Pump C Discharge Flow - Low (Bypass)]	4, 5	[1 per pump(a)]	F	SR 3.3.5.2.1 SR 3.3.5.2.2	≥ [ ] gpm and ≤ [ ] gpm
c. Manual Initiation	4, 5	[1 per subsystem (a)]	F	SR 3.3.5.2.3	NA

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

Table 3.3.5.2-1 (page 2 of 2)
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
~~3. High Pressure Core Spray (HPCS) System~~					
~~a. Reactor Vessel Water Level - High, Level 8~~	~~4, 5~~	~~[1(a)]~~	~~E~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~	~~≤ [55.7] inches~~
~~b. Condensate Storage Tank Level - Low~~	~~4(b), 5(b)~~	~~[1(a)]~~	~~D~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~	~~≥ [-3] inches~~
~~c. [HPCS Pump Discharge Pressure - High (Bypass)]~~	~~4, 5~~	~~[1 per pump (a)]~~	~~F~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~	~~≥ [ ] psig~~
~~d. [HPCS System Flow Rate - Low (Bypass)]~~	~~4, 5~~	~~[1 per pump (a)]~~	~~F~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~	~~≥ [ ] gpm and ≤ [ ] gpm~~
~~e. Manual Initiation~~	~~4, 5~~	~~[1 per subsystem (a)]~~	~~F~~	~~SR 3.3.5.2.3~~	~~[NA]~~
14. RHR System Isolation					
a. Reactor Vessel Water Level - Low, Level 3	(~~a~~c)	[2 in one trip system]	~~B~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~	≥ [10.8] inches
~~25~~. Reactor Water Cleanup (RWCU) System Isolation					
a. Reactor Vessel Water Level - Low Low, Level 2	(~~a~~c)	[2 in one trip system]	~~B~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~	≥ [-43.8] inches

~~(a) Associated with an ECCS subsystem required to be OPERABLE by LCO 3.5.2, "Reactor Pressure Vessel Water Inventory Control."~~
~~(b) When HPCS is OPERABLE for compliance with LCO 3.5.2, "RPV Water Inventory Control," and aligned to the condensate storage tank.~~
(~~a~~c) When automatic isolation of the associated penetration flow path(s) is credited in calculating DRAIN TIME.

3.3 INSTRUMENTATION

3.3.5.2B Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation (With Setpoint Control Program)

LCO 3.3.5.2B The RPV Water Inventory Control instrumentation for each Function in Table 3.3.5.2-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.5.2-1.

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 3.3.5.2-1 for the channel.~~	~~Immediately~~
~~A~~B. One or more channels inoperable.~~As required by Required Action A.1 and referenced in Table 3.3.5.2-1.~~	A.1 Initiate action to place channel in trip. OR ~~A~~B.2.1 Declare associated penetration flow path(s) incapable of automatic isolation. AND ~~A~~B.2.2 Initiate action to c~~C~~alculate DRAIN TIME.	Immediately Immediately Immediately
~~C. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.~~	~~C.1 Place channel in trip.~~	~~1 hour~~

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~D. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.~~	~~D.1 Declare HPCS system inoperable.~~ ~~OR~~ ~~D.2 Align the HPCS pump suction to the suppression pool.~~	~~1 hour~~ ~~1 hour~~
~~E. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.~~	~~E.1 Declare HPCS system inoperable.~~ ~~AND~~ ~~E.2 Restore channel to OPERABLE status.~~	~~1 hour~~ ~~24 hours~~
~~F. As required by Required Action A.1 and referenced in Table 3.3.5.2-1.~~	~~F.1 Restore channel to OPERABLE status.~~	~~24 hours~~
~~G. Required Action and associated Completion Time of Condition C, D, E, or F not met.~~	~~G.1 Declare associated ECCS injection/spray subsystem inoperable.~~	~~Immediately~~

SURVEILLANCE REQUIREMENTS

----------NOTE----------
Refer to Table 3.3.5.2-1 to determine which SRs apply for each ~~ECCS~~ Function.

SURVEILLANCE		FREQUENCY
SR 3.3.5.2.1	Perform CHANNEL CHECK.	[12 hours OR In accordance with the Surveillance Frequency Control Program]
SR 3.3.5.2.2	Perform CHANNEL FUNCTIONAL TEST.	[[92] days OR In accordance with the Surveillance Frequency Control Program]
~~SR 3.3.5.1.3~~	~~Perform LOGIC SYSTEM FUNCTIONAL TEST.~~	~~[[18] months~~ ~~OR~~ ~~In accordance with the Surveillance Frequency Control Program]~~

Table 3.3.5.2-1 (page 1 of 2)
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
1. Low Pressure Coolant Injection A (LPCI) and Low Pressure Core Spray (LPCS) Subsystems				
a. Reactor Steam Dome Pressure - Low (Injection Permissive)	4, 5	[3(a)]	C	SR 3.3.5.2.1 SR 3.3.5.2.2
b. [LPCS Pump Discharge Flow - Low (Bypass)]	4, 5	[1 per pump(a)]	F	SR 3.3.5.2.1 SR 3.3.5.2.2
c. [LPCI Pump A Discharge Flow - Low (Bypass)]	4, 5	[1 per pump(a)]	F	SR 3.3.5.2.1 SR 3.3.5.2.2
d. Manual Initiation	4, 5	[1 per subsystem (a)]	F	SR 3.3.5.2.3
2. LPCI B and LPCI C Subsystems				
a. Reactor Steam Dome Pressure - Low (Injection Permissive)	4, 5	[3(a)]	C	SR 3.3.5.2.1 SR 3.3.5.2.2
b. [LPCI Pump B and LPCI Pump C Discharge Flow - Low (Bypass)]	4, 5	[1 per pump(a)]	F	SR 3.3.5.2.1 SR 3.3.5.21.2
c. Manual Initiation	4, 5	[1 per subsystem (a)]	F	SR 3.3.5.2.3

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

Table 3.3.5.2-1 (page 2 of 2)
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~~
~~3. High Pressure Core Spray (HPCS) System~~				
~~a. Reactor Vessel Water Level - High, Level 8~~	~~4, 5~~	~~[1(a)]~~	~~E~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~
~~b. Condensate Storage Tank Level - Low~~	~~4(b), 5(b)~~	~~[1(a)]~~	~~D~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~
~~c. [HPCS Pump Discharge Pressure - High (Bypass)]~~	~~4, 5~~	~~[1 per pump (a)]~~	~~F~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~
~~d. [HPCS System Flow Rate - Low (Bypass)]~~	~~4, 5~~	~~[1 per pump (a)]~~	~~F~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~
~~e. Manual Initiation~~	~~4, 5~~	~~[1 per subsystem (a)]~~	~~F~~	~~SR 3.3.5.2.3~~
14. RHR System Isolation				
a. Reactor Vessel Water Level - Low, Level 3	(~~a~~c)	[2 in one trip system]	~~B~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~
~~25~~. Reactor Water Cleanup (RWCU) System Isolation				
a. Reactor Vessel Water Level - Low Low, Level 2	(~~a~~c)	[2 in one trip system]	~~B~~	~~SR 3.3.5.2.1 SR 3.3.5.2.2~~

~~(a) Associated with an ECCS subsystem required to be OPERABLE by LCO 3.5.2, "Reactor Pressure Vessel Water Inventory Control."~~
~~(b) When HPCS is OPERABLE for compliance with LCO 3.5.2, "RPV Water Inventory Control," and aligned to the condensate storage tank.~~
(~~a~~c) When automatic isolation of the associated penetration flow path(s) is credited in calculating DRAIN TIME.

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
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 inoperable. OR I.2 Isolate the Reactor Water Cleanup System.	1 hour 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. ~~OR~~ ~~J.2 Initiate action to isolate the Residual Heat Removal (RHR) Shutdown Cooling System.~~	Immediately ~~Immediately~~
K. As required by Required Action C.1 and referenced in Table 3.3.6.1-1.	K.1 Isolate the affected penetration flow path(s). OR K.2 Suspend movement of [recently] irradiated fuel assemblies in the [primary and secondary containment].	Immediately Immediately

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
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 inoperable. OR I.2 Isolate the Reactor Water Cleanup System.	1 hour 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. ~~OR~~ ~~J.2 Initiate action to isolate the Residual Heat Removal (RHR) Shutdown Cooling System.~~	Immediately ~~Immediately~~
K. As required by Required Action C.1 and referenced in Table 3.3.6.1-1.	K.1 Isolate the affected penetration flow path(s). OR K.2 Suspend movement of [recently] irradiated fuel assemblies in the [primary and secondary containment].	Immediately Immediately

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS), RPV WATER INVENTORY CONTROL, 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 [eight] safety/relief valves shall be OPERABLE.

---NOTE---
Low pressure coolant injection (LPCI) subsystems may be considered OPERABLE during alignment and operation for decay heat removal with reactor steam dome pressure less than [the residual heat removal cut in permissive pressure] in MODE 3, if capable of being manually realigned and not otherwise inoperable.

APPLICABILITY: MODE 1,
MODES 2 and 3, except 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 High Pressure Core Spray (HPCS).

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. ~~High Pressure Core Spray (~~HPCS~~)~~ System inoperable.	B.1 Verify by administrative means RCIC System is OPERABLE when RCIC is required to be OPERABLE. AND B.2 Restore HPCS System to OPERABLE status.	Immediately 14 days

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

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

AND

One 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

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. DRAIN TIME < 36 hours and ≥ 8 hours.	C.1	Verify [secondary containment] boundary is capable of being established in less than the DRAIN TIME.	4 hours
	AND		
	C.2	Verify each [secondary containment] penetration flow path is capable of being isolated in less than the DRAIN TIME.	4 hours
	AND		
	C.3	[Verify one standby gas treatment (SGT) subsystem is capable of being placed in operation in less than the DRAIN TIME.	4 hours]
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
	AND		
	D.2	Initiate action to establish [secondary containment] boundary.	Immediately
	AND		

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
	D.3 Initiate action to isolate each [secondary containment] penetration flow path or verify it can be [automatically or] manually isolated from the control room. AND D.4 [Initiate action to verify one SGT ~~standby gas treatment~~ subsystem is capable of being placed in operation.	Immediately Immediately]
E. Required Action and associated Completion Time of Condition C or D not met. OR 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.	[12 hours OR In accordance with the Surveillance Frequency Control Program]
SR 3.5.2.2	Verify, for a required low pressure ECCS injection/spray subsystem, the suppression pool water level is ≥ [12.67 ft].	[12 hours OR In accordance with the Surveillance Frequency Control Program]
SR 3.5.2.3	Verify, for a required High Pressure Core Spray (HPCS) System, the: a. Suppression pool water level is ≥ [12.67 ft] or b. Condensate storage tank water level is ≥ [18 ft].	[12 hours OR In accordance with the Surveillance Frequency Control Program]

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.5.2.4	Verify, for the required ECCS injection/spray subsystem, the piping is filled with water from the pump discharge valve to the injection valve.	[31 days OR In accordance with the Surveillance Frequency Control Program]
~~SR 3.5.2.5~~	~~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.~~	~~[31 days~~ ~~OR~~ ~~In accordance with the Surveillance Frequency Control Program]~~

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.5.2.~~5~~6	----------NOTES---------- 1. Operation may be through the test return line. 2. Credit may be taken for normal system operation to satisfy this SR. ----------	
	Operate the required ECCS injection/spray subsystem ~~through the recirculation line~~ for ≥ 10 minutes.	[92 days OR In accordance with the Surveillance Frequency Control Program]
SR 3.5.2.~~6~~7	Verify each valve credited for automatically isolating a penetration flow path actuates to the isolation position on an actual or simulated isolation signal.	[[18] months OR In accordance with the Surveillance Frequency Control Program]
~~SR 3.5.2.8~~	~~----------NOTE---------- Vessel injection/spray may be excluded. ----------~~	
	~~Verify the required ECCS injection/spray subsystem actuates on a manual initiation signal.~~	~~[[18] months~~ ~~OR~~ ~~In accordance with the Surveillance Frequency Control Program]~~

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.2.1	----------NOTES---------- 1. The following SRs are not required to be performed: SR 3.8.1.3, SR 3.8.1.9, through SR 3.8.1.101, SR 3.8.1.143 through SR 3.8.1.16, and [SR 3.8.1.18], and SR 3.8.1.19. 2. SR 3.8.1.12 and SR 3.8.1.19 are not required to be met when associated ECCS subsystem(s) are not required to be OPERABLE per LCO 3.5.2, "ECCS-Shutdown." ---------- For AC sources required to be OPERABLE, the SRs of Specification 3.8.1, except SR 3.8.1.8, SR 3.8.1.11, SR 3.8.1.12, SR 3.8.1.13, SR 3.8.1.17, SR 3.8.1.19, and SR 3.8.1.20, are applicable.	In accordance with applicable SRs

B 3.3 INSTRUMENTATION

B 3.3.5.2A Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation (Without Setpoint Control Program)

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.

BASES

BACKGROUND (continued)

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 low pressure core spray (LPCS), low pressure coolant injection (LPCI), and high pressure core spray (HPCS). The equipment involved with each of these systems is described in the Bases for LCO 3.5.2.~~

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 considered ~~postulated~~ in MODES 4 and 5 due to the reduced RCS pressure, reduced piping stresses, and ductile piping systems. Instead, an event is ~~postulated~~ considered in which an ~~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 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.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

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

~~Low Pressure 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 subsystems. This 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 four pressure transmitters each drive a master and slave trip unit. The outputs of the trip units are connected to relays whose contacts are arranged in a one-out-of-two taken twice logic for each Division.~~

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

~~Three channels of Reactor Steam Dome Pressure - Low Function per associated ECCS Division are only required to be OPERABLE in MODES 4 and 5 when ECCS Manual Initiation is required to be OPERABLE, since these channels support the manual initiation Function. In addition, the channels are only required when the associated ECCS subsystem is required to be OPERABLE by LCO 3.5.2.~~

~~1.b, 1.c, 2.b. Low Pressure Coolant Injection and Low Pressure Core Spray Pump Discharge Flow - Low (Bypass)~~

~~The minimum flow instruments are provided to protect the associated low pressure ECCS pump from overheating when the pump is operating and the associated injection valve is not fully open. The minimum flow line valve is opened when low flow is sensed, and the valve is automatically closed when the flow rate is adequate to protect the pump.~~

~~One flow transmitter per ECCS pump is used to detect the associated subsystems' flow rates. The logic is arranged such that each transmitter causes its associated minimum flow valve to open. The logic will close~~

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

~~the minimum flow valve once the closure setpoint is exceeded. The LPCI minimum flow valves are time delayed such that the valves will not open for 10 seconds after the switches detect low flow. The time delay is provided to limit reactor vessel inventory loss during the startup of the Residual Heat Removal (RHR) shutdown cooling mode (for RHR A and RHR B).~~

~~The Pump Discharge Flow - Low Allowable Values are high enough to ensure that the pump flow rate is sufficient to protect the pump, yet low enough to ensure that the closure of the minimum flow valve is initiated to allow full flow into the core.~~

~~One channel of the Pump Discharge Flow - Low Function is required to be OPERABLE in MODES 4 and 5 when the associated LPCS or LPCI pump is required to be OPERABLE by LCO 3.5.2 to ensure the pumps are capable of injecting into the Reactor Pressure Vessel when manually initiated.~~

~~1.d, 2.c. Manual Initiation~~

~~The Manual Initiation push button channels introduce signals into the appropriate ECCS logic to provide manual initiation capability. There is one push button for each of the two Divisions of low pressure ECCS (i.e., Division 1 ECCS, LPCS and LPCI A; Division 2 ECCS, LPCI B and LPCI C). The only the manual initiation function required to be OPERABLE is that associated with the ECCS subsystem required to be OPERABLE by LCO 3.5.2.~~

~~There is no Allowable Value for this Function since the channels are mechanically actuated based solely on the position of the push buttons.~~

~~High Pressure Core Spray System~~

~~3.a. Reactor Vessel Water Level - High, Level 8~~

~~The high RPV water level Level 8 signal is used to close the HPCS injection valve to prevent overflow into the main steam lines (MSLs). Reactor Vessel Water Level - High, Level 8 signals for HPCS are initiated from two level transmitters from the narrow range water level measurement instrumentation. One channel associated with the HPCS System required to be OPERABLE by LCO 3.5.2 is required to be OPERABLE.~~

~~The Reactor Vessel Water Level - High, Level 8 Allowable Value is chosen to isolate flow from the HPCS System prior to water overflowing into the MSLs.~~

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

~~One channel of Reactor Vessel Water Level - High, Level 8 Function is required to be OPERABLE in MODES 4 and 5 when the associated HPCS is required to be OPERABLE by LCO 3.5.2 to ensure to the HPCS is capable of injecting into the Reactor Pressure Vessel when manually initiated.~~

~~3.b. 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 HPCS and the CST are open and water for HPCS 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 valve automatically opens, and then the CST suction valve automatically closes. This ensures that an adequate supply of makeup water is available to the HPCS pump. To prevent losing suction to the pump, the suction valves are interlocked so that the suppression pool suction valve must be open before the CST suction valve automatically closes.~~

~~Condensate Storage Tank Level - Low signals are initiated from two level transmitters. The logic is arranged such that either transmitter and associated trip unit can cause the suppression pool suction valve to open and the CST suction valve to close.~~

~~The Condensate Storage Tank Level - Low Function Allowable Value is high enough to ensure adequate pump suction head while water is being taken from the CST.~~

~~One channel of the Condensate Storage Tank Level - Low Function is only required to be OPERABLE when HPCS is required to be OPERABLE to fulfill the requirements of LCO 3.5.2 and HPCS is aligned to the CST.~~

~~3.c, 3.d. HPCS Pump Discharge Pressure - High (Bypass) and HPCS System Flow Rate - Low (Bypass)~~

~~The minimum flow instruments are provided to protect the HPCS pump from overheating when the pump is operating and the associated injection valve is not fully open. The minimum flow line valve is opened when low flow and high pump discharge pressure are sensed, and the valve is automatically closed when the flow rate is adequate to protect the pump or the discharge pressure is low (indicating the HPCS pump is not operating).~~

~~One flow transmitter is used to detect the HPCS System's flow rate. The logic is arranged such that the transmitter causes the minimum flow valve~~

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

~~to open, provided the HPCS pump discharge pressure, sensed by another transmitter, is high enough (indicating the pump is operating). The logic will close the minimum flow valve once the closure setpoint is exceeded. (The valve will also close upon HPCS pump discharge pressure decreasing below the setpoint.)~~

~~The HPCS System Flow Rate - Low and HPCS Pump Discharge Pressure - High Allowable Value is high enough to ensure that pump flow rate is sufficient to protect the pump, yet low enough to ensure that the closure of the minimum flow valve is initiated to allow full flow into the core.~~

~~The HPCS Pump Discharge Pressure - High Allowable Value is set high enough to ensure that the valve will not be open when the pump is not operating.~~

~~One channel of each Function associated with one pump is required to be OPERABLE when HPCS is required to be OPERABLE by LCO 3.5.2 in MODES 4 and 5.~~

~~3.e. Manual Initiation~~

~~The Manual Initiation push button channel introduces a signal into the HPCS logic to provide manual initiation capability. There is one push button for the HPCS System. One channel of the Manual Initiation Function is only required to be OPERABLE in MODES 4 and 5 when the associated ECCS subsystem is required to be OPERABLE per LCO 3.5.2.~~

~~There is no Allowable Value for this Function since the channel is mechanically actuated based solely on the position of the push button.~~

RHR System Isolation

~~14~~.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 automatically isolated by RPV water level isolation instrumentation prior to the RPV water level being equal to the TAF. The Reactor Vessel Water Level - Low, Level 3 Function is only required to be OPERABLE when automatic isolation of the associated RHR penetration flow path is credited in calculating DRAIN TIME.

Reactor Vessel Water Level - Low, Level 3 signals are initiated from four level transmitters (two per trip system) that sense the difference between the pressure due to a constant column of water (reference leg) and the

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

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 (all in the same trip system) are required to be OPERABLE.

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 (LCO 3.3.1.1), since the capability to cool the fuel may be threatened.

This Function isolates the Group ~~3~~11 ~~valves~~.

Reactor Water Cleanup (RWCU) System Isolation

~~2~~5.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 automatically isolated by RPV water level isolation instrumentation prior to the RPV water level being equal to the TAF. 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 is initiated from two channels per trip system 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 (all 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.

This Function isolates the Group 8 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 3.3.5.2-1. 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.~~

~~A~~B.1, A.2.1, and ~~A~~B.2.2

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 ~~A~~B.1 directs immediate action to place the channel in trip. With the inoperable channel in the tripped condition, the remaining channel will isolate the penetration flow path on low water level. If both channels are inoperable and placed in trip, the penetration flow path will be isolated. Alternatively, Required Action A.2.1 requires ~~an immediate declaration~~ that the associated penetration flow path(s) to be immediately declared ~~are~~ incapable of automatic isolation. Required Action ~~A~~B.2.2 directs initiating action to calculat~~eion of~~ DRAIN TIME. The calculation cannot credit automatic isolation of the affected penetration flow paths.

BASES

ACTIONS (continued)

~~C.1~~

~~Low reactor steam dome pressure signals are used as permissives for the low pressure ECCS injection/spray subsystem manual initiation functions. If this 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.~~

~~D.1 and D.2~~

~~Required Actions D.1 and D.2 are intended to ensure that appropriate actions are taken if multiple, inoperable channels within the same Function result in a loss of automatic suction swap for the HPCS system from the condensate storage tank to the suppression pool. The HPCS system must be declared inoperable within 1 hour or the HPCS pump suction must be aligned to the suppression pool, since, if aligned, the function is already performed.~~

~~The 1 hour Completion Time is acceptable because it minimizes the risk of HPCS being needed without an adequate water source while allowing time for restoration or alignment of HPCS pump suction to the suppression pool.~~

~~E.1 and E.2~~

~~Required Actions E.1 and E.2 apply when the HPCS Reactor Vessel Water Level - High, Level 8 function is inoperable. If the function is inoperable and the channel is tripped, the HPCS pump discharge valve will not open and HPCS injection is prevented. The HPCS system must be declared inoperable within 1 hour and the function must be restored to Operable status within 24 hours.~~

~~The Completion Time of 1 hour is provided to declare the HPCS System inoperable. 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 HPCS and to locally open the discharge valve.~~

BASES

ACTIONS (continued)

~~F.1~~

~~If an LPCI or LPCS Discharge Flow - Low bypass function or HPCS System Discharge Pressure - High or Flow Rate - Low bypass function is inoperable, there is a risk that the associated 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.~~

~~G.1~~

~~With the Required Action and associated Completion Time of Conditions C, D, E, or F not met, the associated 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 3.3.5.2-1.

SR 3.3.5.2.1

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.

BASES

SURVEILLANCE REQUIREMENTS (continued)

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 Frequency of 12 hours is based upon operating experience that demonstrates channel failure is rare.

OR

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

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]

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 3.3.5.2.2

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 Frequency of 92 days is based upon operating experience that demonstrates channel failure is rare.

OR

BASES

SURVEILLANCE REQUIREMENTS (continued)

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

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]

~~SR 3.3.5.2.3~~

~~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 18 month Frequency is based on operating experience that has shown that these components usually pass the Surveillance when performed at the 18 month Frequency.~~

~~OR~~

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

~~----------REVIEWER'S NOTE----------~~
~~Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.~~
~~----------]~~

BASES

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.

B 3.3 INSTRUMENTATION

B 3.3.5.2B Reactor Pressure Vessel (RPV) Water Inventory Control Instrumentation (Without Setpoint Control Program)

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 are identified and maintained in the Setpoint Control Program (SCP) controlled by 10 CFR 50.59.

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

BASES

BACKGROUND (continued)

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 low pressure core spray (LPCS), low pressure coolant injection (LPCI), and high pressure core spray (HPCS). The equipment involved with each of these systems is described in the Bases for LCO 3.5.2.~~

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 considered ~~postulated~~ in MODES 4 and 5 due to the reduced RCS pressure, reduced piping stresses, and ductile piping systems. Instead, an event is ~~postulated~~ considered in which an ~~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 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).

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

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

~~Low Pressure 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 subsystems. This 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 four pressure transmitters each drive a master and slave trip unit. The outputs of the trip units are connected to relays whose contacts are arranged in a one-out-of-two taken twice logic for each Division.~~

~~Three channels of Reactor Steam Dome Pressure - Low Function per associated ECCS Division are only required to be OPERABLE in MODES 4 and 5 when ECCS Manual Initiation is required to be OPERABLE, since these channels support the manual initiation Function. In addition, the channels are only required when the associated ECCS subsystem is required to be OPERABLE by LCO 3.5.2.~~

~~1.b, 1.c, 2.b. Low Pressure Coolant Injection and Low Pressure Core Spray Pump Discharge Flow - Low (Bypass)~~

~~The minimum flow instruments are provided to protect the associated low pressure ECCS pump from overheating when the pump is operating and the associated injection valve is not fully open. The minimum flow line valve is opened when low flow is sensed, and the valve is automatically closed when the flow rate is adequate to protect the pump.~~

~~One flow transmitter per ECCS pump is used to detect the associated subsystems' flow rates. The logic is arranged such that each transmitter causes its associated minimum flow valve to open. The logic will close the minimum flow valve once the closure setpoint is exceeded. The LPCI minimum flow valves are time delayed such that the valves will not open for 10 seconds after the switches detect low flow. The time delay is provided to limit reactor vessel inventory loss during the startup of the Residual Heat Removal (RHR) shutdown cooling mode (for RHR A and RHR B).~~

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

~~One channel of the Pump Discharge Flow - Low Function is required to be OPERABLE in MODES 4 and 5 when the associated LPCS or LPCI pump is required to be OPERABLE by LCO 3.5.2 to ensure the pumps are capable of injecting into the Reactor Pressure Vessel when manually initiated.~~

~~1.d, 2.c. Manual Initiation~~

~~The Manual Initiation push button channels introduce signals into the appropriate ECCS logic to provide manual initiation capability. There is one push button for each of the two Divisions of low pressure ECCS (i.e., Division 1 ECCS, LPCS and LPCI A; Division 2 ECCS, LPCI B and LPCI C). The only the manual initiation function required to be OPERABLE is that associated with the ECCS subsystem required to be OPERABLE by LCO 3.5.2.~~

~~High Pressure Core Spray System~~

~~3.a. Reactor Vessel Water Level - High, Level 8~~

~~The high RPV water level Level 8 signal is used to close the HPCS injection valve to prevent overflow into the main steam lines (MSLs). Reactor Vessel Water Level - High, Level 8 signals for HPCS are initiated from two level transmitters from the narrow range water level measurement instrumentation. One channel associated with the HPCS System required to be OPERABLE by LCO 3.5.2 is required to be OPERABLE.~~

~~One channel of Reactor Vessel Water Level - High, Level 8 Function is required to be OPERABLE in MODES 4 and 5 when the associated HPCS is required to be OPERABLE by LCO 3.5.2 to ensure to the HPCS is capable of injecting into the Reactor Pressure Vessel when manually initiated.~~

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

~~3.b. 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 HPCS and the CST are open and water for HPCS 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 valve automatically opens, and then the CST suction valve automatically closes. This ensures that an adequate supply of makeup water is available to the HPCS pump. To prevent losing suction to the pump, the suction valves are interlocked so that the suppression pool suction valve must be open before the CST suction valve automatically closes.~~

~~Condensate Storage Tank Level - Low signals are initiated from two level transmitters. The logic is arranged such that either transmitter and associated trip unit can cause the suppression pool suction valve to open and the CST suction valve to close.~~

~~One channel of the Condensate Storage Tank Level - Low Function is only required to be OPERABLE when HPCS is required to be OPERABLE to fulfill the requirements of LCO 3.5.2 and HPCS is aligned to the CST.~~

~~3.c, 3.d. HPCS Pump Discharge Pressure - High (Bypass) and HPCS System Flow Rate - Low (Bypass)~~

~~The minimum flow instruments are provided to protect the HPCS pump from overheating when the pump is operating and the associated injection valve is not fully open. The minimum flow line valve is opened when low flow and high pump discharge pressure are sensed, and the valve is automatically closed when the flow rate is adequate to protect the pump or the discharge pressure is low (indicating the HPCS pump is not operating).~~

~~One flow transmitter is used to detect the HPCS System's flow rate. The logic is arranged such that the transmitter causes the minimum flow valve to open, provided the HPCS pump discharge pressure, sensed by another transmitter, is high enough (indicating the pump is operating). The logic will close the minimum flow valve once the closure setpoint is exceeded. (The valve will also close upon HPCS pump discharge pressure decreasing below the setpoint.)~~

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

~~One channel of each Function associated with one pump is required to be OPERABLE when HPCS is required to be OPERABLE by LCO 3.5.2 in MODES 4 and 5.~~

~~3.e. Manual Initiation~~

~~The Manual Initiation push button channel introduces a signal into the HPCS logic to provide manual initiation capability. There is one push button for the HPCS System. One channel of the Manual Initiation Function is only required to be OPERABLE in MODES 4 and 5 when the associated ECCS subsystem is required to be OPERABLE per LCO 3.5.2.~~

RHR Cooling System Isolation

14.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 automatically isolated by RPV water level isolation instrumentation prior to the RPV water level being equal to the TAF. The Reactor Vessel Water Level - Low, Level 3 Function is only required to be OPERABLE when automatic isolation of the associated RHR penetration flow path is credited in calculating DRAIN TIME.

Reactor Vessel Water Level - Low, Level 3 signals are initiated from four level transmitters (two per trip system) 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 (all in the same trip system) are required to be OPERABLE.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

This Function isolates the Group ~~3~~11 valves.

Reactor Water Cleanup (RWCU) System Isolation

~~2~~5.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 automatically isolated by RPV water level isolation instrumentation prior to the RPV water level being equal to the TAF. 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 is initiated from two channels per trip system 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 (all in the same trip system) are required to be OPERABLE.

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.

This Function isolates the Group 8 valves.

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.

BASES

ACTIONS (continued)

~~A.1~~

~~Required Action A.1 directs entry into the appropriate Condition referenced in Table 3.3.5.2-1. 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.~~

~~AB~~.1, A.2.1, and ~~AB~~.2.2

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 ~~AB~~.1 directs immediate action to place the channel in trip. With the inoperable channel in the tripped condition, the remaining channel will isolate the penetration flow path on low water level. If both channels are inoperable and placed in trip, the penetration flow path will be isolated. Alternatively, Required Action A.2.1 requires ~~an immediate declaration~~ that the associated penetration flow path(s) to be immediately declared ~~are~~ incapable of automatic isolation. Required Action ~~AB~~.2.2 directs initiating action to calculat~~eion 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 initiation functions. If this 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.~~

BASES

ACTIONS (continued)

~~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.~~

~~D.1 and D.2~~

~~Required Actions D.1 and D.2 are intended to ensure that appropriate actions are taken if multiple, inoperable channels within the same Function result in a loss of automatic suction swap for the HPCS system from the condensate storage tank to the suppression pool. The HPCS system must be declared inoperable within 1 hour or the HPCS pump suction must be aligned to the suppression pool, since, if aligned, the function is already performed.~~

~~The 1 hour Completion Time is acceptable because it minimizes the risk of HPCS being needed without an adequate water source while allowing time for restoration or alignment of HPCS pump suction to the suppression pool.~~

~~E.1 and E.2~~

~~Required Actions E.1 and E.2 apply when the HPCS Reactor Vessel Water Level - High, Level 8 function is inoperable. If the function is inoperable and the channel is tripped, the HPCS pump discharge valve will not open and HPCS injection is prevented. The HPCS system must be declared inoperable within 1 hour and the function must be restored to Operable status within 24 hours.~~

~~The Completion Time of 1 hour is provided to declare the HPCS System inoperable. 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 HPCS and to locally open the discharge valve.~~

BASES

ACTIONS (continued)

~~F.1~~

~~If an LPCI or LPCS Discharge Flow - Low bypass function or HPCS System Discharge Pressure - High or Flow Rate - Low bypass function is inoperable, there is a risk that the associated 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.~~

~~G.1~~

~~With the Required Action and associated Completion Time of Conditions C, D, E, or F not met, the associated 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 3.3.5.2-1.

SR 3.3.5.2.1

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.

BASES

SURVEILLANCE REQUIREMENTS (continued)

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 Frequency of 12 hours is based upon operating experience that demonstrates channel failure is rare.

OR

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

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]

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 3.3.5.2.2

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 Frequency of 92 days is based upon operating experience that demonstrates channel failure is rare.

OR

BASES

SURVEILLANCE REQUIREMENTS (continued)

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

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]

~~SR 3.3.5.2.3~~

~~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 18 month Frequency is based on operating experience that has shown that these components usually pass the Surveillance when performed at the 18 month Frequency.~~
~~OR~~

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

~~----------REVIEWER'S NOTE----------~~
~~Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.~~
~~----------]~~

BASES

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

ACTIONS (continued)

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~~.

K.1 and K.2,

If the channel is not restored to OPERABLE status or placed in trip within the allowed Completion Time, the associated penetration flow path(s) should be isolated (Required Action K.1). Isolating the affected penetration flow path(s) accomplishes the safety function of the inoperable instrumentation. Alternately, the plant must be placed in a condition in which the LCO does not apply. If applicable, movement of [recently] irradiated fuel assemblies must be immediately suspended. Suspension of these activities shall not preclude completion of movement of a component to a safe condition.

SURVEILLANCE REQUIREMENTS

----------REVIEWER'S NOTE----------
Certain Frequencies are based on approved topical reports. In order for a licensee to use these Frequencies, the licensee must justify the Frequencies as required by the staff SER for the topical report.

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 also 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 for up to 6 hours provided the associated Function maintains trip capability. Upon completion of the Surveillance,

BASES

ACTIONS (continued)

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~~.

K.1 and K.2

If the channel is not restored to OPERABLE status or placed in trip within the allowed Completion Time, the associated penetration flow path(s) should be isolated (Required Action K.1). Isolating the affected penetration flow path(s) accomplishes the safety function of the inoperable instrumentation. Alternately, the plant must be placed in a condition in which the LCO does not apply. If applicable, movement of [recently] irradiated fuel assemblies must be immediately suspended. Suspension of these activities shall not preclude completion of movement of a component to a safe condition. .

SURVEILLANCE REQUIREMENTS

----------REVIEWER'S NOTE----------
Certain Frequencies are based on approved topical reports. In order for a licensee to use these Frequencies, the licensee must justify the Frequencies as required by the staff SER for the topical report.

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 also 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 for up to 6 hours provided the associated Function maintains trip capability. Upon completion of the Surveillance,

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

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.

APPLICABLE SAFETY ANALYSES

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.

A double-ended guillotine break of the Reactor Coolant System (RCS) is not ~~postulated~~ considered 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 an ~~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 (an event that creates a drain path through multiple vessel penetrations located below top of active fuel, such as ~~e.g., seismic event,~~ loss of normal power, or a 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.

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).

LCO

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.

BASES

LCO (continued)

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 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 ECCS injection/spray subsystem is required to be OPERABLE and capable of being manually aligned and started from the control room to provide defense-in- depth should an unexpected draining event occur. OPERABILITY of the ECCS injection/spray subsystem includes any necessary valves, instrumentation, or controls needed to manually align and start the subsystem from the control room. A ECCS injection/spray subsystem is defined as either one of the three Low Pressure Coolant Injection (LPCI) subsystems, one Low Pressure Core Spray (LPCS) System, or one High Pressure Core Spray (HPCS) System. The LPCI subsystems and the LPCS System consist of one motor driven pump, piping, and valves to transfer water from the suppression pool to the RPV. The HPCS System consists of one motor driven pump, piping, and valves to transfer water from the suppression pool or condensate storage tank (CST) to the RPV.

The LCO is modified by a Note which allows a required LPCI subsystem (A or B) 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.

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 System~~, and RPV Water Inventory Control~~." 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 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 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.]

---------- REVIEWER'S NOTE ----------
The bracketed information applies to multiple unit sites with a shared secondary containment and recognizes that an OPERABLE secondary containment, secondary containment penetrations, and SGT subsystems satisfy Required Actions C.1, C.2, and C.3.)

[Required Actions C.1, C.2, and C.3 are considered to be met when [secondary containment], [secondary containment] penetrations, and the Standby Gas Treatment System are OPERABLE in accordance with LCO 3.6.4.1, LCO 3.6.4.2, and LCO 3.6.4.3.]

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

---------- REVIEWER'S NOTE ----------
The bracketed information applies to multiple unit sites with a shared secondary containment and recognizes that an OPERABLE secondary

containment, secondary containment penetrations, and SGT subsystems satisfy Required Actions 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

BASES

ACTIONS (continued)

subsystems. The additional method of water injection must be able to 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 [automatically or] 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.]

[Required Actions D.2, D.3, and D.4 are considered to be met when [secondary containment], [secondary containment] penetrations, and the Standby Gas Treatment System are OPERABLE in accordance with LCO 3.6.4.1, LCO 3.6.4.2, and LCO 3.6.4.3.]

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 REQUIREMENTS

SR 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 closed and administratively controlled~~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~~.

BASES

SURVEILLANCE REQUIREMENTS (continued)

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 a single penetration flow path~~s~~, or multiple penetration flow paths susceptible to a common mode failure, from the determination of DRAIN TIME ~~must~~ should consider the ~~potential~~ effects of ~~a single operator error or initiating event on items supporting~~ temporary alterations in support of maintenance ~~maintenance and testing~~ (rigging, scaffolding, temporary shielding, piping plugs, ~~snubber removal,~~ freeze seals, etc.). If reasonable controls are implemented to prevent ~~If failure of~~ such temporary alterations from ~~items could result and would~~ causing~~e~~ a draining event from a closed system, or between the RPV and the isolation device, the effect of the temporary alterations on DRAIN TIME need not be considered. Reasonable controls include, ~~,~~ but are not limited to, ~~the penetration flow path may not be excluded from the DRAIN TIME calculation.~~controls consistent with the guidance in NUMARC 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Revision 4, NUMARC 91-06, "Guidelines for Industry Actions to Assess Shutdown Management," or commitments to NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants."

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 Frequency of 12 hours is sufficient in view of indications of RPV water level available to the operator .

OR

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

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]

SR 3.5.2.2 and SR 3.5.2.3

The minimum water level of [12.67 ft] required for the suppression pool is periodically verified to ensure that the suppression pool will provide adequate net positive suction head (NPSH) for the ECCS pump, recirculation volume, and vortex prevention. With the suppression pool

BASES

SURVEILLANCE REQUIREMENTS (continued)

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 < [12.67 ft], the HPCS 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 HPCS pump. Therefore, a verification that either the suppression pool water level is ≥ [12.67 ft] or the HPCS System is aligned to take suction from the CST and the CST contains ≥ [170,000] gallons of water, equivalent to [18] ft, ensures that the HPCS System can supply makeup water to the RPV.

[The 12 hour Frequency of these SRs was developed considering operating experience related to suppression pool and CST water level variations. Furthermore, the 12 hour Frequency is considered adequate in view of other indications available in the control room, including alarms, to alert the operator to an abnormal suppression pool or CST water level condition.

OR

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

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]

SR 3.5.2.4

The flow path piping has the potential to develop voids and pockets of entrained air. Maintaining the pump discharge lines of the required ECCS injection/spray subsystems full of water ensures that the ECCS subsystem will perform properly. This may also prevent a water hammer following an ECCS actuation~~initiation signal~~. One acceptable method of ensuring that the lines are full is to vent at the high points. [The 31 day Frequency is based on the gradual nature of void buildup in the ECCS piping, the procedural controls governing system operation, and operating experience.

OR

BASES

SURVEILLANCE REQUIREMENTS (continued)

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

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]

~~SR 3.5.2.5~~

~~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 31 day Frequency is appropriate because the valves are operated under procedural control and the probability of their being mispositioned during this time period is low.~~

~~OR~~

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

~~----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]~~

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.5.2.~~5~~6

Verifying that the required ECCS injection/spray subsystem can be manually aligned, and the pump started and operated for at least 10 minutes demonstrates that the subsystem is available to mitigate a draining event. This SR is modified by two Notes. Note 1 states that t~~T~~esting the ECCS injection/spray subsystem may be done through the test return ~~recirculation~~ line ~~is necessary~~ to avoid overfilling the refueling cavity. Note 2 states that credit for meeting the SR may be taken for normal system operation that satisfies the SR, such as using the RHR mode of LPCI for ≥ 10 minutes. The minimum operating time of 10 minutes was based on engineering judgement. [The performance frequency of 92 days is consistent with similar at-power testing required by SR 3.5.1.~~4~~7.

OR

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

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]

SR 3.5.2.~~6~~7

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 [18] month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the Surveillance when performed at the [18] month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

OR

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

BASES

SURVEILLANCE REQUIREMENTS (continued)

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]

~~SR 3.5.2.8~~

~~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 LCPI subsystem, LCPS System, or HPCS System to start and operate as designed, including pump startup and actuation of all automatic valves to their required positions.~~

~~[The [18] month Frequency is based on the need to perform the Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power.~~

~~Operating experience has shown that these components usually pass the SR when performed at the [18] month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.~~

~~OR~~

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

~~----------REVIEWER'S NOTE----------~~
~~Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.~~
~~----------]~~

~~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.~~

BASES

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.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.5.3.5

The RCIC System is required to actuate automatically to perform its design function. This Surveillance verifies that with a required system initiation signal (actual or simulated) the automatic initiation logic of RCIC will cause the system to operate as designed, including actuation of the system throughout its emergency operating sequence, automatic pump startup and actuation of all automatic valves to their required positions. This Surveillance test also ensures that the RCIC System will automatically restart on an RPV low water level (Level 2) signal received subsequent to an RPV high water level (Level 8) trip and that the suction is automatically transferred from the CST to the suppression pool. The LOGIC SYSTEM FUNCTIONAL TEST performed in LCO 3.3.5.~~3~~2 overlaps this Surveillance to provide complete testing of the assumed safety function.

[The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency, which is based on the refueling cycle. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

OR

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

----------REVIEWER'S NOTE----------
Plants controlling Surveillance Frequencies under a Surveillance Frequency Control Program should utilize the appropriate Frequency description, given above, and the appropriate choice of Frequency in the Surveillance Requirement.
----------]

This SR is modified by a Note that excludes vessel injection 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.

BASES

ACTIONS (continued)

C.1

When the HPCS is required to be OPERABLE, and the additional required Division 3 AC source is inoperable, the required diversity of AC power sources to the HPCS is not available. Since these sources only affect the HPCS, the HPCS is declared inoperable and the Required Actions of the affected Emergency Core Cooling Systems LCO entered.

In the event all sources of power to Division 3 are lost, Condition A will also be entered and direct that the ACTIONS of LCO 3.8.10 be taken. If only the Division 3 additional required AC source is inoperable, and power is still supplied to HPCS, 72 hours is allowed to restore the additional required AC source to OPERABLE. This is reasonable considering HPCS will still perform its function, absent an additional single failure.

SURVEILLANCE REQUIREMENTS

SR 3.8.2.1

SR 3.8.2.1 requires the SRs from LCO 3.8.1 that are necessary for ensuring the OPERABILITY of the AC sources in other than MODES 1, 2, and 3. SR 3.8.1.8 is not required to be met since only one offsite circuit is required to be OPERABLE. SR 3.8.1.11, SR 3.8.1.12, SR 3.8.1.13, and SR 3.8.1.19 are not required to be met because DG response on an offsite power or ECCS initiation signal is not required. SR 3.8.1.17 is not required to be met because the required OPERABLE DG(s) is not required to undergo periods of being synchronized to the offsite circuit. SR 3.8.1.20 is excepted because starting independence is not required with the DG(s) that is not required to be OPERABLE. Refer to the corresponding Bases for LCO 3.8.1 for a discussion of each SR.

This SR is modified by a~~two~~ Note~~s~~ which precludes ~~. The reason for Note 1 is to preclude~~ requiring the OPERABLE DG(s) from being paralleled with the offsite power network or otherwise rendered inoperable during the performance of SRs. With limited AC sources available, a single event could compromise both the required circuit and the DG, and to preclude deenergizing a required 4160 V ESF bus or disconnecting a required offsite circuit during performance of SRs. It is the intent that these SRs must still be capable of being met, but actual performance is not required during periods when the DG and offsite circuit is required to be OPERABLE. ~~Note 2 states that SRs 3.8.1.12 and 3.8.1.19 are not~~

BASES

SURVEILLANCE REQUIREMENTS (continued)

~~required to be met when its associated ECCS subsystem(s) are not required to be OPERABLE. These SRs demonstrate the DG response to an ECCS signal (either alone or in conjunction with a loss-of-power signal). This is consistent with the ECCS instrumentation requirements that do not require the ECCS signals when the ECCS System is not required to be OPERABLE .~~

REFERENCES None.