Technical Specifications Task Force
Improved Standard Technical Specifications Change Traveler

Add Containment Sump TS to Address GSI-191 Issues

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

Classification: 1) Technical Change

Recommended for CLIIP?: Yes

Correction or Improvement: Improvement

NRC Fee Status: Exemption Requested

Changes Marked on ISTS Rev 4.0

Revision History

OG Revision 0 Revision Status: Active

Revision Proposed by: PWROG

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Original Issue

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Affected Technical Specifications

Bkgnd 3.5.2 Bases	ECCS - Operating
Bkgnd 3.5.3 Bases	ECCS - Shutdown
SR 3.5.3.1	ECCS - Shutdown
SR 3.5.3.1 Bases	ECCS - Shutdown
5.5.15	Safety Function Determination Program Change Description: Optional Change

SR 3.5.2.9	ECCS - Operating Change Description: Deleted	NUREG(s)- 1430 Only
SR 3.5.2.9 Bases	ECCS - Operating Change Description: Deleted	NUREG(s)- 1430 Only
Bkgnd 3.6.8 Bases	Containment Sump Change Description: New specification	NUREG(s)- 1430 Only
S/A 3.6.8 Bases	Containment Sump Change Description: New specification	NUREG(s)- 1430 Only
LCO 3.6.8	Containment Sump Change Description: New specification	NUREG(s)- 1430 Only
LCO 3.6.8 Bases	Containment Sump Change Description: New specification	NUREG(s)- 1430 Only
Appl. 3.6.8	Containment Sump Change Description: New specification	NUREG(s)- 1430 Only
Appl. 3.6.8 Bases	Containment Sump Change Description: New specification	NUREG(s)- 1430 Only
Ref. 3.6.8 Bases	Containment Sump Change Description: New specification	NUREG(s)- 1430 Only
Action 3.6.8.A	Containment Sump Change Description: New specification	NUREG(s)- 1430 Only
Action 3.6.8.A Bases	Containment Sump Change Description: New specification	NUREG(s)- 1430 Only
Action 3.6.8.B	Containment Sump Change Description: New specification	NUREG(s)- 1430 Only
Action 3.6.8.B Bases	Containment Sump Change Description: New specification	NUREG(s)- 1430 Only
Action 3.6.8.C	Containment Sump Change Description: New specification	NUREG(s)- 1430 Only
Action 3.6.8.C	Containment Sump Change Description: New specification	NUREG(s)- 1430 Only
SR 3.6.8.1	Containment Sump Change Description: New specification	NUREG(s)- 1430 Only
SR 3.6.8.1 Bases	Containment Sump Change Description: New specification	NUREG(s)- 1430 Only
SR 3.5.2.8	ECCS - Operating Change Description: Deleted	NUREG(s)- 1431 Only

SR 3.5.2.8 Bases	ECCS - Operating	NUREG(s)- 1431 Only
	Change Description: Deleted	
Bkgnd 3.6.19 Bases	Containment Sump	NUREG(s)- 1431 Only
	Change Description: New specification	
S/A 3.6.19 Bases	Containment Sump	NUREG(s)- 1431 Only
	Change Description: New specification	
LCO 3.6.19	Containment Sump	NUREG(s)- 1431 Only
	Change Description: New specification	
LCO 3.6.19 Bases	Containment Sump	NUREG(s)- 1431 Only
	Change Description: New specification	
Appl. 3.6.19	Containment Sump	NUREG(s)- 1431 Only
	Change Description: New specification	
Appl. 3.6.19 Bases	Containment Sump	NUREG(s)- 1431 Only
	Change Description: New specification	
Ref. 3.6.19 Bases	Containment Sump	NUREG(s)- 1431 Only
	Change Description: New specification	
Action 3.6.19.A	Containment Sump	NUREG(s)- 1431 Only
	Change Description: New specification	
Action 3.6.19.A Bases	Containment Sump	NUREG(s)- 1431 Only
	Change Description: New specification	
Action 3.6.19.B	Containment Sump	NUREG(s)- 1431 Only
	Change Description: New specification	
Action 3.6.19.B Bases	Containment Sump	NUREG(s)- 1431 Only
	Change Description: New specification	
Action 3.6.19.C	Containment Sump	NUREG(s)- 1431 Only
	Change Description: New specification	
Action 3.6.19.C Bases	Containment Sump	NUREG(s)- 1431 Only
	Change Description: New specification	
SR 3.6.19.1	Containment Sump	NUREG(s)- 1431 Only
	Change Description: New specification	
SR 3.6.19.1 Bases	Containment Sump	NUREG(s)- 1431 Only
	Change Description: New specification	
SR 3.5.2.10	ECCS - Operating	NUREG(s)- 1432 Only
	Change Description: Deleted	
SR 3.5.2.10 Bases	ECCS - Operating	NUREG(s)- 1432 Only
	Change Description: Deleted	

Bkgnd 3.6.13 Bases	Containment Sump	NUREG(s)- 1432 Only
	Change Description: New specification	
S/A 3.6.13 Bases	Containment Sump	NUREG(s)- 1432 Only
	Change Description: New specification	
LCO 3.6.13	Containment Sump	NUREG(s)- 1432 Only
	Change Description: New specification	
LCO 3.6.13 Bases	Containment Sump	NUREG(s)- 1432 Only
	Change Description: New specification	
Appl. 3.6.13	Containment Sump	NUREG(s)- 1432 Only
	Change Description: New specification	
Appl. 3.6.13 Bases	Containment Sump	NUREG(s)- 1432 Only
	Change Description: New specification	
Ref. 3.6.13 Bases	Containment Sump	NUREG(s)- 1432 Only
	Change Description: New specification	
Action 3.6.13.A	Containment Sump	NUREG(s)- 1432 Only
	Change Description: New specification	
Action 3.6.13.A Bases	Containment Sump	NUREG(s)- 1432 Only
	Change Description: New specification	
Action 3.6.13.B	Containment Sump	NUREG(s)- 1432 Only
	Change Description: New specification	
Action 3.6.13.B Bases	Containment Sump	NUREG(s)- 1432 Only
	Change Description: New specification	
Action 3.6.13.C	Containment Sump	NUREG(s)- 1432 Only
	Change Description: New specification	
Action 3.6.13.C Bases	Containment Sump	NUREG(s)- 1432 Only
	Change Description: New specification	
SR 3.6.13.1	Containment Sump	NUREG(s)- 1432 Only
	Change Description: New specification	
SR 3.6.13.1 Bases	Containment Sump	NUREG(s)- 1432 Only
	Change Description: New specification	

1 SUMMARY DESCRIPTION

The proposed change adds a new Technical Specification (TS) on the containment sump and adds an Action to address the condition of the containment sump made inoperable due to the potential for containment accident generated and transported debris exceeding the analyzed limits. The Action provides time to correct or evaluate the condition in lieu of an immediate plant shutdown. The new specification otherwise retains the existing Technical Specifications requirements.

2 DETAILED DESCRIPTION

2.1 GSI-191 Background

Generic Safety Issue 191 (GSI-191), "Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance," concerns the possibility that debris generated during a high energy line break (HELB) inside the containment of pressurized water reactors (PWRs) could clog the Emergency Core Cooling System (ECCS) and Containment Spray System[1] (CSS) flow paths needed for post-accident fluid recirculation. Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors" (Reference 1), requests that licensees address GSI-191 issues, with a focus on demonstrating compliance with the ECCS acceptance criteria in 10 CFR 50.46. Analyses are performed to demonstrate that long-term cooling will be provided following accidents that require recirculation of coolant from the containment sump.

Licensees have taken compensatory actions and modifications to reduce the risk of strainer clogging. All PWR licensees have made their sump strainers substantially larger. Some licensees have removed fibrous or particulate insulation, changed their sump pH buffers to reduce chemical effects, or installed debris interceptors to reduce the amount of debris that can reach the sump strainers. The industry has also spent considerable effort trying to reduce the uncertainties and conservatisms in the standard methods for assessing GSI-191. Licensees have made, and will continue to make, modifications and develop analyses to resolve the GSI-191 concerns in accordance with the regulations. These actions are documented in the updated final safety analysis report (UFSAR), in accordance with 10 CFR 50.71(e). However, the resolution of GSI-191 has been challenging because of a history of unexpected test results (e.g., sensitivities to debris types and time of arrival of debris at the sump strainer) and new issues (e.g., the inclusion of in-vessel effects). Licensees have implemented compensatory measures in response to Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors" (Reference 2), and GL 2004-02 to address the potential for sump strainer blockage, while continuing to develop methods to address in-vessel effects.

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[1] In some Westinghouse plant designs, the Recirculation Spray System takes suction from the containment sump and sprays into the containment. For the purposes of this traveler, the name "Containment Spray System" will refer to all designs.

In-vessel debris testing completed in 2011 determined that in-vessel effects will be the limiting factor for many plants. Even latent debris (which does not include accident-generated debris) can cause a reduction in core flow if conservative assumptions are made regarding the amount of latent fiber, the fiber transport, and the percent of fiber passing through the strainer. In July 2013, WCAP-16793-NP-A, Rev. 2 (Reference 3) was approved by the NRC for use in addressing in-vessel effects. The methodology presented in WCAP-16793-NP-A, Rev. 2 provides a single conservative fibrous debris limit of 15 grams per fuel assembly (g/FA) for all plants. The WCAP-16793-NP-A, Rev. 2 methodology is based on assumptions regarding debris types, timing of debris arrival, and the immediate onset of chemical effects that significantly increases the head loss across a fiber bed that forms at the core inlet. The associated limit is restrictive and does not support GSI-191 closure for a large fraction of the U.S. PWR fleet.

The PWR Owners Group (PWROG) sponsored a comprehensive testing and analysis program to increase the fibrous debris limit to support licensees that could not otherwise close the in-vessel debris issues without substantial modifications to existing insulation systems. The program provides a refined evaluation methodology for determining in-vessel fiber limits and produces final limits that satisfy the evaluation of long-term cooling as required by 10CFR50.46. This alternate approach is consistent with guidance provided in NRC SECY-12-0093 "Closure Options for Generic Safety Issue – 191, Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance," (Reference 4). The results may also be applied as the basis for a risk-informed approach to evaluating in-vessel effects. The program is complete and the results are currently being reviewed by the NRC.

Additional compensatory measures have been developed by licensees to specifically address in-vessel blockage. PWRs have instrumentation to monitor core water levels and temperatures following a loss-of-coolant accident (LOCA) and operating procedures to initiate hot leg recirculation, which may provide an alternate flow path that bypasses core inlet blockage. For these reasons and others documented in GL 2004-02, that are still applicable, continued operation of PWR plants is justified.

<u>GSI-191 Closure Options</u>

The Nuclear Energy Institute (NEI) submitted a letter on May 4, 2012 (Reference 5), recommending actions that a licensee could select for resolving GSI-191 based on the amount of fiber in containment. In response, all PWR licensees submitted a plant-specific path and schedule for resolution of GSI-191. Licensees that did not meet the deterministic criteria by December 31, 2012 implemented additional defense-in-depth measures to mitigate risk while they either continued testing or pursued a risk-informed approach. Licensees of "high fiber" plants agreed to take measurements at the next opportunity to prepare to replace fibrous insulation, if necessary.

The entire U.S. PWR fleet has selected one of the options discussed below.

- *Option 1: Compliance with 10 CFR 50.46 Based on Approved Models*

  Licensees will demonstrate compliance with 10 CFR 50.46 through approved models for analyses, strainer head loss testing, and in-vessel effects. Licensees that selected Option

1 typically operate plants with very low fiber amounts and strict containment cleanliness programs. Some licensees have installed strainer design features such as bypass eliminators that significantly reduce the amount of debris that passes through the sump strainer and reaches the core, such that the in-vessel limits can be met even with high fiber loads in containment.

- *Option 2: Mitigative Measures and Alternative Methods Approach*

  Option 2 is a graded approach in which licensees' actions and schedules are based on the amount of fibrous insulation in the plant. Licensees have implemented mitigating measures for unresolved strainer blockage or in-vessel effects while they complete their analyses and plant modifications. Plants with high fiber loads are generally recognized as having higher risk of strainer and in-vessel issues than plants with relatively low fiber amounts; therefore, higher fiber plants have taken measurements in preparation for insulation modifications. In parallel, Option 2 licensees are continuing to pursue refinements to the evaluation methods or are considering a risk-informed approach (described in Reference 6), which focuses plant modifications on the most risk-significant aspects of GSI-191.

  Licensees following a risk-informed approach will develop a model of plant piping and insulation and commit to performing any plant-specific testing needed to justify the major assumptions (e.g., chemical effects or strainer head loss correlation).

- *Option 3: Different Regulatory Treatment for Suction Strainer and In-Vessel Effects*

  Option 3 treats suction strainer blockage deterministically while addressing in-vessel effects in a risk-informed manner. In-vessel effects can be addressed using a risk-informed approach that evaluates the timing and potential mitigating actions associated with the event, rather than assuming worst-case conditions throughout.

All three options have been determined by the NRC to be effective in resolving GSI-191. The proposed TS change is applicable to all plants, regardless of the GSI-191 closure option selected.

2.2 <u>Containment Sump Description</u>

The containment sump system consists of the containment drainage flow paths, any design features upstream of the containment sump that are credited in the containment debris analysis, the containment sump strainers, the pump suction trash racks, and the inlet to the ECCS and CSS piping. Following an accident, water from the Reactor Coolant System (RCS) and the ECCS and water sprayed into the containment from the CSS collects in the sump. The recirculation mode from the containment sump is initiated when the ECCS and CSS pump suction is transferred to the containment sump from the Borated Water Storage Tank (BWST) (Babcock & Wilcox plants), the Refueling Water Storage Tank (RWST) (Westinghouse plants), or the Refueling Water Tank (RWT) (Combustion Engineering plants). The containment sump provides a borated water source to support recirculation of coolant from the sump to the ECCS and CSS for residual heat removal, emergency core cooling, containment cooling, and (depending on the plant design) containment atmosphere cleanup.

Containment sumps are designed to meet the requirements of Regulatory Guide (RG) 1.82, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident" (Ref. 7). PWR plant designs may include a single sump and multiple sumps, with a single sump being more common. A single containment sump supplying both trains of ECCS and CSS is acceptable as the sump is a passive component, and passive failures are not assumed to occur coincident with Design Basis Events. In multiple sump designs, separate sumps supply redundant trains of ECCS and CSS.

The containment sump is designed to not be restricted by potential accident generated and transported debris. Pre-existing (latent) and accident-generated debris materials may exist in the water entering the containment sump. The containment sump contains strainers to limit the quantity of these debris materials from entering the downstream systems (i.e., ECCS and CSS). The debris can be divided into the following categories:

a. Debris that is generated directly by the high energy line break (HELB) blowdown (e.g., insulation, coatings, and other materials near the break) and is subject to transport by the blowdown forces,

b. Pre-existing debris or debris created by adverse environmental conditions (e.g., latent debris, or dirt, and unqualified coatings not influenced by the HELB blowdown) that may be transported to the containment sump primarily by water flowing to the containment sump, and

c. Chemical reaction products generated within containment.

When the recirculation mode begins after an accident, the debris can be transported to the containment sump. Larger pieces of debris accumulate on the sump strainers, but some fraction of smaller debris (fiber fines, particulates, and chemical corrosion products) can penetrate the strainers and be transported to the ECCS and CSS water inlets. Evaluations are performed to demonstrate that long-term cooling requirements are met following accidents that require recirculation from the containment sump.

2.3 Current Technical Specifications Requirements

TS 3.5.2, "ECCS - Operating," contains a Surveillance Requirement (SR) on the containment sump. It is SR 3.5.2.9 in the Standard Technical Specifications (STS) for Babcock and Wilcox plants (NUREG-1430), SR 3.5.2.8 in the STS for Westinghouse plants (NUREG-1431), and SR 3.5.2.10 in the STS for Combustion Engineering plants (NUREG-1432). The SR states:

> Verify, by visual inspection, each ECCS train containment sump suction inlet is not restricted by debris and the suction inlet trash racks and screens show no evidence of structural distress or abnormal corrosion.

The Frequency for performing the SR is 18 months or as specified in the Surveillance Frequency Control Program. The Bases state that the purpose of the SR is to ensure that the containment sump is unrestricted and stays in proper operating condition. The Frequency is based on the need to perform the SR during a plant outage in order to have access to the location.

TS 3.5.3, "ECCS - Shutdown," SR 3.5.3.1, requires performing several SRs in TS 3.5.2, including containment sump SR. The SR 3.5.3.1 Bases refer to the TS 3.5.2 Bases.

There is no current TS Action for an inoperable containment sump. If the containment sump is inoperable, the affected trains of ECCS and CSS are inoperable. For plants with a single containment sump, an inoperable sump results in all trains of ECCS and CSS being inoperable, immediate entry into LCO 3.0.3, and a plant shutdown.

2.4 Reason for the Proposed Change

Licensees have analyzed the susceptibility of the ECCS and CSS to the adverse effects of post-accident debris blockage and operation with debris-laden fluids. Licensees have established appropriate limits on the allowable quantities of containment accident generated debris that could be transported to the containment sump based on their current plant configuration.

If unanalyzed debris sources are discovered inside containment, if errors are discovered in debris-related analyses, or if a previously unevaluated phenomenon that can affect containment sump performance is discovered, the containment sump, and the supported ECCS and CSS, may be inoperable. In this case, the TS require an immediate plant shutdown and no time is provided to evaluate the condition.

2.5 Description of the Proposed Change

The proposed change provides a new TS Action that applies when the containment sump is inoperable due to the potential for containment accident generated and transported debris that exceeds the analyzed limits.

To facilitate the addition of the new Action, a new specification is created containing all requirements on the containment sump. The new specification is titled, "Containment Sump," and is placed in Section 3.6, "Containment Systems." The new specification number is 3.6.8 in NUREG-1430 (Babcock and Wilcox plants), 3.6.19 in NUREG-1431 (Westinghouse plants), and 3.6.13 in NUREG-1432 (Combustion Engineering plants).

The LCO requires the containment sump to be operable and contains plant-specific options for a single or multiple sump designs. The LCO is Applicable in Modes 1, 2, 3, and 4, corresponding to the Applicability of the ECCS and CSS.

Action A applies when the containment sump is inoperable due to the potential for containment accident generated and transported debris that exceeds the analyzed limits, and requires immediately initiating action to mitigate the condition, performing the RCS leakage monitoring surveillance more frequently, and restoring the containment sump to operable status within 90 days.

Action B applies when the containment sump is inoperable for reasons other than Condition A and requires restoring the sump to operable status within 72 hours or 7 days, depending on the plant's existing TS requirements. Action B is modified by Notes that require entering the Conditions and Required Actions of ECCS and CSS trains made inoperable by the inoperable sump.

Action C applies if the Required Actions and associated Completion Times of Actions A or B are not met and requires placing the plant in Mode 3 in 6 hours and Mode 5 in 36 hours.

The existing TS 3.5.2 Surveillance Requirement on the containment sump is moved to the new specification. The wording is revised to reflect the move and to be more generic.

TS 3.5.2 is revised to delete the containment sump SR. SR 3.5.3.1 is revised to eliminate the reference to the TS 3.5.2 containment sump SR.

If a plant's TS does not include the following sentence in the TS Section 5.5 Safety Function Determination Program, it may be added as the last sentence of the last paragraph of the program as part of this proposed change:

> When a loss of safety function is caused by the inoperability of a single Technical Specification support system, the appropriate Conditions and Required Actions to enter are those of the support system.

The proposed change is supported by changes to the TS Bases. In addition to adding Bases for the new specification, the ECCS and CSS Bases are revised to reflect the proposed change. 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 staff 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 included in the proposed change as Enclosure 1. The model may be used by licensees desiring to adopt the traveler following NRC approval. The model application is intended for use by Option 1 plants and Option 2 plants utilizing NRC-approved higher fibrous debris limits as NRC approval of the limits or methods is not required. Option 2 or Option 3 plants using a risk-informed approach will not use the model application, but may use the proposed TS changes and associated justification in a plant-specific license amendment request that includes the necessary technical justification.

3 TECHNICAL EVALUATION

The proposed change provides an Action which is applicable when the potential for containment accident generated and transported debris that exceeds the analyzed limits. In the current TS, this condition would result in declaring the supported ECCS and CSS trains inoperable and an immediate plant shutdown in accordance with LCO 3.0.3. This does not provide time to evaluate or correct the condition. Providing time to evaluate or correct the condition is appropriate because of small likelihood of an accident requiring recirculation from the containment sump during the proposed Completion Time, the margins in the debris generation and transport

analyses and in the downstream and in-vessel effects analyses, and the mitigating actions required by the proposed TS.

The containment sump supports the post-accident operation of the ECCS and CSS, but only the current ECCS TS contain SRs on the containment sump. There are no TS Actions specifically applicable to an inoperable containment sump in the ECCS or CSS TS. To address this inconsistency, the proposed change creates a new specification on the containment sump which treats the containment sump as a TS support system, similar to the treatment of the TS 3.5.4 ECCS and CSS water source called the Borated Water Storage Tank (NUREG-1430), the RWST (NUREG-1431), or the Refueling Water Tank (NUREG-1432).

The following sections describe the proposed specification.

3.1 LCO

The LCO states, "[The][Two] containment sumps shall be OPERABLE." In the STS, brackets are used to indicate plant-specific information. As such, the LCO for plants with a single containment sump will state "The containment sump shall be OPERABLE," and the LCO for plants with two containment sumps will state "Two containment sumps shall be OPERABLE."

The LCO Bases describe the system and explain how the TS Section 1.1 definition of operability applies to the LCO. A containment sump consists of the containment drainage flow paths, any design features upstream of the containment sump that are credited in the containment debris analysis, the containment sump strainers, the pump suction trash racks, and the inlet to the ECCS and CSS piping. An OPERABLE containment sump will not be restricted by accident generated and transported debris and has no structural damage or abnormal corrosion that could prevent recirculation of coolant.

3.2 Applicability

The specification is Applicable in Modes 1, 2, 3, and 4. This is consistent with the Applicability of the supported ECCS and CSS specifications.

3.3 Actions

3.3.1 Action A

Action A is applicable when the containment sump or sumps (depending on the plant design) are inoperable due to potential containment accident generated and transported debris exceeding the analyzed limits.

Required Action A.1 requires immediate action to mitigate the potential for containment accident generated and transported debris in excess of the analyzed limits. Section 1.3, "Completion Times," of the TS defines an immediate Completion Time as "the Required Action should be pursued without delay and in a controlled manner." The TS Bases provide examples of mitigating actions, such as removing the debris source from containment or preventing the debris from being transported, evaluating the debris source against the assumptions in the analysis,

maintaining the availability of the containment coolers and other LOCA mitigating equipment, or applying an alternative method to establish new limits.

Required Action A.2 requires performance of the RCS water inventory balance, SR 3.4.13.1, at an increased Frequency of once per 24 hours instead of the usual Frequency of 72 hours. An unexpected increase in RCS leakage could be indicative of an increased potential for an RCS pipe break, which could result in debris being generated and transported to the containment sump. The more frequent monitoring allows operators to act in a timely fashion to minimize the potential for an RCS pipe break while the containment sump is inoperable.

Required Action A.3 requires the containment sump to be restored to operable status within 90 days. A 90-day Completion Time is reasonable for emergent conditions that involve the potential for debris that could be generated and transported to the containment sump under accident conditions in excess of the analyzed limits. The likelihood of an initiating event in the 90-day completion time is very small (1/4 of the Loss of Coolant Accident (LOCA) annual frequency). Ninety days is a reasonable time to identify and implement mitigating or compensatory action, such as removing the debris, securing or containing the debris so that it is not transportable, performing additional analysis, or obtaining regulatory relief.

There is precedent in the STS for an extended Completion Time for equipment that mitigates highly unlikely events. The control room filtration system, which is called the Control Room Emergency Ventilation System (CREVS) in NUREG-1430, the Control Room Emergency Filtration System (CREFS) in NUREG-1431, and the Control Room Emergency Air Cleanup System (CREACS) in NUREG-1432, removes radioactive materials, hazardous chemicals, and smoke from the control room air following an accident or transient. If both trains of the system are inoperable due to an inoperable control room envelope boundary, 90 days are provided to restore the boundary to operable status provided mitigating actions are taken. The 90-day Completion Time was approved by the NRC under TSTF-448 (Reference 8).

3.3.2 Action B

Action B is applicable when the containment sump or sumps are inoperable for reasons other than Condition A. Examples of other reasons why the containment sump would be inoperable are a strainer obstructed by a tarp or a strainer with large gaps that would pass debris fragments.

Required Action B.1 requires restoring the containment sump to operable status and is modified by two Notes. The first note states, "Enter applicable Conditions and Required Actions of LCO 3.5.2, 'ECCS - Operating,' and LCO 3.5.3, 'ECCS - Shutdown,' for emergency core cooling trains made inoperable by the containment sump[s]." The second Note states, "Enter applicable Conditions and Required Actions of LCO 3.6.6, 'Containment Spray and Cooling Systems,' for containment spray trains made inoperable by the containment sump[s]." These Notes direct entry into the Conditions and Required Actions for the supported systems (ECCS and CSS). LCO 3.0.6 states, "When a support system's Required Action directs a supported system to be declared inoperable or directs entry into Conditions and Required Actions for a supported system, the applicable Conditions and Required Actions shall be entered in accordance with LCO 3.0.2." The Notes retain the existing TS Actions for ECCS or CSS trains made inoperable

by a containment sump inoperable for reasons other than potential containment accident generated and transported debris exceeding the analyzed limits.

The Completion Time is either 72 hours or 7 days, depending on the current plant TS. The Required Action Action B.1 Completion Time to be no more limiting than the ECCS or CSS Completion Times for a single inoperable train. The Completion Time for one ECCS train inoperable is 72 hours. The Completion Time for one CSS train inoperable is either 72 hours or 7 days, depending on the plant design and licensing basis. A Reviewer's Note in the Bases for Required Action B.1 directs the licensee to select the appropriate Completion Time.

3.3.3 Action C

Action C applies if the Required Actions and associated Completion Times of Action A or B are not met. If the containment sump is not restored to operable status within the specified Completion Times, 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 6 hours and to MODE 5 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.

3.4 Surveillance Requirement

The single SR is moved from TS 3.5.2 and reworded to be more generic. The TS 3.5.2 SR was specific to ECCS train containment sump suction. The proposed SR requires verification, by visual inspection, that the containment sump or sumps do not show structural damage, abnormal corrosion, or debris blockage. The Frequency is 18 months or as specified in the Surveillance Frequency Control Program. Licensees will retain the existing TS 3.5.2 Surveillance Frequency in the new Surveillance.

This periodic inspection includes strainers, trash racks, vortex suppressors, and pump suction piping inlets for evidence of structural degradation, potential for debris bypass, and presence of corrosion or debris blockage. Containment is inspected for evidence of unanalyzed debris sources that could lead to increased accident generated and transported debris, including drainage flow paths (e.g., refueling cavity drains and floor drains), debris interceptors, trash racks, and other design features that are credited in the strainer performance or in-vessel effects analyses. Inspection of the containment sump, associated structures, and upstream components is typically conducted late in a refueling outage to ensure the absence of debris generated by construction or maintenance activities.

In summary, the new specification retains the existing Technical Specifications requirements with the exception of the addition of Action A for the containment sump inoperable due to the potential for containment accident generated and transported debris exceeding the analyzed limits.

3.5 LCO 3.0.6 and the Safety Function Determination Program

Under the proposed change, LCO 3.0.6 may be applied if the containment sump is inoperable. Under LCO 3.0.6, the supported TS systems (ECCS and CSS) are inoperable, but the Actions are

not required to be followed; only the containment sump TS Actions must be followed. LCO 3.0.6 also requires an evaluation in accordance with the TS Safety Function Determination Program (SFDP) (Specification 5.5.15 in NUREG-1430, NUREG-1431, and NUREG-1432). Typically, when a loss of safety function is determined to exist by the program, the appropriate Conditions and Required Actions of the LCO in which the loss of safety function exists are required to be entered. However, when a loss of safety function is caused by the inoperability of a single Technical Specification support system (such as the containment sump), the appropriate Conditions and Required Actions to enter are those of the support system (the sump). This clarification of the requirements of LCO 3.0.6 and the SFDP was added to Revision 2 of STS NUREGs by TSTF-273, Revision 2, "SFDP Clarifications," approved by the NRC on August 16, 1999. As such, it should appear in the TS of most plants. As stated in TSTF-273, Revision 2, the STS were developed such that the Actions for an inoperable support system are sufficient without cascading to the supported system Actions, even if both trains of the supported system were inoperable resulting in a loss of function. If a plant's TS does not include the STS changes added by TSTF-273, the following sentence from the STS may be appended to the last paragraph of the SFDP as part of this proposed change:

> When a loss of safety function is caused by the inoperability of a single Technical Specification support system, the appropriate Conditions and Required Actions to enter are those of the support system.

4 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

The following NRC requirements and guidance documents are applicable to the proposed change.

10 CFR 50, Appendix A, General Design Criterion (GDC) 4, "Environmental and Dynamic Effects Design Bases," states:

> Structures, systems, and components important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents.

GDC 35, "Emergency Core Cooling," states:

> A system to provide abundant emergency core cooling shall be provided. The system safety function shall be to transfer heat from the reactor core following any loss of reactor coolant at a rate such that (1) fuel and clad damage that could interfere with continued effective core cooling is prevented and (2) clad metal-water reaction is limited to negligible amounts.

GDC 38, "Containment Heat Removal," states:

> A system to remove heat from the reactor containment shall be provided. The system safety function shall be to reduce rapidly, consistent with the functioning of other

> associated systems, the containment pressure and temperature following any loss-of-coolant accident and maintain them at acceptably low levels.

GDC 41, "Containment Atmospheric Cleanup," states:

> Systems to control fission products, hydrogen, oxygen, and other substances which may be released into the reactor containment shall be provided as necessary to reduce, consistent with the functioning of other associated systems, the concentration and quality of fission products released to the environment following postulated accidents, and to control the concentration of hydrogen or oxygen and other substances in the containment atmosphere following postulated accidents to assure that containment integrity is maintained.

GDC 36, "Inspection of Emergency Core Cooling," states:

> The emergency core cooling system shall be designed to permit appropriate periodic inspection of important components, such as spray rings in the reactor pressure vessel, water injection nozzles, and piping, to assure the integrity and capability of the system.

GDC 39, "Inspection of Containment Heat Removal," states:

> The containment heat removal system shall be designed to permit appropriate periodic inspection of important components, such as the torus, sumps, spray nozzles, and piping to assure the integrity and capability of the system.

GDC 42, "Inspection of Containment Atmospheric Cleanup," states:

> The containment atmosphere cleanup systems shall be designed to permit appropriate periodic inspection of important components, such as filter frames, ducts, and piping to assure the integrity and capability of the systems.

10 CFR 50.46(b)(5), "Long-term cooling," states:

> After any calculated successful initial operation of the ECCS, the calculated core temperature shall be maintained at an acceptably low value and decay heat shall be removed for the extended period of time required by the long-lived radioactivity remaining in the core.

Regulatory Guide 1.82, "Water Sources for Long-term Recirculation Cooling Following a Loss-of-Coolant Accident," describes methods that the U.S. NRC considers acceptable for use in implementing requirements regarding PWR containment sumps that provide water sources for emergency core cooling, containment heat removal, or containment atmosphere cleanup systems. It also provides guidelines for evaluating the adequacy and the availability of the containment sump for long-term recirculation cooling following a loss-of-coolant accident (LOCA).

The proposed change does not alter the design of the plants. As a result, the applicability of the General Design Criteria and the Regulatory Guide is not affected.

10 CFR 50.36 "Technical Specifications," states that Technical Specifications shall be derived from the analyses and evaluation included in the safety analysis report. 10 CFR 50.36(C)(2) states that when a limiting condition for operation is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met. The proposed change provides a remedial action to be followed if the limiting condition for operation is not met. Therefore, the proposed change is consistent with the requirements of 10 CFR 50.36.

The proposed change does not affect compliance with these regulations or guidance and will ensure that the lowest functional capabilities or performance levels of equipment required for safe operation are met.

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.

5 REFERENCES

1. NRC Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors," September 13, 2004, ADAMS Accession No. ML042360586.

2. Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Recirculation During Design-Basis Accidents at Pressurized-Water Reactors," June 9, 2003, ADAMS Accession No. ML031600259.

3. WCAP-16793-NP-A, Rev. 2, "Evaluation of Long-Term Cooling Considering Particulate, Fibrous and Chemical Debris in the Recirculation Fluid," July 2013.

4. SECY-12-0093, "Closure Options for Generic Safety Issue – 191, Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance," July 2012.

5. Letter from J. Butler, NEI to W. Ruland, NRC, "GSI-191 – Current Status and Recommended Actions for Closure," Dated May 4, 2012, ADAMS Accession No. ML12142A316.

6. South Texas Project Units 1 and 2 Docket Nos. STN 50-498 and STN 50-499 Supplement 3 to Revised STP Pilot Submittal and Requests for Exemptions and License Amendment for a Risk-Informed Approach to Address Generic Safety Issue (GSI) -191 and Response to Generic Letter (GL) 2004-02 (TAC NOS. MF2400 – MF2409), Dated October 20, 2016, ADAMS Accession No. ML16302A015.

7. Regulatory Guide 1.82, Revision 4, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident," March 2012.

8. "NRC Notice of Availability of Technical Specification Improvement to Modify Requirements Regarding Control Room Envelope Habitability using the Consolidated Line Item Improvement Process," January 2007, ADAMS Accession No. ML063460558.

Enclosure 1

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-567, "Add Containment Sump TS to Address GSI-191 Issues"

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-567, "Add Containment Sump TS to Address GSI-191 Issues," which is an approved change to the Improved Standard Technical Specifications (ISTS), into the [PLANT NAME, UNIT NOS] Technical Specifications (TS). The proposed amendment adds a new Technical Specification (TS) 3.6.[8], "Containment Sump," and adds an Action to address the condition of the containment sump made inoperable due to the potential for containment accident generated and transported debris exceeding the analyzed limits. The Action provides time to correct or evaluate the condition in lieu of an immediate plant shutdown.

Attachment 1 provides a description and assessment of the proposed changes. Attachment 2 provides the existing TS pages marked to show the proposed changes. Attachment 3 provides revised (clean) TS pages. Attachment 4 provides existing TS Bases pages marked to show the proposed changes for information only.

Approval of the proposed amendment is requested by [date]. Once approved, the amendment shall be implemented within [ ] days.

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]

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

{Attachments 2, 3, and 4 are not included in the model application and are to be provided by the licensee.}

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

ATTACHMENT 1 - DESCRIPTION AND ASSESSMENT

1.0 DESCRIPTION

[LICENSEE] requests adoption of TSTF-567, "Add Containment Sump TS to Address GSI-191 Issues," which is an approved change to the Improved Standard Technical Specifications (ISTS), into the [PLANT NAME, UNIT NOS] Technical Specifications (TS).

The proposed amendment adds a new Technical Specification (TS) 3.6.[8], "Containment Sump," and adds an Action to address the condition of the containment sump made inoperable due to the potential for containment accident generated and transported debris exceeding the analyzed limits. The Action provides time to correct or evaluate the condition in lieu of an immediate plant shutdown. This Action is placed in a new specification on the containment sump that otherwise retains the existing Technical Specifications requirements. An existing Surveillance Requirement (SR) is moved from TS 3.5.2 to the new specification. A reference to the SR in TS 3.5.3 is deleted.

[The proposed amendment also revises the Safety Function Determination Program to clarify its application when a supported system is made inoperable by the inoperability of a single Technical Specification support system.]

2.0 ASSESSMENT

2.1 Applicability of Safety Evaluation

[LICENSEE] has reviewed the safety evaluation for TSTF-567 provided to the Technical Specifications Task Force in a letter dated [DATE]. This review included the NRC staff's evaluation, as well as the information provided in TSTF-567. [As described herein,] [LICENSEE] has concluded that the justifications presented in TSTF-567 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.

2.2 Variations

[LICENSEE is not proposing any variations from the TS changes described in the TSTF-567 or the applicable parts of the NRC staff's safety evaluation.] [LICENSEE is proposing the following variations from the TS changes described in the TSTF-567 or the applicable parts of the NRC staff's safety evaluation. These variations do not affect the applicability of TSTF-567 or the NRC staff's safety evaluation to the proposed license amendment.]

[The [PLANT] TS utilize different [numbering][and][titles] than the Standard Technical Specifications on which TSTF-567 was based. Specifically, [describe differences between the plant-specific TS numbering and/or titles and the TSTF-567 numbering and titles.] These differences are administrative and do not affect the applicability of TSTF-567 to the [PLANT] TS.]

[The [PLANT] TS contain requirements that differ from the ISTS on which TSTF-567 was based, but are encompassed within the TSTF-567 justification. [Describe differences and why TSTF-567 is still applicable.]]

[The [PLANT] design is different than the model plant assumed in the Standard Technical Specifications, but the TSTF-567 justification and the NRC staff's safety evaluation are still applicable. [Describe differences and why TSTF-567 is still applicable.]]

[The traveler and model Safety Evaluation discuss the applicable regulatory requirements and guidance, including the 10 CFR 50, Appendix A, General Design Criteria (GDC). [PLANT] was not licensed to the 10 CFR 50, Appendix A, GDC. The [PLANT] equivalents of the referenced GDC are [reference including UFSAR location, if applicable]. [Discuss the equivalence of the referenced plant-specific requirements to the Appendix A GDC as related to the proposed change.] This difference does not alter the conclusion that the proposed change is applicable to [PLANT].]

[The [PLANT] Technical Specifications contain a Surveillance Frequency Control Program. Therefore, the Frequency for Surveillance Requirement 3.6.[8].1 is "In accordance with the Surveillance Frequency Control Program."]

3.0 REGULATORY ANALYSIS

3.1 No Significant Hazards Consideration Analysis

The proposed amendment adds a new Technical Specification (TS) 3.6.[8], "Containment Sump," and adds an Action to address the condition of the containment sump made inoperable due to the potential for containment accident generated and transported debris exceeding the analyzed limits. The Action provides time to correct or evaluate the condition in lieu of an immediate plant shutdown. This Action is placed in a new specification on the containment sump that otherwise retains the existing Technical Specifications requirements. This Action is placed in a new specification on the containment sump that otherwise retains the existing Technical Specifications requirements. An existing Surveillance Requirement (SR) is moved from TS 3.5.2 to the new specification. A reference to the SR in TS 3.5.3 is deleted.

[The proposed amendment also revises the Safety Function Determination Program to clarify its application when a supported system is made inoperable by the inoperability of a single Technical Specification support system.]

[LICENSEE] has evaluated whether a significant hazards consideration is involved with the proposed change 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 adds a new specification to the TS on the containment sump. An existing SR on the containment sump is moved to the new specification and a reference to the SR is removed. The new specification retains the existing requirements on the containment sump and the actions to be taken when the containment sump is inoperable with the exception of adding new actions to be taken when the containment sump is inoperable due to the potential for containment accident generated and transported debris exceeding the analyzed limits. The new action provides time to evaluate and correct the condition instead of requiring an immediate plant shutdown.

The containment sump is not an initiator of any accident previously evaluated. The containment sump is a passive component and the proposed change does not increase the likelihood of the malfunction. As a result, the probability of an accident if unaffected by the proposed change.

The containment sump is used to mitigate accidents previously evaluated by providing a borated water source for the Emergency Core Cooling System (ECCS) and Containment Spray System (CSS). The design of the containment sump and the capability of the containment sump assumed in the accident analysis is not changed. The proposed action requires implementation of mitigating actions while the containment sump is inoperable and more frequent monitoring of reactor coolant leakage to detect any increased potential for an accident that would require the containment sump. The consequences of an accident during the proposed action are no different than the current consequences of an accident if the containment sump is inoperable.

[The proposed change clarifies the Safety Function Determination Program when a supported system is made inoperable by the inoperability of a single Technical Specification support system. The Safety Function Determination Program directs the appropriate use of TS actions and the proposed change does not alter the current intent of the TS. The actions taken when a system is inoperable are not an assumption in the initiation or mitigation of any previously evaluated accident.]

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 adds a new specification to the TS on the containment sump. An existing SR on the containment sump is moved to the new specification and a reference to the SR is removed. The new specification retains the existing requirements on the containment sump and the actions to be taken when the containment sump is inoperable with the exception of adding new actions to be taken when the containment sump is inoperable due to the potential for containment accident generated and transported debris exceeding the analyzed limits. The new action provides time to evaluate and correct the condition instead of requiring an immediate plant shutdown.

The proposed change does not alter the design or design function of the containment sump or the plant. No new systems are installed or removed as part of the proposed change. The containment sump is a passive component and cannot initiate a malfunction or accident. No new credible accident is created that is not encompassed by the existing accident analyses that assume the function of the containment sump.

[The proposed change clarifies the Safety Function Determination Program when a supported system is made inoperable by the inoperability of a single Technical Specification support system. The Safety Function Determination Program directs the appropriate use of TS actions and the proposed change does not alter the current intent of the TS. The proposed change to the Safety Function Determination Program will not result in any change to the design or design function of the containment sump or a method of operation of the plant.]

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 adds a new specification to the TS on the containment sump. An existing SR on the containment sump is moved to the new specification and a reference to the SR is removed. The new specification retains the existing requirements on the containment sump and the actions to be taken when the containment sump is inoperable with the exception of adding new actions to be taken when the containment sump is inoperable due to the potential for containment accident generated and transported debris exceeding the analyzed limits. The new action provides time to evaluate and correct the condition instead of requiring an immediate plant shutdown.

The proposed change does not affect the controlling values of parameters used to avoid exceeding regulatory or licensing limits. No Safety Limits are affected by the proposed change. The proposed change does not affect any assumptions in the accident analyses that demonstrate compliance with regulatory and licensing requirements.

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

Based on the above, [LICENSEE] concludes that the proposed amendment does not involve a 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 CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or a 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 amendment 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 amendment.

Enclosure 2

Technical Specifications Proposed Changes

TABLE OF CONTENTS / REVISION SUMMARY

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.5.2.8	[Verify the flow controllers for the following LPI throttle valves operate properly: a. [DHV-110] and b. [DHV-111].	[[18] months OR In accordance with the Surveillance Frequency Control Program]]
~~SR 3.5.2.9~~	~~Verify, by visual inspection, each ECCS train containment sump suction inlet is not restricted by debris and suction inlet trash racks and screens show no evidence of structural distress or abnormal corrosion.~~	~~[[18] months~~ ~~OR~~ ~~In accordance with the Surveillance Frequency Control Program]~~

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.3.1	For all equipment required to be OPERABLE, the following SRs are applicable: [SR 3.5.2.1] SR 3.5.2.6 SR 3.5.2.2 [SR 3.5.2.7] [SR 3.5.2.3] [SR 3.5.2.8] SR 3.5.2.4 ~~SR 3.5.2.9~~ SR 3.5.2.5	In accordance with applicable SRs

3.6 CONTAINMENT SYSTEMS

3.6.8 Containment Sump

LCO 3.6.8 [The][Two] containment sump[s] shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. [One or more] containment sump[s] inoperable due to potential for containment accident generated and transported debris exceeding the analyzed limits.	A.1	Initiate action to mitigate containment accident generated and transported debris.	Immediately
	<u>AND</u>		
	A.2	Perform SR 3.4.13.1.	Once per 24 hours
	<u>AND</u>		
	A.3	Restore the containment sump[s] to OPERABLE status.	90 days

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. [One or more] containment sump[s] inoperable for reasons other than Condition A.	B.1	--------------NOTES------------- 1. Enter applicable Conditions and Required Actions of LCO 3.5.2, "ECCS - Operating," and LCO 3.5.3, "ECCS - Shutdown," for emergency core cooling trains made inoperable by the containment sump[s]. 2. Enter applicable Conditions and Required Actions of LCO 3.6.6, "Containment Spray and Cooling Systems," for containment spray trains made inoperable by the containment sump[s]. ------------------------------------- Restore the containment sump[s] to OPERABLE status.	[7 days]
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 3.	6 hours
	<u>AND</u>		
	C.2	Be in MODE 5.	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.8.1	Verify, by visual inspection, the containment sump[s] does not show structural damage, abnormal corrosion, or debris blockage.	[[18] months <u>OR</u> In accordance with the Surveillance Frequency Control Program]

5.5.13 Diesel Fuel Oil Testing Program (continued)

b. Within 31 days following addition of the new fuel oil to storage tanks, verify that the properties of the new fuel oil, other than those addressed in a., above, are within limits for ASTM 2D fuel oil, and

c. Total particulate concentration of the fuel oil is ≤ 10 mg/l when tested every 31 days.

The provisions of SR 3.0.2 and SR 3.0.3 are applicable to the Diesel Fuel Oil Testing Program testing frequencies.

5.5.14 Technical Specifications (TS) Bases Control Program

This program provides a means for processing changes to the Bases of these Technical Specifications.

a. Changes to the Bases of the TS shall be made under appropriate administrative controls and reviews.

b. Licensees may make changes to Bases without prior NRC approval provided the changes do not require either of the following:

   1. A change in the TS incorporated in the license or

   2. A change to the updated FSAR or Bases that requires NRC approval pursuant to 10 CFR 50.59.

c. The Bases Control Program shall contain provisions to ensure that the Bases are maintained consistent with the FSAR.

d. Proposed changes that meet the criteria of 5.5.14b above shall be reviewed and approved by the NRC prior to implementation. Changes to the Bases implemented without prior NRC approval shall be provided to the NRC on a frequency consistent with 10 CFR 50.71(e).

5.5.15 Safety Function Determination Program (SFDP)

This program ensures loss of safety function is detected and appropriate actions taken. Upon entry into LCO 3.0.6, an evaluation shall be made to determine if loss of safety function exists. Additionally, other appropriate limitations and remedial or compensatory actions may be identified to be taken as a result of the support system inoperability and corresponding exception to entering supported system Condition and Required Actions. This program implements the requirements of LCO 3.0.6. The SFDP shall contain the following:

5.5 Programs and Manuals

5.5.15 Safety Function Determination Program (continued)

a. Provisions for cross train checks to ensure a loss of the capability to perform the safety function assumed in the accident analysis does not go undetected,

b. Provisions for ensuring the plant is maintained in a safe condition if a loss of function condition exists,

c. Provisions to ensure that an inoperable supported system's Completion Time is not inappropriately extended as a result of multiple support system inoperabilities, and

d. Other appropriate limitations and remedial or compensatory actions.

A loss of safety function exists when, assuming no concurrent single failure, no concurrent loss of offsite power, or no concurrent loss of onsite diesel generator(s), a safety function assumed in the accident analysis cannot be performed. For the purpose of this program, a loss of safety function may exist when a support system is inoperable, and

a. A required system redundant to the system(s) supported by the inoperable support system is also inoperable, or

b. A required system redundant to the system(s) in turn supported by the inoperable supported system is also inoperable, or

c. A required system redundant to the support system(s) for the supported systems (a) and (b) above is also inoperable.

Optional Change. Only applicable if not already in the plant-specific TS.

The SFDP identifies where a loss of safety function exists. If a loss of safety function is determined to exist by this program, the appropriate Conditions and Required Actions of the LCO in which the loss of safety function exists are required to be entered. When a loss of safety function is caused by the inoperability of a single Technical Specification support system, the appropriate Conditions and Required Actions to enter are those of the support system.

5.5.16 Containment Leakage Rate Testing Program

[OPTION A]

a. A program shall establish the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option A, as modified by approved exemptions.

b. The maximum allowable containment leakage rate, L_a, at P_a, shall be [ ]% of containment air weight per day.

BACKGROUND (continued)

the LPI pump to the suction of the HPI pumps would be opened. This is known as "piggy backing" HPI to LPI and enables continued HPI to the RCS, if needed, after the BWST is emptied.

In the long term cooling period, flow paths in the LPI System are established to preclude the possibility of boric acid in the core region reaching an unacceptably high concentration. One flow path is from the hot leg through the decay heat suction line from the hot leg and then in a reverse direction through the containment sump outlet line into the sump. The other flow path is through the pressurizer auxiliary spray line from one LPI train into the pressurizer and through the hot leg into the top region of the core.

The HPI subsystem also functions to supply borated water to the reactor core following increased heat removal events, such as large SLBs.

During low temperature conditions in the RCS, limitations are placed on the maximum number of ECCS pumps that may be OPERABLE. Refer to the Bases for LCO 3.4.12, "Low Temperature Overpressure Protection (LTOP) System," for the basis of these requirements.

During a large break LOCA, RCS pressure will decrease to < 200 psia in < 20 seconds. The ECCS is actuated upon receipt of an Engineered Safety Feature Actuation System (ESFAS) signal. The actuation of safeguard loads is accomplished in a programmed time sequence. If offsite power is available, the safeguard loads start immediately (in the programmed sequence). If offsite power is not available, the Engineered Safety Feature (ESF) buses shed normal operating loads and are connected to the diesel generators. Safeguard loads are then actuated in the programmed time sequence. The time delay associated with diesel starting, sequenced loading, and pump starting determines the time required before pumped flow is available to the core following a LOCA.

The active ECCS components, along with the passive core flood tanks (CFTs)*,* ~~and~~ the BWST*, and the containment sump, are* covered in LCO 3.5.1, "Core Flood Tanks (CFTs)," ~~and~~ LCO 3.5.4, "Borated Water Storage Tank (BWST)," *and LCO 3.6.8, "Containment Sump," and* provide the cooling water necessary to meet 10 CFR 50.46 (Ref. 1).

APPLICABLE SAFETY ANALYSES

The LCO helps to ensure that the following acceptance criteria for the ECCS, established by 10 CFR 50.46 (Ref. 1), will be met following a LOCA:

a. Maximum fuel element cladding temperature is ≤ 2200°F,

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

This Surveillance ensures that the flow controllers for the LPI throttle valves will automatically control the LPI train flow rate in the desired range and prevent LPI pump runout as RCS pressure decreases after a LOCA. [The 18 month Frequency is justified by the same reasons as those stated for SR 3.5.2.5 and SR 3.5.2.6.

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 3.5.2.9~~

~~Periodic inspections of the containment sump suction inlet ensure that it is unrestricted and stays in proper operating condition. [The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage, on the need to preserve access to the location, and on the potential for an unplanned transient if the Surveillance were performed with the reactor at power. This Frequency has been found to be sufficient to detect abnormal degradation and has been confirmed by operating experience.~~

~~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.~~
~~--]~~

REFERENCES

1. 10 CFR 50.46.

2. FSAR, Section [6.3].

3. BAW-2295-A, Revision 1, Justification for Extension of Allowed Outage Time for Low Pressure Injection and Reactor Building Spray System.

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

5. IE Information Notice 87-01, "RHR Valve Misalignment Causes Degradation of ECCS in PWRs," January 6, 1987.

6. ASME Code for Operation and Maintenance of Nuclear Power Plants.

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

B 3.5.3 ECCS - Shutdown

BASES

BACKGROUND

The Background section for Bases B 3.5.2, "ECCS - Operating," is applicable to these Bases, with the following modifications.

In MODE 4, the required ECCS train consists of two separate subsystems: high pressure injection (HPI) and low pressure injection (LPI), each consisting of two redundant, 100% capacity trains.

The ECCS flow paths consist of piping, valves, heat exchangers, and pumps, such that water from the borated water storage tank (BWST) *and the containment sump* can be injected into the Reactor Coolant System (RCS) following the accidents described in Bases 3.5.2.

APPLICABLE SAFETY ANALYSES

The Applicable Safety Analyses section of Bases 3.5.2 is applicable to these Bases.

Due to the stable conditions associated with operation in MODE 4 and the reduced probability of occurrence of a Design Basis Accident (DBA), the ECCS operational requirements are reduced. Included in these reductions is that certain automatic Engineered Safety Feature Actuation System (ESFAS) actuation is not available. In this MODE sufficient time exists for manual actuation of the required ECCS to mitigate the consequences of a DBA.

Only one ECCS train is required for MODE 4. This requirement dictates that single failures are not considered during this MODE. The ECCS train - shutdown satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

In MODE 4, one of the two independent (and redundant) ECCS trains is required to ensure sufficient ECCS flow is available to the core following a DBA.

In MODE 4, an ECCS train consists of an HPI subsystem and an LPI subsystem. Each train includes the piping, instruments, and controls to ensure an OPERABLE flow path capable of taking suction from the BWST and transferring suction to the containment sump.

During an event requiring ECCS actuation, a flow path is required to provide an abundant supply of water from the BWST to the RCS, via the ECCS pumps and their respective supply headers, to each of the four cold leg injection nozzles. In the long term, this flow path may be switched to take its supply from the containment sump and to supply its flow to the RCS hot and cold legs.

B 3.6 CONTAINMENT SYSTEMS

B 3.6.8 Containment Sump

BASES

BACKGROUND

---------------------------------- REVIEWER'S NOTE ---------------------------------
Some plant designs have more than one containment sump. LCO 3.6.8 provides the option of specifying one or two containment sumps. The Bases specify when to discuss differences between one or two sump designs by providing bracketed information. However, for clarity, all references to the containment sump are not provided with plural bracketed alternatives. Licensees adopting this Bases section for plants with two containment sumps should make the appropriate changes to the Bases to reflect the plant design.

The containment sump provides a borated water source to support recirculation of coolant from the containment sump for residual heat removal, emergency core cooling, containment cooling, and [containment atmosphere cleanup] during accident conditions.

The containment sump supplies both trains of the Emergency Core Cooling System (ECCS) and the Containment Spray System (CSS) during any accident that requires recirculation of coolant from the containment sump. The recirculation mode is initiated when the pump suction is transferred to the containment sump on low Borated Water Storage Tank (BWST) level, which ensures the containment sump has enough water to supply the net positive suction head to the ECCS and Containment Spray System pumps. [The use of a single containment sump to supply both trains of the ECCS and CSS is acceptable since the containment sump is a passive component, and passive failures are not required to be assumed to occur coincident with Design Basis Events.][Describe the design of plants with two containment sumps.]

Following an accident, the containment sump water source may contain accident generated and transported debris consisting of the following (Ref. 1):

a. Accident generated debris created by the high energy line break (HELB) (e.g., insulation, coatings, and other materials near the break) and subject to transport by the HELB blowdown forces;

b. Pre-existing debris or debris created by adverse environmental conditions following the accident (e.g., latent debris, dirt, and unqualified coatings not generated by the HELB) that may be transported to the containment sump; and

BASES

BACKGROUND (continued)

c. Chemical reaction products generated within containment following the accident and transported to the containment sump.

The containment sump contains strainers to limit the quantity of the debris materials from entering the sump suction piping. Debris accumulation on the strainers can lead to undesirable hydraulic effects including air ingestion through vortexing or deaeration, and reduced net positive suction head (NPSH) at pump suction piping.

While the majority of debris accumulates on the strainers, some fraction penetrates the strainers and is transported to downstream components in the ECCS, CSS, and the Reactor Coolant System (RCS). Debris that penetrates the strainer can result in wear to the downstream components and blockages. Excessive debris in the containment sump water source could result in insufficient recirculation of coolant during the accident.

APPLICABLE SAFETY ANALYSIS

During all accidents that require recirculation, the containment sump provides a source of borated water to the ECCS and CSS pumps. As such, it supports residual heat removal, emergency core cooling, containment cooling, and [containment atmosphere cleanup] during an accident. It also provides a source of negative reactivity (Ref. 2). The design basis transients and applicable safety analyses concerning each of these systems are discussed in the Applicable Safety Analyses section of B 3.5.2, "ECCS - Operating," B 3.5.3, "ECCS - Shutdown," and B 3.6.6, "Containment Spray and Cooling Systems."

FSAR Section X.XX (Ref. 3) describes evaluations that confirm long-term core cooling is assured following any accident that requires recirculation from the containment sump.

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

LCO

[The][Two] containment sump is required to ensure a source of borated water to support ECCS and CSS OPERABILITY. A containment sump consists of the containment drainage flow paths, [design features upstream of the containment sump that are credited in the containment debris analysis,] the containment sump strainers, the pump suction trash racks, and the inlet to the ECCS and CSS piping. An OPERABLE containment sump will not be restricted by accident generated and transported debris and has no structural damage or abnormal corrosion that could prevent recirculation of coolant.

BASES

APPLICABILITY

In MODES 1, 2, 3, and 4, containment sump OPERABILITY requirements are dictated by the ECCS and CSS OPERABILITY requirements. Since both the ECCS and the CSS must be OPERABLE in MODES 1, 2, 3, and 4, the containment sump must also be OPERABLE to support their operation.

In MODES 5 and 6, the probability and consequences of these events are reduced due to the pressure and temperature limitations of these MODES. Thus, the containment sump is not required to be OPERABLE in MODES 5 or 6.

ACTIONS

A.1, A.2, and A.3

Condition A is applicable when [the][one or more] containment sump is inoperable due to the potential for containment accident generated and transported debris exceeding the analyzed limits.

Containment accident generated and transported debris consists of the following (Ref. 1):

a. Accident generated debris created by the HELB (e.g., insulation, coatings, and other materials near the break) and subject to transport by the HELB blowdown forces;

b. Pre-existing debris or debris created by adverse environmental conditions following the accident (e.g., latent debris, dirt, and unqualified coatings not generated by the HELB) that may be transported to the containment sump; and

c. Chemical reaction products generated within containment following the accident and transported to the containment sump.

Containment debris limits are defined in FSAR Section X.XX (Ref. 3).

Immediate action must be initiated to mitigate the condition, such as removing the debris source from containment or preventing the debris from being transported, evaluating the debris source against the assumptions in the analysis, maintaining the availability of the containment coolers and other LOCA mitigating equipment, or applying an alternative method to establish new limits.

BASES

ACTIONS (continued)

While in this condition, the RCS water inventory balance, SR 3.4.13.1, must be performed at an increased Frequency of once per 24 hours. An unexpected increase in RCS leakage could be indicative of an increased potential for an RCS pipe break, which could result in debris being generated and transported to the containment sump. The more frequent monitoring allows operators to take action in a timely fashion to minimize the potential for an RCS pipe break while the containment sump is inoperable.

The inoperable containment sump must be restored to OPERABLE status in 90 days. The 90 day Completion Time is reasonable based on the time required to remove the debris source or to establish a revised analysis that addresses the debris.

B.1

------------------------------------- Reviewer's Note -----------------------------------
The Required Action B.1 Completion Time should be the same as the LCO 3.6.6 Completion Time for a single inoperable CSS train.

When the containment sump is inoperable for reasons other than Condition A, it must be restored to OPERABLE status within [7 days]. The [7 day] Completion Time takes into account the reasonable time for repairs, and low probability of an accident that requires the containment sump occurring during this period.

Required Action B.1 is modified by two Notes. The first Note indicates that the applicable Conditions and Required Actions of LCO 3.5.2, "ECCS - Operating," and LCO 3.5.3, "ECCS - Shutdown," should be entered if an inoperable containment sump results in an inoperable ECCS train. The second Note indicates that the applicable Conditions and Required Actions of LCO 3.6.6, "Containment Spray and Cooling Systems," should be entered if an inoperable containment sump results in an inoperable CSS train. This is an exception to LCO 3.0.6 and ensures the proper actions are taken for these components.

BASES

ACTIONS (continued)

C.1 and C.2

If the containment sump cannot be restored to OPERABLE status within the associated Completion Time, 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 6 hours and to MODE 5 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.

SURVEILLANCE REQUIREMENTS

SR 3.6.8.1

Periodic inspections are performed to verify the containment sump and strainers do not show current or potential debris blockage, structural damage, or abnormal corrosion to ensure the operability and structural integrity of the containment sump, strainers, and associated structures (Ref. 1).

Containment accident generated and transported debris consists of the following (Ref. 1):

a. Accident generated debris created by the HELB (e.g., insulation, coatings, and other materials near the break) and subject to transport by the HELB blowdown forces;

b. Pre-existing debris or debris created by adverse environmental conditions following the accident (e.g., latent debris, dirt, and unqualified coatings not generated by the HELB) that may be transported to the containment sump; and

c. Chemical reaction products generated within containment following the accident and transported to the containment sump.

Containment debris limits are defined in FSAR Section X.XX (Ref. 3).

[The 18 month Frequency is based on the need to perform this Surveillance during a refueling outage, because of the need to enter containment. This Frequency is sufficient to detect any indication of structural damage, abnormal corrosion, or debris blockage of the sump strainers.

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. Regulatory Guide 1.82, Revision 4, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident," March 2012.

2. FSAR, Chapter [6] and Chapter [15].

3. FSAR, Section X.XX, [Sump Debris Evaluation].

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
~~SR 3.5.2.8~~	~~Verify, by visual inspection, each ECCS train containment sump suction inlet is not restricted by debris and the suction inlet trash racks and screens show no evidence of structural distress or abnormal corrosion.~~	~~[[18] months~~ ~~OR~~ ~~In accordance with the Surveillance Frequency Control Program]~~

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.3.1	The following SRs are applicable for all equipment required to be OPERABLE: [SR 3.5.2.1] [SR 3.5.2.7] [SR 3.5.2.3] ~~SR 3.5.2.8~~ SR 3.5.2.4	In accordance with applicable SRs

3.6 CONTAINMENT SYSTEMS

3.6.19 Containment Sump

LCO 3.6.19 [The][Two] containment sump[s] shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. [One or more] containment sump[s] inoperable due to potential for containment accident generated and transported debris exceeding the analyzed limits.	A.1 Initiate action to mitigate containment accident generated and transported debris.	Immediately
	AND	
	A.2 Perform SR 3.4.13.1.	Once per 24 hours
	AND	
	A.3 Restore the containment sump[s] to OPERABLE status.	90 days

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. [One or more] containment sump[s] inoperable for reasons other than Condition A.	B.1	--------------NOTES------------- 1. Enter applicable Conditions and Required Actions of LCO 3.5.2, "ECCS - Operating," and LCO 3.5.3, "ECCS - Shutdown," for emergency core cooling trains made inoperable by the containment sump[s]. 2. Enter applicable Conditions and Required Actions of LCO 3.6.6, "[Containment Spray and Cooling Systems]," for [containment spray] trains made inoperable by the containment sump[s]. ------------------------------------- Restore the containment sump[s] to OPERABLE status.	[72 hours]
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 3.	6 hours
	<u>AND</u>		
	C.2	Be in MODE 5.	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.19.1	Verify, by visual inspection, the containment sump[s] does not show structural damage, abnormal corrosion, or debris blockage.	[[18] months <u>OR</u> In accordance with the Surveillance Frequency Control Program]

5.5 Programs and Manuals

5.5.14 Technical Specifications (TS) Bases Control Program (continued)

c. The Bases Control Program shall contain provisions to ensure that the Bases are maintained consistent with the FSAR.

d. Proposed changes that meet the criteria of Specification 5.5.14b above shall be reviewed and approved by the NRC prior to implementation. Changes to the Bases implemented without prior NRC approval shall be provided to the NRC on a frequency consistent with 10 CFR 50.71(e).

5.5.15 Safety Function Determination Program (SFDP)

This program ensures loss of safety function is detected and appropriate actions taken. Upon entry into LCO 3.0.6, an evaluation shall be made to determine if loss of safety function exists. Additionally, other appropriate actions may be taken as a result of the support system inoperability and corresponding exception to entering supported system Condition and Required Actions. This program implements the requirements of LCO 3.0.6. The SFDP shall contain the following:

a. Provisions for cross train checks to ensure a loss of the capability to perform the safety function assumed in the accident analysis does not go undetected,

b. Provisions for ensuring the plant is maintained in a safe condition if a loss of function condition exists,

c. Provisions to ensure that an inoperable supported system's Completion Time is not inappropriately extended as a result of multiple support system inoperabilities, and

d. Other appropriate limitations and remedial or compensatory actions.

A loss of safety function exists when, assuming no concurrent single failure, no concurrent loss of offsite power, or no concurrent loss of onsite diesel generator(s), a safety function assumed in the accident analysis cannot be performed. For the purpose of this program, a loss of safety function may exist when a support system is inoperable, and:

a. A required system redundant to the system(s) supported by the inoperable support system is also inoperable, or

b. A required system redundant to the system(s) in turn supported by the inoperable supported system is also inoperable, or

5.5 Programs and Manuals

5.5.15 Safety Function Determination Program (SFDP) (continued)

c. A required system redundant to the support system(s) for the supported systems (a) and (b) above is also inoperable.

Optional Change. Only applicable if not already in the plant-specific TS.

The SFDP identifies where a loss of safety function exists. If a loss of safety function is determined to exist by this program, the appropriate Conditions and Required Actions of the LCO in which the loss of safety function exists are required to be entered. When a loss of safety function is caused by the inoperability of a single Technical Specification support system, the appropriate Conditions and Required Actions to enter are those of the support system.

5.5.16 Containment Leakage Rate Testing Program

[OPTION A]

a. A program shall establish the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option A, as modified by approved exemptions.

b. The maximum allowable containment leakage rate, L_a, at P_a, shall be [ ]% of containment air weight per day.

c. Leakage rate acceptance criteria are:

  1. Containment leakage rate acceptance criterion is $\leq 1.0\ L_a$. During the first unit startup following testing in accordance with this program, the leakage rate acceptance criteria are $< 0.60\ L_a$ for the Type B and C tests and $< 0.75\ L_a$ for Type A tests.

  2. Air lock testing acceptance criteria are:

     a) Overall air lock leakage rate is $\leq$ [0.05 L_a] when tested at $\geq P_a$.

     b) For each door, leakage rate is $\leq$ [0.01 L_a] when pressurized to [$\geq$ 10 psig].

d. The provisions of SR 3.0.3 are applicable to the Containment Leakage Rate Testing Program.

e. Nothing in these Technical Specifications shall be construed to modify the testing Frequencies required by 10 CFR 50, Appendix J.

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BACKGROUND (continued)

During low temperature conditions in the RCS, limitations are placed on the maximum number of ECCS pumps that may be OPERABLE. Refer to the Bases for LCO 3.4.12, "Low Temperature Overpressure Protection (LTOP) System," for the basis of these requirements.

The ECCS subsystems are actuated upon receipt of an SI signal. The actuation of safeguard loads is accomplished in a programmed time sequence. If offsite power is available, the safeguard loads start immediately in the programmed sequence. If offsite power is not available, the Engineered Safety Feature (ESF) buses shed normal operating loads and are connected to the emergency diesel generators (EDGs). Safeguard loads are then actuated in the programmed time sequence. The time delay associated with diesel starting, sequenced loading, and pump starting determines the time required before pumped flow is available to the core following a LOCA.

The active ECCS components, along with the passive accumulators~~, and~~ the RWST*, and the containment sump, are* covered in LCO 3.5.1, "Accumulators," ~~and~~ LCO 3.5.4, "Refueling Water Storage Tank (RWST)," *and LCO 3.6.19, "Containment Sump," and* provide the cooling water necessary to meet GDC 35 (Ref. 1).

APPLICABLE SAFETY ANALYSES

The LCO helps to ensure that the following acceptance criteria for the ECCS, established by 10 CFR 50.46 (Ref. 2), will be met following a LOCA:

a. Maximum fuel element cladding temperature is ≤ 2200°F,

b. Maximum cladding oxidation is ≤ 0.17 times the total cladding thickness before oxidation,

c. Maximum hydrogen generation from a zirconium water reaction is ≤ 0.01 times the hypothetical amount generated if all of the metal in the cladding cylinders surrounding the fuel, excluding the cladding surrounding the plenum volume, were to react,

d. Core is maintained in a coolable geometry, and

e. Adequate long term core cooling capability is maintained.

The LCO also limits the potential for a post trip return to power following an MSLB event and ensures that containment temperature limits are met.

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~~

~~Periodic inspections of the containment sump suction inlet ensure that it is unrestricted and stays in proper operating condition. [The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage, on the need to have access to the location, and because of the potential for an unplanned transient if the Surveillance were performed with the reactor at power. This Frequency has been found to be sufficient to detect abnormal degradation and is confirmed by operating experience.~~

~~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.~~
~~--]~~

REFERENCES

1. 10 CFR 50, Appendix A, GDC 35.
2. 10 CFR 50.46.
3. FSAR, Section [ ].
4. FSAR, Chapter [15], "Accident Analysis."
5. NRC Memorandum to V. Stello, Jr., from R.L. Baer, "Recommended Interim Revisions to LCOs for ECCS Components," December 1, 1975.
6. IE Information Notice No. 87-01.

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

B 3.5.3 ECCS - Shutdown

BASES

BACKGROUND

The Background section for Bases 3.5.2, "ECCS - Operating," is applicable to these Bases, with the following modifications.

In MODE 4, the required ECCS train consists of two separate subsystems: centrifugal charging (high head) and residual heat removal (RHR) (low head).

The ECCS flow paths consist of piping, valves, heat exchangers, and pumps such that water from the refueling water storage tank (RWST) *and the containment sump* can be injected into the Reactor Coolant System (RCS) following the accidents described in Bases 3.5.2.

APPLICABLE SAFETY ANALYSES

The Applicable Safety Analyses section of Bases 3.5.2 also applies to this Bases section.

Due to the stable conditions associated with operation in MODE 4 and the reduced probability of occurrence of a Design Basis Accident (DBA), the ECCS operational requirements are reduced. It is understood in these reductions that certain automatic safety injection (SI) actuation is not available. In this MODE, sufficient time exists for manual actuation of the required ECCS to mitigate the consequences of a DBA.

Only one train of ECCS is required for MODE 4. This requirement dictates that single failures are not considered during this MODE of operation. The ECCS trains satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

In MODE 4, one of the two independent (and redundant) ECCS trains is required to be OPERABLE to ensure that sufficient ECCS flow is available to the core following a DBA.

In MODE 4, an ECCS train consists of a centrifugal charging subsystem and an RHR subsystem. Each train includes the piping, instruments, and controls to ensure an OPERABLE flow path capable of taking suction from the RWST and transferring suction to the containment sump.

During an event requiring ECCS actuation, a flow path is required to provide an abundant supply of water from the RWST to the RCS via the ECCS pumps and their respective supply headers to each of the four cold leg injection nozzles. In the long term, this flow path may be switched to take its supply from the containment sump and to deliver its flow to the RCS hot and cold legs.

B 3.6 CONTAINMENT SYSTEMS

B 3.6.19 Containment Sump

BASES

BACKGROUND

---------------------------------- REVIEWER'S NOTE ---------------------------------
Some plant designs have more than one containment sump. LCO 3.6.19 provides the option of specifying one or two containment sumps. The Bases specify when to discuss differences between one or two sump designs by providing bracketed information. However, for clarity, all references to the containment sump are not provided with plural bracketed alternatives. Licensees adopting this Bases section for plants with two containment sumps should make the appropriate changes to the Bases to reflect the plant design.

The containment sump provides a borated water source to support recirculation of coolant from the containment sump for residual heat removal, emergency core cooling, containment cooling, and [containment atmosphere cleanup] during accident conditions.

The containment sump supplies both trains of the Emergency Core Cooling System (ECCS) and the [Containment Spray System (CSS)][Recirculation Spray (RS) System] during any accident that requires recirculation of coolant from the containment sump. The recirculation mode is initiated when the pump suction is transferred to the containment sump on low Refueling Water Storage Tank (RWST) level, which ensures the containment sump has enough water to supply the net positive suction head to the ECCS and [CSS][RS System] pumps. [The use of a single containment sump to supply both trains of the ECCS and [CSS][RS System] is acceptable since the containment sump is a passive component, and passive failures are not required to be assumed to occur coincident with Design Basis Events.][Describe the design of plants with two containment sumps.]

Following an accident, the containment sump water source may contain accident generated and transported debris consisting of the following (Ref. 1):

a. Accident generated debris created by the high energy line break (HELB) (e.g., insulation, coatings, and other materials near the break) and subject to transport by the HELB blowdown forces;

b. Pre-existing debris or debris created by adverse environmental conditions following the accident (e.g., latent debris, dirt, and unqualified coatings not generated by the HELB) that may be transported to the containment sump; and

BACKGROUND (continued)

c. Chemical reaction products generated within containment following the accident and transported to the containment sump.

The containment sump contains strainers to limit the quantity of the debris materials from entering the sump suction piping. Debris accumulation on the strainers can lead to undesirable hydraulic effects including air ingestion through vortexing or deaeration, and reduced net positive suction head (NPSH) at pump suction piping.

While the majority of debris accumulates on the strainers, some fraction penetrates the strainers and is transported to downstream components in the ECCS, [CSS][RS System][RS System], and the Reactor Coolant System (RCS). Debris that penetrates the strainer can result in wear to the downstream components and blockages. Excessive debris in the containment sump water source could result in insufficient recirculation of coolant during the accident.

APPLICABLE SAFETY ANALYSIS

During all accidents that require recirculation, the containment sump provides a source of borated water to the ECCS and [CSS][RS System] pumps. As such, it supports residual heat removal, emergency core cooling, containment cooling, and [containment atmosphere cleanup] during an accident. It also provides a source of negative reactivity (Ref. 2). The design basis transients and applicable safety analyses concerning each of these systems are discussed in the Applicable Safety Analyses section of B 3.5.2, "ECCS - Operating," B 3.5.3, "ECCS - Shutdown," and B 3.6.6, "[Containment Spray and Cooling Systems]."

FSAR Section X.XX (Ref. 3) describes evaluations that confirm long-term core cooling is assured following any accident that requires recirculation from the containment sump.

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

LCO

[The][Two] containment sump is required to ensure a source of borated water to support ECCS and [CSS][RS System] OPERABILITY. A containment sump consists of the containment drainage flow paths, [design features upstream of the containment sump that are credited in the containment debris analysis,] the containment sump strainers, the pump suction trash racks, and the inlet to the ECCS and [CSS][RS System] piping. An OPERABLE containment sump will not be restricted by accident generated and transported debris and has no structural damage or abnormal corrosion that could prevent recirculation of coolant.

APPLICABILITY

In MODES 1, 2, 3, and 4, containment sump OPERABILITY requirements are dictated by the ECCS and [CSS][RS System] OPERABILITY requirements. Since both the ECCS and the [CSS][RS System] must be OPERABLE in MODES 1, 2, 3, and 4, the containment sump must also be OPERABLE to support their operation.

In MODES 5 and 6, the probability and consequences of these events are reduced due to the pressure and temperature limitations of these MODES. Thus, the containment sump is not required to be OPERABLE in MODES 5 or 6.

ACTIONS

A.1, A.2, and A.3

Condition A is applicable when [the][one or more] containment sump is inoperable due to the potential for containment accident generated and transported debris exceeding the analyzed limits.

Containment accident generated and transported debris consists of the following (Ref. 1):

a. Accident generated debris created by the HELB (e.g., insulation, coatings, and other materials near the break) and subject to transport by the HELB blowdown forces;

b. Pre-existing debris or debris created by adverse environmental conditions following the accident (e.g., latent debris, dirt, and unqualified coatings not generated by the HELB) that may be transported to the containment sump; and

c. Chemical reaction products generated within containment following the accident and transported to the containment sump.

Containment debris limits are defined in FSAR Section X.XX (Ref. 3).

Immediate action must be initiated to mitigate the condition, such as removing the debris source from containment or preventing the debris from being transported, evaluating the debris source against the assumptions in the analysis, maintaining the availability of the containment coolers and other LOCA mitigating equipment, or applying an alternative method to establish new limits.

ACTIONS (continued)

While in this condition, the RCS water inventory balance, SR 3.4.13.1, must be performed at an increased Frequency of once per 24 hours. An unexpected increase in RCS leakage could be indicative of an increased potential for an RCS pipe break, which could result in debris being generated and transported to the containment sump. The more frequent monitoring allows operators to take action in a timely fashion to minimize the potential for an RCS pipe break while the containment sump is inoperable.

The inoperable containment sump must be restored to OPERABLE status in 90 days. The 90 day Completion Time is reasonable based on the time required to remove the debris source or to establish a revised analysis that addresses the debris.

B.1

------------------------------------- Reviewer's Note ------------------------------------
The Required Action B.1 Completion Time should be the same as the LCO 3.6.6 Completion Time for a single inoperable CSS train.

When the containment sump is inoperable for reasons other than Condition A, it must be restored to OPERABLE status within [72 hours]. The [72 hour] Completion Time takes into account the reasonable time for repairs, and low probability of an accident that requires the containment sump occurring during this period.

Required Action B.1 is modified by two Notes. The first Note indicates that the applicable Conditions and Required Actions of LCO 3.5.2, "ECCS - Operating," and LCO 3.5.3, "ECCS - Shutdown," should be entered if an inoperable containment sump results in an inoperable ECCS train. The second Note indicates that the applicable Conditions and Required Actions of LCO 3.6.6, "[Containment Spray and Cooling Systems]," should be entered if an inoperable containment sump results in an inoperable [CSS][RS System] train. This is an exception to LCO 3.0.6 and ensures the proper actions are taken for these components.

BASES

ACTIONS (continued)

C.1 and C.2

If the containment sump cannot be restored to OPERABLE status within the associated Completion Time, 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 6 hours and to MODE 5 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.

SURVEILLANCE REQUIREMENTS

SR 3.6.19.1

Periodic inspections are performed to verify the containment sump and strainers do not show current or potential debris blockage, structural damage, or abnormal corrosion to ensure the operability and structural integrity of the containment sump, strainers, and associated structures (Ref. 1).

Containment accident generated and transported debris consists of the following (Ref. 1):

a. Accident generated debris created by the HELB (e.g., insulation, coatings, and other materials near the break) and subject to transport by the HELB blowdown forces;

b. Pre-existing debris or debris created by adverse environmental conditions following the accident (e.g., latent debris, dirt, and unqualified coatings not generated by the HELB) that may be transported to the containment sump; and

c. Chemical reaction products generated within containment following the accident and transported to the containment sump.

Containment debris limits are defined in FSAR Section X.XX (Ref. 3).

[The 18 month Frequency is based on the need to perform this Surveillance during a refueling outage, because of the need to enter containment. This Frequency is sufficient to detect any indication of structural damage, abnormal corrosion, or debris blockage of the sump strainers.

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. Regulatory Guide 1.82, Revision 4, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident," March 2012.

2. FSAR, Chapter [6] and Chapter [15].

3. FSAR, Section X.XX, [Sump Debris Evaluation].

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.5.2.8	Verify each LPSI pump stops on an actual or simulated actuation signal.	[[18] months OR In accordance with the Surveillance Frequency Control Program]
SR 3.5.2.9	[Verify, for each ECCS throttle valve listed below, each position stop is in the correct position. Valve Number [ ] [ ]	[[18] months OR In accordance with the Surveillance Frequency Control Program]]
~~SR 3.5.2.10~~	~~Verify, by visual inspection, each ECCS train containment sump suction inlet is not restricted by debris and the suction inlet trash racks and screens show no evidence of structural distress or abnormal corrosion.~~	~~[[18] months~~ ~~OR~~ ~~In accordance with the Surveillance Frequency Control Program]~~

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.3 ECCS - Shutdown

LCO 3.5.3 One high pressure safety injection (HPSI) train shall be OPERABLE.

APPLICABILITY: MODE 3 with pressurizer pressure < [1700] psia,
MODE 4.

ACTIONS

--NOTE--
LCO 3.0.4.b is not applicable to ECCS High Pressure Safety Injection subsystem when entering MODE 4.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required HPSI train inoperable.	A.1 Restore required HPSI train to OPERABLE status.	1 hour
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 5.	24 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.3.1	The following SRs are applicable: [SR 3.5.2.1] SR 3.5.2.6 SR 3.5.2.2 SR 3.5.2.7 [SR 3.5.2.3] [SR 3.5.2.9] SR 3.5.2.4 ~~SR 3.5.2.10~~	In accordance with applicable SRs

3.6 CONTAINMENT SYSTEMS

3.6.13 Containment Sump

LCO 3.6.13 [The][Two] containment sump[s] shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. [One or more] containment sump[s] inoperable due to potential for containment accident generated and transported debris exceeding the analyzed limits.	A.1 Initiate action to mitigate containment accident generated and transported debris.	Immediately
	AND	
	A.2 Perform SR 3.4.13.1.	Once per 24 hours
	AND	
	A.3 Restore the containment sump[s] to OPERABLE status.	90 days

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. [One or more] containment sump[s] inoperable for reasons other than Condition A.	B.1	--------------NOTES------------- 1. Enter applicable Conditions and Required Actions of LCO 3.5.2, "ECCS - Operating," and LCO 3.5.3, "ECCS - Shutdown," for emergency core cooling trains made inoperable by the containment sump[s]. 2. Enter applicable Conditions and Required Actions of LCO 3.6.6, "Containment Spray and Cooling Systems," for containment spray trains made inoperable by the containment sump[s]. ------------------------------------- Restore the containment sump[s] to OPERABLE status.	[7 days]
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 3.	6 hours
	AND		
	C.2	Be in MODE 5.	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.13.1	Verify, by visual inspection, the containment sump[s] does not show structural damage, abnormal corrosion, or debris blockage.	[[18] months <u>OR</u> In accordance with the Surveillance Frequency Control Program]

5.5.13 Diesel Fuel Oil Testing Program (continued)

c. Total particulate concentration of the fuel oil is ≤ 10 mg/l when tested every 31 days.

The provisions of SR 3.0.2 and SR 3.0.3 are applicable to the Diesel Fuel Oil Testing Program test frequencies.

5.5.14 Technical Specifications (TS) Bases Control Program

This program provides a means for processing changes to the Bases of these Technical Specifications.

a. Changes to the Bases of the TS shall be made under appropriate administrative controls and reviews.

b. Licensees may make changes to Bases without prior NRC approval provided the changes do not require either of the following:

 1. A change in the TS incorporated in the license or

 2. A change to the updated FSAR or Bases that requires NRC approval pursuant to 10 CFR 50.59.

c. The Bases Control Program shall contain provisions to ensure that the Bases are maintained consistent with the FSAR.

d. Proposed changes that meet the criteria of 5.5.14b above shall be reviewed and approved by the NRC prior to implementation. Changes to the Bases implemented without prior NRC approval shall be provided to the NRC on a frequency consistent with 10 CFR 50.71(e).

5.5.15 Safety Function Determination Program (SFDP)

This program ensures loss of safety function is detected and appropriate actions taken. Upon entry into LCO 3.0.6, an evaluation shall be made to determine if loss of safety function exists. Additionally, other appropriate limitations and remedial or compensatory actions may be identified to be taken as a result of the support system inoperability and corresponding exception to entering supported system Condition and Required Actions. This program implements the requirements of LCO 3.0.6. The SFDP shall contain the following:

a. Provisions for cross train checks to ensure a loss of the capability to perform the safety function assumed in the accident analysis does not go undetected,

5.5.15 Safety Function Determining Program (continued)

b. Provisions for ensuring the plant is maintained in a safe condition if a loss of function condition exists,

c. Provisions to ensure that an inoperable supported system's Completion Time is not inappropriately extended as a result of multiple support system inoperabilities, and

d. Other appropriate limitations and remedial or compensatory actions.

A loss of safety function exists when, assuming no concurrent single failure, no concurrent loss of offsite power, or no concurrent loss of onsite diesel generator(s), a safety function assumed in the accident analysis cannot be performed. For the purpose of this program, a loss of safety function may exist when a support system is inoperable, and

a. A required system redundant to the system(s) supported by the inoperable support system is also inoperable, or

b. A required system redundant to the system(s) in turn supported by the inoperable supported system is also inoperable, or

c. A required system redundant to the support system(s) for the supported systems (a) and (b) above is also inoperable.

Optional Change. Only applicable if not already in the plant-specific TS.

The SFDP identifies where a loss of safety function exists. If a loss of safety function is determined to exist by this program, the appropriate Conditions and Required Actions of the LCO in which the loss of safety function exists are required to be entered. When a loss of safety function is caused by the inoperability of a single Technical Specification support system, the appropriate Conditions and Required Actions to enter are those of the support system.

5.5.16 Containment Leakage Rate Testing Program

[OPTION A]

a. A program shall establish the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option A, as modified by approved exemptions.

b. The maximum allowable containment leakage rate, L_a at P_a, shall be [ ]% of containment air weight per day.

c. Leakage rate acceptance criteria are:

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BASES

BACKGROUND (continued)

For LOCAs that are too small to initially depressurize the RCS below the shutoff head of the HPSI pumps, the charging pumps supply water to maintain inventory until the RCS pressure decreases below the HPSI pump shutoff head. During this period, the steam generators (SGs) must provide the core cooling function. The charging pumps take suction from the RWT on a safety injection actuation signal (SIAS) and discharge directly to the RCS through a common header. The normal supply source for the charging pumps is isolated on an SIAS to prevent noncondensible gas (e.g., air, nitrogen, or hydrogen) from being entrained in the charging pumps.

During low temperature conditions in the RCS, limitations are placed on the maximum number of HPSI pumps that may be OPERABLE. Refer to the Bases for LCO 3.4.12, "Low Temperature Overpressure Protection (LTOP) System," for the basis of these requirements.

During a large break LOCA, RCS pressure will decrease to < 200 psia in < 20 seconds. The safety injection (SI) systems are actuated upon receipt of an SIAS. The actuation of safeguard loads is accomplished in a programmed time sequence. If offsite power is available, the safeguard loads start immediately in the programmed sequence. If offsite power is not available, the Engineered Safety Feature (ESF) buses shed normal operating loads and are connected to the diesel generators (DGs). Safeguard loads are then actuated in the programmed time sequence. The time delay associated with diesel starting, sequenced loading, and pump starting determines the time required before pumped flow is available to the core following a LOCA.

The active ECCS components, along with the passive safety injection tanks (SITs)*,* ~~and~~ the RWT, *and the containment sump, are* covered in LCO 3.5.1, "Safety Injection Tanks (SITs)," ~~and~~ LCO 3.5.4, "Refueling Water Tank (RWT)," *and LCO 3.8.13, "Containment Sump,"* provide the cooling water necessary to meet GDC 35 (Ref. 1).

APPLICABLE SAFETY ANALYSES

The LCO helps to ensure that the following acceptance criteria, established by 10 CFR 50.46 (Ref. 2) for ECCSs, will be met following a LOCA:

a. Maximum fuel element cladding temperature is ≤ 2200°F,

b. Maximum cladding oxidation is ≤ 0.17 times the total cladding thickness before oxidation,

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 3.5.2.10~~

~~Periodic inspection of the containment sump ensures that it is unrestricted and stays in proper operating condition. [The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during an outage, on the need to have access to the location, and on the potential for unplanned transients if the Surveillance were performed with the reactor at power. This Frequency is sufficient to detect abnormal degradation and is confirmed by operating experience.~~

~~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.~~
~~--]~~

REFERENCES

1. 10 CFR 50, Appendix A, GDC 35.
2. 10 CFR 50.46.
3. FSAR, Chapter [6].
4. NRC Memorandum to V. Stello, Jr., from R. L. Baer, "Recommended Interim Revisions to LCOs for ECCS Components," December 1, 1975.
5. IE Information Notice No. 87-01, January 6, 1987.
6. CE NPSD-995, "Low Pressure Safety Injection System AOT Extension," May 1995.

B 3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

B 3.5.3 ECCS - Shutdown

BASES

BACKGROUND

The Background section for Bases B 3.5.2, "ECCS - Operating," is applicable to these Bases, with the following modifications.

In MODE 3 with pressurizer pressure < 1700 psia and in MODE 4, an ECCS train is defined as one high pressure safety injection (HPSI) subsystem. The HPSI flow path consists of piping, valves, and pumps that enable water from the refueling water tank (RWT) *and the containment sump* to be injected into the Reactor Coolant System (RCS) following the accidents described in Bases 3.5.2.

APPLICABLE SAFETY ANALYSES

The Applicable Safety Analyses section of Bases 3.5.2 is applicable to these Bases.

Due to the stable conditions associated with operation in MODE 4, and the reduced probability of a Design Basis Accident (DBA), the ECCS operational requirements are reduced. Included in these reductions is that certain automatic safety injection (SI) actuation signals are not available. In this MODE, sufficient time exists for manual actuation of the required ECCS to mitigate the consequences of a DBA.

Only one train of ECCS is required for MODE 4. Protection against single failures is not relied on for this MODE of operation.

ECCS - Shutdown satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

In MODE 3 with pressurizer pressure < 1700 psia, an ECCS subsystem is composed of a single HPSI subsystem. Each HPSI subsystem includes the piping, instruments, and controls to ensure an OPERABLE flow path capable of taking suction from the RWT and transferring suction to the containment sump.

During an event requiring ECCS actuation, a flow path is required to supply water from the RWT to the RCS via the HPSI pumps and their respective supply headers to each of the four cold leg injection nozzles. In the long term, this flow path may be switched to take its supply from the containment sump and to deliver its flow to the RCS hot and cold legs.

B 3.6 CONTAINMENT SYSTEMS

B 3.6.13 Containment Sump

BASES

BACKGROUND

---------------------------------- REVIEWER'S NOTE ---------------------------------
Some plant designs have more than one containment sump. LCO 3.6.13 provides the option of specifying one or two containment sumps. The Bases specify when to discuss differences between one or two sump designs by providing bracketed information. However, for clarity, all references to the containment sump are not provided with plural bracketed alternatives. Licensees adopting this Bases section for plants with two containment sumps should make the appropriate changes to the Bases to reflect the plant design.

The containment sump provides a borated water source to support recirculation of coolant from the containment sump for residual heat removal, emergency core cooling, containment cooling, and [containment atmosphere cleanup] during accident conditions.

The containment sump supplies both trains of the Emergency Core Cooling System (ECCS) and the Containment Spray System (CSS) during any accident that requires recirculation of coolant from the containment sump. The recirculation mode is initiated when the pump suction is transferred to the containment sump on low Refueling Water Tank (RWT) level, which ensures the containment sump has enough water to supply the net positive suction head to the ECCS and Containment Spray System pumps. [The use of a single containment sump to supply both trains of the ECCS and CSS is acceptable since the containment sump is a passive component, and passive failures are not required to be assumed to occur coincident with Design Basis Events.][Describe the design of plants with two containment sumps.]

Following an accident, the containment sump water source may contain accident generated and transported debris consisting of the following (Ref. 1):

a. Accident generated debris created by the high energy line break (HELB) (e.g., insulation, coatings, and other materials near the break) and subject to transport by the HELB blowdown forces;

b. Pre-existing debris or debris created by adverse environmental conditions following the accident (e.g., latent debris, dirt, and unqualified coatings not generated by the HELB) that may be transported to the containment sump; and

BASES

BACKGROUND (continued)

c. Chemical reaction products generated within containment following the accident and transported to the containment sump.

The containment sump contains strainers to limit the quantity of the debris materials from entering the sump suction piping. Debris accumulation on the strainers can lead to undesirable hydraulic effects including air ingestion through vortexing or deaeration, and reduced net positive suction head (NPSH) at pump suction piping.

While the majority of debris accumulates on the strainers, some fraction penetrates the strainers and is transported to downstream components in the ECCS, CSS, and the Reactor Coolant System (RCS). Debris that penetrates the strainer can result in wear to the downstream components and blockages. Excessive debris in the containment sump water source could result in insufficient recirculation of coolant during the accident.

APPLICABLE SAFETY ANALYSIS

During all accidents that require recirculation, the containment sump provides a source of borated water to the ECCS and CSS pumps. As such, it supports residual heat removal, emergency core cooling, containment cooling, and [containment atmosphere cleanup] during an accident. It also provides a source of negative reactivity (Ref. 2). The design basis transients and applicable safety analyses concerning each of these systems are discussed in the Applicable Safety Analyses section of B 3.5.2, "ECCS - Operating," B 3.5.3, "ECCS - Shutdown," and B 3.6.6, "Containment Spray and Cooling Systems."

FSAR Section X.XX (Ref. 3) describes evaluations that confirm long-term core cooling is assured following any accident that requires recirculation from the containment sump.

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

LCO

[The][Two] containment sump is required to ensure a source of borated water to support ECCS and CSS OPERABILITY. A containment sump consists of the containment drainage flow paths, [design features upstream of the containment sump that are credited in the containment debris analysis,] the containment sump strainers, the pump suction trash racks, and the inlet to the ECCS and CSS piping. An OPERABLE containment sump will not be restricted by accident generated and transported debris and has no structural damage or abnormal corrosion that could prevent recirculation of coolant.

BASES

APPLICABILITY

In MODES 1, 2, 3, and 4, containment sump OPERABILITY requirements are dictated by the ECCS and CSS OPERABILITY requirements. Since both the ECCS and the CSS must be OPERABLE in MODES 1, 2, 3, and 4, the containment sump must also be OPERABLE to support their operation.

In MODES 5 and 6, the probability and consequences of these events are reduced due to the pressure and temperature limitations of these MODES. Thus, the containment sump is not required to be OPERABLE in MODES 5 or 6.

ACTIONS

A.1, A.2, and A.3

Condition A is applicable when [the][one or more] containment sump is inoperable due to the potential for containment accident generated and transported debris exceeding the analyzed limits.

Containment accident generated and transported debris consists of the following (Ref. 1):

a. Accident generated debris created by the HELB (e.g., insulation, coatings, and other materials near the break) and subject to transport by the HELB blowdown forces;

b. Pre-existing debris or debris created by adverse environmental conditions following the accident (e.g., latent debris, dirt, and unqualified coatings not generated by the HELB) that may be transported to the containment sump; and

c. Chemical reaction products generated within containment following the accident and transported to the containment sump.

Containment debris limits are defined in FSAR Section X.XX (Ref. 3).

Immediate action must be initiated to mitigate the condition, such as removing the debris source from containment or preventing the debris from being transported, evaluating the debris source against the assumptions in the analysis, maintaining the availability of the containment coolers and other LOCA mitigating equipment, or applying an alternative method to establish new limits.

ACTIONS (continued)

While in this condition, the RCS water inventory balance, SR 3.4.13.1, must be performed at an increased Frequency of once per 24 hours. An unexpected increase in RCS leakage could be indicative of an increased potential for an RCS pipe break, which could result in debris being generated and transported to the containment sump. The more frequent monitoring allows operators to take action in a timely fashion to minimize the potential for an RCS pipe break while the containment sump is inoperable.

The inoperable containment sump must be restored to OPERABLE status in 90 days. The 90 day Completion Time is reasonable based on the time required to remove the debris source or to establish a revised analysis that addresses the debris.

B.1

-------------------------------------- Reviewer's Note ------------------------------------
The Required Action B.1 Completion Time should be the same as the LCO 3.6.6 Completion Time for a single inoperable CSS train.

When the containment sump is inoperable for reasons other than Condition A, it must be restored to OPERABLE status within [7 days]. The [7 day] Completion Time takes into account the reasonable time for repairs, and low probability of an accident that requires the containment sump occurring during this period.

Required Action B.1 is modified by two Notes. The first Note indicates that the applicable Conditions and Required Actions of LCO 3.5.2, "ECCS - Operating," and LCO 3.5.3, "ECCS - Shutdown," should be entered if an inoperable containment sump results in an inoperable ECCS train. The second Note indicates that the applicable Conditions and Required Actions of LCO 3.6.6, "Containment Spray and Cooling Systems," should be entered if an inoperable containment sump results in an inoperable CSS train. This is an exception to LCO 3.0.6 and ensures the proper actions are taken for these components.

BASES

ACTIONS (continued)

C.1 and C.2

If the containment sump cannot be restored to OPERABLE status within the associated Completion Time, 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 6 hours and to MODE 5 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.

SURVEILLANCE REQUIREMENTS

SR 3.6.13.1

Periodic inspections are performed to verify the containment sump and strainers do not show current or potential debris blockage, structural damage, or abnormal corrosion to ensure the operability and structural integrity of the containment sump, strainers, and associated structures (Ref. 1).

Containment accident generated and transported debris consists of the following (Ref. 1):

a. Accident generated debris created by the HELB (e.g., insulation, coatings, and other materials near the break) and subject to transport by the HELB blowdown forces;

b. Pre-existing debris or debris created by adverse environmental conditions following the accident (e.g., latent debris, dirt, and unqualified coatings not generated by the HELB) that may be transported to the containment sump; and

c. Chemical reaction products generated within containment following the accident and transported to the containment sump.

Containment debris limits are defined in FSAR Section X.XX (Ref. 3).

[The 18 month Frequency is based on the need to perform this Surveillance during a refueling outage, because of the need to enter containment. This Frequency is sufficient to detect any indication of structural damage, abnormal corrosion, or debris blockage of the sump strainers.

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. Regulatory Guide 1.82, Revision 4, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident," March 2012.

2. FSAR, Chapter [6] and Chapter [15].

3. FSAR, Section X.XX, [Sump Debris Evaluation].