SOUTHERN CALIFORNIA
EDISON
An EDISON INTERNATIONAL℠ Company

Dwight E. Nunn
Vice President

September 22, 2000

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

Subject: **Docket Nos. 50-361 and 50-362**
Positive Reactivity Additions When Shutdown
Proposed Technical Specification Change NPF-10/15-520
San Onofre Nuclear Generating Station Units 2 and 3

Reference: Letter from William D. Beckner (NRC) to James Davis (Nuclear Energy Institute) dated July 6, 2000

Gentlemen:

Enclosed are Amendment Application Numbers 204 and 189 to Facility Operating Licenses NPF-10 and NPF-15 for San Onofre Nuclear Generating Station Units 2 and 3 (SONGS 2 & 3), respectively. The amendment applications consist of Proposed Change Number (PCN) 520. PCN-520 revises 14 specific Technical Specifications (TS) applicable in shutdown MODES relating to positive reactivity additions. PCN-520 conforms closely to change TSTF-286 Revision 2 of the industry Technical Specification Task Force, with differences noted in the Enclosure. NRC staff approved TSTF-286 Revision 2 by means of the referenced letter.

Southern California Edison (SCE) requests this amendment be effective when issued, to be fully implemented within 30 days of issuance. Since Unit 2 is scheduled to begin its Cycle 11 refueling outage on October 7, 2000, NRC approval is requested at the earliest possible time.

If you would like additional information regarding this amendment application, please let me know.

Sincerely,

A001

Enclosures

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cc: E. W. Merschoff, Regional Administrator, NRC Region IV
J. A. Sloan, NRC Senior Resident Inspector, San Onofre Units 2 and 3
L. Raghavan, NRC Project Manager, San Onofre Units 2 and 3
S. Y. Hsu, Department of Health Services, Radiologic Health Branch

ENCLOSURE

DESCRIPTION AND NO SIGNIFICANT HAZARDS CONSIDERATIONS OF PROPOSED CHANGE NUMBER NPF-10/15-520 (PCN-520)

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

Application of SOUTHERN, CALIFORNIA EDISON COMPANY, ET AL. for a class 103 License to Acquire, Possess, and Use a Utilization Facility as Part of Unit No. 2 of the San Onofre Nuclear Generating Station	))))))	Docket No. 50-361 Amendment Application No. 204

SOUTHERN CALIFORNIA EDISON COMPANY, ET AL. pursuant to 10CFR50.90, hereby submit Amendment Application No. 204. This amendment application consists of Proposed Change No. PCN-520 to Facility Operating License NPF-10. PCN-520 is a request to revise 14 specific Limiting Conditions For Operation of the Technical Specifications to clarify those specifications involving positive reactivity additions to the shutdown reactor. This amendment application conforms in general to TSTF-286 Revision 2 of the industry Technical Specification Task Force.

Subscribed on this 22nd day of September, 2000.

Respectfully Submitted,

SOUTHERN CALIFORNIA EDISON COMPANY

By: Dwight E. Nunn

Dwight E. Nunn
Vice President

State of California
County of San Diego

On 9/22/2000 before me, Mariane Sanchez, personally appeared Dwight E. Nunn, personally known to me to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person, or the entity upon behalf of which the person acted, executed the instrument. WITNESS my hand and official seal.

Signature Mariane Sanchez

MARIANE SANCHEZ
Commission #1196482
Notary Public - California
San Diego County
My Comm. Expires Oct 14, 2002

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

Application of SOUTHERN, CALIFORNIA EDISON COMPANY, ET AL. for a class 103 License to Acquire, Possess, and Use a Utilization Facility as Part of Unit No. 3 of the San Onofre Nuclear Generating Station	))))))	Docket No. 50-362 Amendment Application No. 189

SOUTHERN CALIFORNIA EDISON COMPANY, ET AL. pursuant to 10CFR50.90, hereby submit Amendment Application No. 189. This amendment application consists of Proposed Change No. PCN-520 to Facility Operating License NPF-15. PCN-520 is a request to revise 14 specific Limiting Conditions For Operation of the Technical Specifications to clarify those specifications involving positive reactivity additions to the shutdown reactor. This amendment application conforms in general to TSTF-286 Revision 2 of the industry Technical Specification Task Force.

Subscribed on this 22nd day of September, 2000.

Respectfully Submitted,

SOUTHERN CALIFORNIA EDISON COMPANY

By: [signature]
Dwight E. Nunn
Vice President

State of California

County of San Diego

On 9/22/2000 before me, Mariane Sanchez, personally appeared Dwight E. Nunn, personally known to me to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the person, or the entity upon behalf of which the person acted, executed the instrument. WITNESS my hand and official seal.

Signature [signature]

MARIANE SANCHEZ
Commission #1196482
Notary Public - California
San Diego County
My Comm. Expires Oct 14, 2002

DESCRIPTION AND SAFETY ANALYSIS
OF PROPOSED CHANGE NPF-10/15-520
(PCN-520)

PCN-520 is a request to revise 14 specific Limiting Conditions For Operation of the Technical Specifications for San Onofre Nuclear Generating Station Units 2 and 3 (SONGS 2 & 3) to clarify those specifications involving positive reactivity additions to the shutdown reactor. This amendment application conforms in general to TSTF-286 Revision 2 of the industry Technical Specification Task Force. Plant-specific differences between PCN-520 and TSTF-286 Revision 2 are detailed in Table 2.

Existing Technical Specifications and Bases

Unit 2: See Attachment A
Unit 3: See Attachment B

Proposed TS and Bases, PCN 520 (redline and strikeout)

Unit 2: See Attachment C
Unit 3: See Attachment D

Proposed Technical Specifications and Bases, PCN 520

Unit 2: See Attachment E
Unit 3: See Attachment F

Description of Changes

SUMMARY:

PCN-520 is a request to revise 14 specific Limiting Conditions For Operation (LCOs) of the Technical Specifications (TS) for San Onofre Nuclear Generating Station Units 2 and 3 (SONGS 2 & 3) as itemized in Table 1. The proposed change will clarify specifications involving positive reactivity additions to the shutdown reactor so that small, controlled, safe insertions of positive reactivity will be allowed where they are now categorically prohibited, posing operational difficulties. This amendment application conforms to TSTF-286 Revision 2 of the industry Technical Specification Task Force, with the exception of plant-specific differences identified in Table 2.

Also provided, for information only, is proposed revised Bases wording in support of the LCO changes. The Bases revisions also conform, with plant-specific exceptions, to the intent of TSTF-286 Revision 2. Southern California Edison intends to make changes comparable to TSTF-286 Revision 2 to the SONGS 2 & 3 Licensee Controlled Specifications.

1.0 BACKGROUND

SONGS 2 & 3 has been a participant in the industry Technical Specification Task Force. This industry group has submitted a change to NUREG-1432, "Standard Technical Specifications Combustion Engineering Plants," to revise several LCOs as requested in this submittal. The industry proposal is identified as TSTF-286 Revision 2. NRC staff approval of TSTF-286 Revision 2 was documented in a letter dated July 6, 2000 from William D. Beckner (NRC) to James Davis (Nuclear Energy Institute). SONGS 2 & 3 adopted the standard TS in 1996 under Amendments 127 and 116 for Units 2 and 3, respectively. PCN-520 is a request for the changes proposed by TSTF-286 Revision 2, amended as described in Table 2, to be applied to the SONGS 2 & 3 TS.

2.0 DISCUSSION

As currently written, certain TS applicable in shutdown MODES categorically prohibit the addition of positive reactivity to the shutdown reactor. This prohibition poses operational difficulties. For example, temperature changes in the reactor coolant system (RCS) impose reactivity changes by means of the moderator temperature coefficient of reactivity. Small, controlled changes in RCS temperature being unavoidable, the requested change clarifies that such changes are permissible so long as the required shutdown margin is maintained.

Likewise, additions of makeup water to the RCS are routinely required. If the makeup water source is at a lower boron concentration than the RCS, the makeup operation will add positive reactivity. In addition, water in the Refueling Water Storage Tank of the same boron concentration as the RCS or refueling cavity may appear to be at a slightly lower boron concentration due to chemistry sampling uncertainties. Nevertheless, makeup to the RCS under these circumstances is an entirely safe operation provided the makeup boron concentration is greater than the concentration required to preserve the required shutdown margin. The requested change clarifies that such operations are permissible.

The proposed change will provide the flexibility necessary for continued safe reactor operations, while limiting any potential for excess positive reactivity addition to the shutdown reactor. NRC staff has reviewed and approved this concept as presented by the industry in TSTF-286 Revision 2.

3.0 AMENDMENT PROPOSAL

Southern California Edison proposes to amend the Technical Specifications for SONGS 2 & 3 as detailed in Table 1. The proposed amendment is consistent with TSTF-286 Revision 2 of the industry Technical Specification Task Force, as modified by the plant-specific considerations detailed in Table 2.

Southern California Edison also proposes to amend the wording of the supporting Technical Specification Bases as identified, for information only, in Attachments C through F. The proposed revised Bases wording is consistent with TSTF-286 Revision 2 of the industry Technical Specification Task Force, with plant-specific exceptions.

NO SIGNIFICANT HAZARDS CONSIDERATIONS:

The Commission has provided standards for determining whether a significant hazards consideration exists as stated in 10 CFR 50.92. A proposed amendment to a facility operating license involves no significant hazards consideration if operation of the facility in accordance with a proposed amendment would not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety. A discussion of these standards as they relate to this amendment request follows.

1. Will operation of the facility in accordance with this proposed change involve a significant increase in the probability or consequences of any accident previously evaluated?

   Response: No

   The proposed change would revise 14 specific Limiting Conditions For Operation (LCOs) of the Technical Specifications (TS) for San Onofre Nuclear Generating Station Units 2 and 3 (SONGS 2 & 3) as itemized in Table 1. The intent is to clarify those specifications involving positive reactivity additions to the shutdown reactor so that small, controlled, safe insertions of positive reactivity will be allowed where they are now categorically prohibited, posing operational difficulties. This amendment application conforms to TSTF-286 Revision 2 of the industry Technical Specification Task Force, with the exception of the plant-specific differences identified in Table 2.

TABLE 1 SUMMARY OF SONGS 2 & 3 PCN-520

	LCO	TITLE	EXISTING WORDING	PROPOSED WORDING
1	3.1.10	Boration Systems – Shutdown	A.1 Suspend all operations involving CORE ALTERATIONS or positive reactivity changes	A.1 NOTE Plant temperature changes are allowed provided the temperature change is accounted for in the calculated SDM. Suspend all operations involving CORE ALTERATIONS or positive reactivity changes
2	3.3.9	Control Room Isolation Signal (CRIS)	B.2.2 Suspend positive reactivity additions	B.2.2 NOTE Limited plant control operations are allowed provided the changes are accounted for in the calculated SDM. Suspend positive reactivity additions
3	3.3.13	Source Range Monitoring Channels	A.1 Suspend all operations involving positive reactivity additions	A.1 NOTE Limited plant control operations are allowed provided the changes are accounted for in the calculated SDM. Suspend all operations involving positive reactivity additions
4	3.4.5	RCS Loops – MODE 3	NOTE a. No operations are permitted that could cause reduction of the RCS boron concentration; and	NOTE a. No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.1; and

	LCO	TITLE	EXISTING WORDING	PROPOSED WORDING
			C.1 Suspend all operations involving a reduction of RCS boron concentration.	C.1 Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet SDM of LCO 3.1.1.
5	3.4.6	RCS Loops – MODE 4	NOTES 1. a. No operations are permitted that would cause reduction of the RCS boron concentration; and C.1 Suspend all operations involving reduction of RCS boron concentration.	NOTES 1. a. No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.1; and C.1 Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet SDM of LCO 3.1.1.
6	3.4.7	RCS Loops – MODE 5, Loops Filled	NOTES 1. a. No operations are permitted that would cause reduction of the RCS boron concentration; and B.1 Suspend all operations involving reduction in RCS boron concentration.	NOTES 1. a. No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.2; and B.1 Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet SDM of LCO 3.1.2.
7	3.4.8	RCS Loops – MODE 5, Loops Not Filled	NOTES 1. b. No operations are permitted that would cause a reduction of the RCS boron concentration; and NOTES 2. b. No operations are permitted that would cause a reduction of the RCS boron concentration. B.1 Suspend all operations involving reduction of RCS boron concentration.	NOTES 1. b. No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.2; and NOTES 2. b. No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.2. B.1 Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet SDM of LCO 3.1.2.
8	3.8.2	AC Sources – Shutdown	A.2.3 Initiate actions to suspend operations involving positive reactivity additions. B.3 Initiate actions to suspend operations involving positive reactivity additions.	A.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration. B.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.
9	3.8.5	DC Sources – Shutdown	A.2.3 Initiate action to suspend operations involving positive reactivity additions.	A.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.
10	3.8.8	Inverters – Shutdown	A.2.3 Initiate action to suspend operations involving positive reactivity additions.	A.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.
11	3.8.10	Distribution Systems – Shutdown	A.2.3 Initiate action to suspend operations involving positive reactivity additions.	A.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.
12	3.9.2	Nuclear Instrumentation	A.2 Suspend positive reactivity additions.	A.2 Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet the boron concentration of LCO 3.9.1.
13	3.9.4	Shutdown Cooling (SDC) and Coolant Circulation – High Water Level	NOTES b. No operations are permitted that would cause a reduction of the RCS boron concentration. A.1 Suspend operations involving a reduction in reactor coolant boron concentration.	NOTES b. No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than that required to meet the minimum required boron concentration of LCO 3.9.1. A.1 Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet the boron concentration of LCO 3.9.1.

	LCO	TITLE	EXISTING WORDING	PROPOSED WORDING
14	3.9.5	Shutdown Cooling (SDC) and Coolant Circulation – Low Water Level	C.1 Suspend operations involving a reduction in reactor coolant boron concentration.	C.1 Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet the boron concentration of LCO 3.9.1.

TABLE 2 DIFFERENCES BETWEEN SONGS 2 & 3 PCN-520 AND TSTF-286 REVISION 2

LCO	TSTF-286 REVISION 2	PCN-520	DISCUSSION
3.1.10	Not applicable	Allows plant temperature changes provided the change is accounted for in the calculated shutdown margin	NUREG-1432 has no LCO for Boration Systems – Shutdown. Boron dilutions continue to be prohibited for this condition where no boron injection flow path is OPERABLE.
3.3.9	NOTE Limited plant cooldown or boron dilution is allowed provided the change is accounted for in the calculated SDM.	NOTE Limited plant control operations are allowed provided the changes are accounted for in the calculated SDM.	TSTF version does not allow for plant temperature increases when the MTC is positive. PCN-520 wording is taken from the TSTF Bases for LCO 3.3.9.
3.3.13	NOTE Limited plant cooldown or boron dilution is allowed provided the change is accounted for in the calculated SDM.	NOTE Limited plant control operations are allowed provided the changes are accounted for in the calculated SDM.	TSTF version does not allow for plant temperature increases when the MTC is positive. PCN-520 wording is taken from the TSTF Bases for LCO 3.3.13.
3.4.7	Shutdown margin of LCO 3.1.1 must be preserved	Shutdown margin of LCO 3.1.2 must be preserved	TSTF-286 Rev. 2 assumes LCOs 3.1.1 and 3.1.2 have been combined; not true for SONGS 2 & 3.
3.4.8	Shutdown margin of LCO 3.1.1 must be preserved Not applicable	Shutdown margin of LCO 3.1.2 must be preserved NOTE 2. b. Shutdown margin of LCO 3.1.2 must be preserved	TSTF-286 Rev. 2 assumes LCOs 3.1.1 and 3.1.2 have been combined; not true for SONGS 2 & 3. NUREG-1432 has no NOTE 2.
3.9.4	Has a single contiguous NOTE Shutdown margin of LCO 3.1.1 must be preserved	Provisions of the NOTE are distributed in a, b, c and d. Shutdown margin of LCO 3.1.2 must be preserved	Provisions are the same in TSTF-286 Rev. 2 and PCN-520. TSTF-286 Rev. 2 assumes LCOs 3.1.1 and 3.1.2 have been combined; not true for SONGS 2 & 3.
3.9.5	Shutdown margin of LCO 3.1.1 must be preserved	Shutdown margin of LCO 3.1.2 must be preserved	TSTF-286 Rev. 2 assumes LCOs 3.1.1 and 3.1.2 have been combined; not true for SONGS 2 & 3.

The proposed change does not permit the shutdown margin required by the TS to be reduced. While the proposed change will permit reductions in the discretionary shutdown margin above the TS requirements, this excess margin is not credited in the safety analyses. Therefore, the probability or consequences of any accident previously evaluated will not be significantly increased by the proposed change.

2. Will operation of the facility in accordance with this proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

This amendment request allows for minor plant operational perturbations without adversely impacting the safety analysis required shutdown margin. It does not involve any change to plant equipment or the shutdown margin requirements in the

TS. Therefore, it will not create the possibility of a new or different kind of accident from any previously evaluated.

3. Will operation of the facility in accordance with this proposed change involve a significant reduction in a margin of safety?

Response: No

This amendment request does not change the manner in which safety limits or limiting safety settings are determined.

The proposed change will permit reductions in discretionary shutdown margin, above the TS requirements, that are now prohibited. However, the reductions are not deemed significant because the shutdown margin required by the TS will be preserved.

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

ENVIRONMENTAL CONSIDERATION:

Southern California Edison has determined that the proposed Technical Specification change involves no changes in the amount or type of effluent that may be released offsite, and results in no increase in individual or cumulative occupational radiation exposure. As described above, the proposed TS amendment involves no significant hazards consideration and, as such, meets the eligibility criteria for categorical exclusion set forth in 10CFR51.22(c)(9).

ATTACHMENT A

EXISTING TECHNICAL SPECIFICATIONS AND BASES

SONGS UNIT 2

3.1 REACTIVITY CONTROL SYSTEMS

3.1.10 Boration Systems - Shutdown

LCO 3.1.10 One RCS boron injection flow path shall be OPERABLE.

APPLICABILITY: MODES 5 and 6.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. No boron injection flow path OPERABLE.	A.1	Suspend all operations involving CORE ALTERATIONS or positive reactivity changes.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
	-------------------NOTE------------------- Only required when the Refueling Water Storage Tank (RWST) is the source of borated water and the outside temperature is < 40°F or > 100°F. --	
SR 3.1.10.1	Verify RWST temperature is within limits.	24 hours
SR 3.1.10.2	Verify volume of available borated water is within limits.	7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. CRIS Manual Trip, Actuation Logic, or required control room airborne radiation monitors inoperable in MODE 5 or 6, or during movement of irradiated fuel assemblies.	B.1	--------NOTE--------- Place CREACUS in isolation mode if automatic transfer to isolation mode inoperable. ---------------------	
		Place one CREACUS train in emergency mode.	Immediately
	OR		
	B.2.1	Suspend movement of irradiated fuel assemblies.	Immediately
	AND		
	B.2.2	Suspend positive reactivity additions.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.9.1	Perform a CHANNEL CHECK on the required control room airborne radiation monitor channel.	12 hours

(continued)

3.3 INSTRUMENTATION

3.3.13 Source Range Monitoring Channels

LCO 3.3.13 Two channels of source range monitoring instrumentation shall be OPERABLE.

APPLICABILITY: MODES 3, 4, and 5, with the reactor trip circuit breakers open or Control Element Assembly (CEA) Drive System not capable of CEA withdrawal.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more required channels inoperable.	A.1	Suspend all operations involving positive reactivity additions.	Immediately
	AND		
	A.2	Perform SDM verification in accordance with SR 3.1.1.2, if $T_{avg} > 200°F$, or SR 3.1.2.1, if $T_{avg} \leq 200°F$.	4 hours AND Once per 12 hours thereafter

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.5 RCS Loops—MODE 3

LCO 3.4.5 Two RCS loops shall be OPERABLE and one RCS loop shall be in operation.

---------------------------NOTE---------------------------
All reactor coolant pumps may be de-energized for ≤ 1 hour per 8 hour period, provided:

a. No operations are permitted that would cause reduction of the RCS boron concentration; and

b. Core outlet temperature is maintained at least 10°F below saturation temperature.

APPLICABILITY: MODE 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required RCS loop inoperable.	A.1 Restore required RCS loop to OPERABLE status.	72 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Be in MODE 4.	12 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. No RCS loop OPERABLE. OR No RCS loop in operation.	C.1 Suspend all operations involving a reduction of RCS boron concentration. AND C.2 Initiate action to restore one RCS loop to OPERABLE status and operation.	Immediately Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.5.1	Verify required RCS loop is in operation.	12 hours
SR 3.4.5.2	Verify secondary side water level in each steam generator ≥ 50% (wide range).	12 hours
SR 3.4.5.3	Verify correct breaker alignment and indicated power available to the required pump that is not in operation.	7 days

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.6 RCS Loops—MODE 4

LCO 3.4.6 Two loops or trains consisting of any combination of RCS loops and shutdown cooling (SDC) trains shall be OPERABLE and at least one loop or train shall be in operation.

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

1. All reactor coolant pumps (RCPs) and SDC pumps may be de-energized for ≤ 1 hour per 8 hour period, provided:
   a. No operations are permitted that would cause reduction of the RCS boron concentration; and
   b. Core outlet temperature is maintained at least 10°F below saturation temperature.
2. No RCP shall be started with any RCS cold leg temperature ≤ 256°F unless:
   a. Pressurizer water volume is < 900 ft^3, or
   b. Secondary side water temperature in each steam generator (SG) is < 100°F above each of the RCS cold leg temperatures.

APPLICABILITY: MODE 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required RCS loop inoperable. AND Two SDC trains inoperable.	A.1 Initiate action to restore a second loop or train to OPERABLE status.	Immediately
B. One required SDC train inoperable. AND Two required RCS loops inoperable.	B.1 Be in MODE 5.	24 hours
C. Required RCS loop(s) or SDC train(s) inoperable. OR No RCS loop or SDC train in operation.	C.1 Suspend all operations involving reduction of RCS boron concentration. AND C.2 Initiate action to restore one loop or train to OPERABLE status and operation.	Immediately Immediately

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.7 RCS Loops—MODE 5, Loops Filled

LCO 3.4.7 At least one of the following loop(s)/trains listed below shall be OPERABLE and in operation:

a. Reactor Coolant Loop 1 and its associated steam generator and at least one associated Reactor Coolant Pump;

b. Reactor Coolant Loop 2 and its associated steam generator and at least one associated Reactor Coolant Pump;

c. Shutdown Cooling Train A; or

d. Shutdown Cooling Train B

One additional Reactor Coolant Loop/shutdown cooling train shall be OPERABLE, or

The secondary side water level of each steam generator shall be greater than 50% (wide range).

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

1. All reactor coolant pumps (RCPs) and pumps providing shutdown cooling may be de-energized for ≤ 1 hour per 8 hour period, provided:

   a. No operations are permitted that would cause reduction of the RCS boron concentration; and

   b. Core outlet temperature is maintained at least 10°F below saturation temperature.

2. One required SDC train may be inoperable for up to 2 hours for surveillance testing provided that the other SDC train or RCS loop is OPERABLE and in operation.

3. One required RCS loop may be inoperable for up to 2 hours for surveillance testing provided that the other RCS loop or SDC train is OPERABLE and in operation.

-- (continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. No SDC train/RCS loop in operation.	B.1 Suspend all operations involving reduction in RCS boron concentration.	Immediately
	AND	
	B.2 Initiate action to restore required SDC train/RCS loop to operation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.7.1	Verify at least one RCS loop or SDC train is in operation.	12 hours
SR 3.4.7.2	Verify required SG secondary side water level is > 50% (wide range).	12 hours
SR 3.4.7.3	Verify the second required RCS loop, SDC train or steam generator secondary is OPERABLE.	7 days

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.8 RCS Loops—MODE 5, Loops Not Filled

LCO 3.4.8 Two shutdown cooling (SDC) trains shall be OPERABLE and at least one SDC train shall be in operation.

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

1. All SDC pumps may be de-energized for ≤ 15 minutes when switching from one train to another provided:
   a. The core outlet temperature is maintained > 10°F below saturation temperature;
   b. No operations are permitted that would cause a reduction of the RCS boron concentration; and
   c. No draining operations to further reduce the RCS water volume are permitted.
2. The pump providing shutdown cooling may be de-energized for ≤ 1 hour per 8 hour period provided:
   a. The core outlet temperature is maintained > 10°F below saturation temperature; and
   b. No operations are permitted that would cause a reduction of the RCS boron concentration.
3. One SDC train may be inoperable for ≤ 2 hours for surveillance testing provided the other SDC train is OPERABLE and in operation.
4. A containment spray pump may be used in place of a low pressure safety injection pump in either or both shutdown cooling trains to provide shutdown cooling flow provided the reactor has been sub-critical for a period > 24 hours and the RCS is fully depressurized and vented in accordance with LCO 3.4.12.1.

APPLICABILITY: MODE 5 with RCS loops not filled.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One SDC train inoperable.	A.1 Initiate action to restore SDC train to OPERABLE status.	Immediately
B. Both SDC trains inoperable. <u>OR</u> No SDC train in operation.	B.1 Suspend all operations involving reduction of RCS boron concentration. <u>AND</u> B.2 Initiate action to restore one SDC train to OPERABLE status and operation.	Immediately Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.8.1	Verify at least one SDC train is in operation.	12 hours
SR 3.4.8.2	Verify correct breaker alignment and indicated power available to the required SDC pump that is not in operation.	7 days

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.2.2	Suspend movement of irradiated fuel assemblies.	Immediately
	AND		
	A.2.3	Initiate action to suspend operations involving positive reactivity additions.	Immediately
	AND		
	A.2.4	Initiate action to restore required offsite power circuit to OPERABLE status.	Immediately
B. One required DG inoperable.	B.1	Suspend CORE ALTERATIONS.	Immediately
	AND		
	B.2	Suspend movement of irradiated fuel assemblies.	Immediately
	AND		
	B.3	Initiate action to suspend operations involving positive reactivity additions.	Immediately
	AND		
	B.4	Initiate action to restore required DG to OPERABLE status.	Immediately

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources—Shutdown

LCO 3.8.5 DC electrical power subsystem shall be OPERABLE to support the DC electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems—Shutdown."

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One battery or associated control equipment or cabling inoperable.	A.1 Declare affected required feature(s) inoperable.	Immediately
	OR	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	AND	
	A.2.3 Initiate action to suspend operations involving positive reactivity additions.	Immediately
	AND	
		(continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.8 Inverters—Shutdown

LCO 3.8.8 Required inverters shall be OPERABLE to support the onsite Class 1E AC vital bus electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems—Shutdown."

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required inverters inoperable.	A.1 Declare affected required feature(s) inoperable.	Immediately
	<u>OR</u>	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>	
	A.2.3 Initiate action to suspend operations involving positive reactivity additions.	Immediately
	<u>AND</u>	
		(continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.10 Distribution Systems—Shutdown

LCO 3.8.10 The necessary portion of AC, DC, and AC vital bus electrical power distribution subsystems shall be OPERABLE to support equipment required to be OPERABLE.

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required AC, DC, or AC vital bus electrical power distribution subsystems inoperable.	A.1 Declare associated supported required feature(s) inoperable.	Immediately
	<u>OR</u>	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>	
	A.2.3 Initiate action to suspend operations involving positive reactivity additions.	Immediately
	<u>AND</u>	
		(continued)

3.9 REFUELING OPERATIONS

3.9.2 Nuclear Instrumentation

LCO 3.9.2 Two source range monitors (SRMs) shall be OPERABLE.

APPLICABILITY: MODE 6.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One SRM inoperable.	A.1	Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>		
	A.2	Suspend positive reactivity additions.	Immediately
B. Two SRMs inoperable.	B.1	Initiate actions to restore one SRM to OPERABLE status.	Immediately
	<u>AND</u>		
	B.2	Perform SR 3.9.1.1.	4 hours <u>AND</u> Once per 12 hours thereafter

3.9 REFUELING OPERATIONS

3.9.4 Shutdown Cooling (SDC) and Coolant Circulation—High Water Level

LCO 3.9.4 One SDC loop shall be OPERABLE and in operation.

---------------------------NOTES---------------------------
With the upper guide structure removed from the reactor vessel the required SDC loop may be removed from operation for ≤ 2 hours per 8-hour period, provided:

a. The maximum RCS temperature is maintained ≤ 140°F.
b. No operations are permitted that would cause a reduction of the RCS boron concentration.
c. The capability to close the containment penetrations with direct access to the outside atmosphere within the calculated time to boil is maintained.
d. The reactor cavity water level is maintained ≥ 20 feet above the top of the reactor pressure vessel flange, or, for core alterations, ≥ 23 feet above the top of the reactor pressure vessel flange.

---------------------------NOTE---------------------------
A containment spray pump may be used in place of a low pressure safety injection pump in either or both shutdown cooling loops to provide shutdown cooling flow.

APPLICABILITY: MODE 6 with the water level ≥ 20 ft above the top of reactor vessel flange.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. SDC loop requirements not met.	A.1 Suspend operations involving a reduction in reactor coolant boron concentration. AND	Immediately
		(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One SDC loop inoperable. (Applicable to initial conditions of two shutdown cooling loops OPERABLE)	A.1	Initiate action to restore SDC loop to OPERABLE status.	Immediately
	<u>OR</u>		
	A.2	Initiate actions to establish ≥ 20 ft of water above the top of reactor vessel flange.	Immediately
B. One SDC loop operable, less than 20 feet of water above the reactor vessel flange and any of the 8 requirements not met (Applicable to initial conditions of one shutdown cooling loop OPERABLE and operating with requirements 1-8)	B.1	Initiate actions to establish ≥ 20 feet of water.	Immediately
C. No SDC loop OPERABLE or in operation.	C.1	Suspend operations involving a reduction in reactor coolant boron concentration.	Immediately
	<u>AND</u>		
			(continued)

BASES (continued)

ACTION

A.1

With no boron injection flow path to the reactor coolant System OPERABLE, all operations involving CORE ALTERATIONS or positive reactivity changes shall be suspended immediately without consideration of temperature fluctuations. A boron injection flow path is not OPERABLE if it is not capable of performing its boron injection function. In consideration of the stable reactor configuration and the initial boron concentration, a core alteration is the only possible source for a significant increase in reactivity.

SURVEILLANCE REQUIREMENTS

SR 3.1.10.1, SR 3.1.10.2, and SR 3.1.10.3

SRs 3.1.10.1, 3.1.10.2, and 3.1.10.3, ensure that the required borated water supply is available. SR 3.1.10.1 verifies that the temperature of the boric acid solution in the RWST is ≥ 40°F and ≤ 100°F. The RWST water temperature is not expected to approach 40°F or 100°F, considering local meteorology and the large heat capacity of the RWST. Furthermore, at 40°F boric acid precipitation will not occur below a concentration of 4720 ppm boron. The maximum boric acid concentration in the tanks is 2800 ppm boron. However, SR 3.1.10.1 is only applicable when the RWST is the source of borated water and the outside air temperature is not within the normally expected range of 40 to 100°F.

The solubility of boric acid at 50°F is about 3.5 wt%. There is no similar requirement to verify BAMU Tank temperature 50°F is within the normal operating range of the building.

SR 3.1.10.2 and 3.1.10.3 verify that a sufficient amount of boron is available for RCS injection from either the BAMU tanks or the RWST. This requires a minimum of 4150 gallons of boric acid solution at a concentration of 2350 PPM Boron in either the RWST (15.5%[1] level indication) or a BAMU tank. A maximum boric acid solution concentration of 6119 ppm is specified for the BAMU Tank. The water volume limits are specified relative to the top of the highest suction connection to the tank and considers vortexing, internal structures and instrument errors. The 7 day Surveillance Frequency ensures that a sufficient initial water supply is available for boron injection.

1 15.5% level with tanks T005 and T006 cross connected (Reference 4, CCN-1). 17.0% level with tanks T005 (Reference 6) and T006 (Reference 4, CCN-3) isolated.

(continued)

BASES (continued)

ACTIONS (continued)

Condition B applies to the failure of CRIS Manual Trip, Actuation Logic, and required gaseous radiation monitor channels in Mode 5 or 6, or when moving irradiated assemblies. The Required Actions are immediately taken to place one OPERABLE CREACUS train in the emergency mode, or to suspend positive reactivity additions, and movement of irradiated fuel assemblies. The Completion Time recognizes the fact that the radiation signals are the only Functions available to initiate control room isolation in the event of a fuel handling accident.

SURVEILLANCE REQUIREMENTS

SR 3.3.9.1

Performance of the CHANNEL CHECK once every 12 hours ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value.

Significant deviations between the two instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

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

The Frequency, about once every shift, is based on operating experience that demonstrates the rarity of channel failure. Thus, performance of the CHANNEL CHECK guarantees that undetected overt channel failure is limited to 12 hours. Since the probability of two random failures in redundant channels in any 12 hour period is low, the CHANNEL CHECK minimizes the chance of loss of protective function due to failure of redundant channels. The CHANNEL CHECK supplements less formal, but more frequent, checks of channel OPERABILITY during normal operational use of the displays associated with the LCO required channels.

(continued)

BASES (continued)

LCO

The LCO on the source range monitoring channels ensures that adequate information is available to verify core reactivity conditions while shut down.

A minimum of two source range monitoring channels are required to be OPERABLE.

APPLICABILITY

In MODES 3, 4, and 5, with RTCBs open or the Control Element Assembly (CEA) Drive System not capable of CEA withdrawal, source range monitoring channels must be OPERABLE to monitor core power for reactivity changes. In MODES 1 and 2, and in MODES 3, 4, and 5, with the RTCBs shut and the CEAs capable of withdrawal, the Logarithmic Power Monitoring channels are addressed as part of the RPS in LCO 3.3.1, "Reactor Protective System (RPS) Instrumentation—Operating," and LCO 3.3.2, "Reactor Protective System (RPS) Instrumentation—Shutdown."

The requirements for source range neutron flux monitoring in MODE 6 are addressed in LCO 3.9.2, "Nuclear Instrumentation." The source range nuclear instrumentation channels provide neutron flux coverage extending an additional one to two decades below the logarithmic channels for use during refueling, when neutron flux may be extremely low.

ACTIONS

A channel is inoperable when it does not satisfy the OPERABILITY criteria for the channel's function. These criteria are outlined in the LCO section of the Bases.

<u>A.1 and A.2</u>

With one required channel inoperable, it may not be possible to perform a CHANNEL CHECK to verify that the other required channel is OPERABLE. Therefore, with one or more required channels inoperable, the source range monitoring Function cannot be reliably performed. Consequently, the Required Actions are the same for one required channel inoperable or more than one required channel inoperable. The absence of reliable neutron flux indication makes it difficult to ensure SDM is maintained. Required Action A.1 therefore

(continued)

BASES

ACTIONS

A.1 and A.2 (continued)

requires that all positive reactivity additions that are under operator control, such as boron dilution or Reactor Coolant System temperature changes, be halted immediately, preserving SDM. However, temperature fluctuations associated with maintaining the plant status are permissible provided they remain within limits established for the plant conditions.

SDM must be verified periodically to ensure that it is being maintained. Both required channels must be restored as soon as possible. The initial Completion Time of 4 hours and once every 12 hours thereafter to perform SDM verification takes into consideration that Required Action A.1 eliminates many of the means by which SDM can be reduced. These Completion Times are also based on operating experience in performing the Required Actions and the fact that plant conditions will change slowly.

SURVEILLANCE REQUIREMENTS

SR 3.3.13.1

SR 3.3.13.1 is the performance of a CHANNEL CHECK on each required channel every 12 hours. A CHANNEL CHECK is a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based upon the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying that the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria are determined by the plant staff and should be based on a combination of the channel instrument uncertainties including control isolation, indication, and readability. If a channel is outside of the match criteria, it may be an indication that the transmitter or the signal processing equipment has drifted outside of its limits. If the channels are within the match criteria, it is an indication that the channels are OPERABLE.

The Frequency, about once every shift, is based on operating experience that demonstrates the rarity of channel failure. Thus, the performance of CHANNEL CHECK ensures that

(continued)

BASES

LCO (continued)

of requiring both SGs to be capable (> 50% wide range water level) of transferring heat from the reactor coolant at a controlled rate. Forced reactor coolant flow is the required way to transport heat, although natural circulation flow provides adequate removal. A minimum of one running RCP meets the LCO requirement for one loop in operation.

The Note permits a limited period of operation without RCPs. All RCPs may be de-energized for ≤ 1 hour per 8 hour period. This means that natural circulation has been established. When in natural circulation, a reduction in boron concentration is prohibited because an even concentration distribution throughout the RCS cannot be ensured. Core outlet temperature is to be maintained at least 10°F below the saturation temperature so that no vapor bubble may form and possibly cause a natural circulation flow obstruction.

In MODES 3, 4, and 5, it is sometimes necessary to stop all RCPs or shutdown cooling (SDC) pump forced circulation (e.g., to change operation from one SDC train to the other, to perform surveillance or startup testing, to perform the transition to and from SDC System cooling, or to avoid operation below the RCP minimum net positive suction head limit). The time period is acceptable because natural circulation is adequate for heat removal, or the reactor coolant temperature can be maintained subcooled and boron stratification affecting reactivity control is not expected.

An OPERABLE loop consists of at least one RCP providing forced flow for heat transport and an SG that is OPERABLE in accordance with the Steam Generator Tube Surveillance Program. An RCP is OPERABLE if it is capable of being powered and is able to provide forced flow if required.

APPLICABILITY

In MODE 3, the heat load is lower than at power; therefore, one RCS loop in operation is adequate for transport and heat removal. A second RCS loop is required to be OPERABLE but not in operation for redundant heat removal capability.

Operation in other MODES is covered by:

LCO 3.4.4, "RCS Loops—MODES 1 and 2";
LCO 3.4.6, "RCS Loops—MODE 4";

(continued)

BASES

APPLICABILITY (continued)	LCO 3.4.7, "RCS Loops—MODE 5, Loops Filled"; LCO 3.4.8, "RCS Loops—MODE 5, Loops Not Filled"; LCO 3.9.4, "Shutdown Cooling (SDC) and Coolant Circulation—High Water Level" (MODE 6); and LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation—Low Water Level" (MODE 6).

ACTIONS

A.1

If one required RCS loop is inoperable, redundancy for forced flow heat removal is lost. The Required Action is restoration of the required RCS loop to OPERABLE status within a Completion Time of 72 hours. This time allowance is a justified period to be without the redundant, nonoperating loop because a single loop in operation has a heat transfer capability greater than that needed to remove the decay heat produced in the reactor core.

B.1

If restoration is not possible within 72 hours, the unit must be placed in MODE 4 within 12 hours. In MODE 4, the plant may be placed on the SDC System. The Completion Time of 12 hours is compatible with required operation to achieve cooldown and depressurization from the existing plant conditions in an orderly manner and without challenging plant systems.

C.1 and C.2

If no RCS loop is in operation, except as provided in Note 1 in the LCO section, all operations involving a reduction of RCS boron concentration must be immediately suspended. This is necessary because boron dilution requires forced circulation for proper homogenization. Action to restore one RCS loop to OPERABLE status and operation shall be initiated immediately and continued until one RCS loop is restored to OPERABLE status and operation. The immediate Completion Times reflect the importance of maintaining operation for decay heat removal.

(continued)

BASES

LCO (continued)

prohibits boron dilution when forced flow is stopped because an even concentration distribution cannot be ensured. Core outlet temperature is to be maintained at least 10°F below saturation temperature so that no vapor bubble may form and possibly cause a natural circulation flow obstruction. The response of the RCS without the RCPs or SDC pumps depends on the core decay heat load and the length of time that the pumps are stopped. As decay heat diminishes, the effects on RCS temperature and pressure diminish. Without cooling by forced flow, higher heat loads will cause the reactor coolant temperature and pressure to increase at a rate proportional to the decay heat load. Because pressure can increase, the applicable system pressure limits (pressure and temperature (P/T) limits or low temperature overpressure protection (LTOP) limits) must be observed and forced SDC flow or heat removal via the SGs must be re-established prior to reaching the pressure limit. The circumstances for stopping both RCPs or SDC pumps are to be limited to situations where:

a. Pressure and temperature increases can be maintained well within the allowable pressure (P/T limits and LTOP) and 10°F subcooling limits; or

b. An alternate heat removal path through the SGs is in operation.

Note 2 requires that either of the following two conditions be satisfied before an RCP may be started with any RCS cold leg temperature ≤ 256°F.

a. Pressurizer water volume is < 900 ft^3; or

b. Secondary side water temperature in each SG is < 100°F above each of the RCS cold leg temperatures.

Satisfying the above condition will preclude a large pressure surge in the RCS when the RCP is started.

An OPERABLE RCS loop consists of at least one OPERABLE RCP and an SG that is OPERABLE in accordance with the Steam Generator Tube Surveillance Program and has the minimum water level specified in SR 3.4.6.2.

(continued)

BASES

ACTIONS

B.1 (continued)

reasonable, based on operating experience, to reach MODE 5 from MODE 4, with only one SDC train operating, in an orderly manner and without challenging plant systems.

C.1 and C.2

If no RCS loops or SDC trains are OPERABLE or in operation, except during conditions permitted by Note 1 in the LCO section, all operations involving reduction of RCS boron concentration must be suspended and action to restore one RCS loop or SDC train to OPERABLE status and operation must be initiated. Boron dilution requires forced circulation for proper mixing, and the margin to criticality must not be reduced in this type of operation. The immediate Completion Times reflect the importance of decay heat removal. The action to restore must continue until one loop or train is restored to operation.

SURVEILLANCE REQUIREMENTS

SR 3.4.6.1

This SR requires verification every 12 hours that one required loop or train is in operation. This ensures forced flow is providing heat removal. Verification includes flow rate, temperature, or pump status monitoring. The 12 hour Frequency has been shown by operating practice to be sufficient to regularly assess RCS loop status. In addition, control room indication and alarms will normally indicate loop status.

SR 3.4.6.2

This SR requires verification every 12 hours of secondary side water level in the required SG(s) $\geq$ 50% (wide range). An adequate SG water level is required in order to have a heat sink for removal of the core decay heat from the reactor coolant. The 12 hour interval has been shown by operating practice to be sufficient to regularly assess degradation and verify operation within safety analyses assumptions.

(continued)

BASES (continued)

LCO

The purpose of this LCO is to require at least one of the SDC trains or RCS loops be OPERABLE and in operation with an additional SDC train or RCS loop OPERABLE or secondary side water level of each SG shall be ≥ 50% wide range. One SDC train or RCS loop provides sufficient forced circulation to perform the safety functions of the reactor coolant under these conditions. The second SDC or RCS loop train is normally maintained OPERABLE as a backup to the operating train/loop to provide redundant paths for decay heat removal. However, if the standby SDC train/RCS loop is not OPERABLE, a sufficient alternate method to provide redundant paths for decay heat removal is two SGs with their secondary side water levels ≥ 50% wide range. Should the operating SDC train/RCS loop fail, the SGs could be used to remove the decay heat.

Note 1 permits all RCPs and SDC pumps to be de-energized ≤ 1 hour per 8 hour period. The circumstances for stopping both SDC trains/RCS loops are to be limited to situations where pressure and temperature increases can be maintained well within the allowable pressure (pressure and temperature and low temperature overpressure protection) and 10°F subcooling limits, or an alternate heat removal path through the SG(s) is in operation.

This LCO is modified by a Note that prohibits boron dilution when forced flow is stopped because an even concentration distribution cannot be ensured. Core outlet temperature is to be maintained at least 10°F below saturation temperature, so that no vapor bubble would form and possibly cause a natural circulation flow obstruction. In this MODE, the SG(s) can be used as the backup for heat removal. To ensure their availability, the RCS loop flow path is to be maintained with subcooled liquid.

In MODE 5, it is sometimes necessary to stop all RCP or SDC forced circulation. This is permitted to change operation from one SDC train or RCS loop to the other, perform surveillance or startup testing, perform the transition to and from the SDC, or to avoid operation below the RCP minimum net positive suction head limit. The time period is acceptable because natural circulation is acceptable for decay heat removal, the reactor coolant temperature can be maintained subcooled, and boron stratification affecting reactivity control is not expected.

(continued)

BASES

LCO (continued)	An OPERABLE RCS loop consists of at least one RCP providing forced flow for heat transport and an SG that is OPERABLE in accordance with the Steam Generator Tube Surveillance Program. An RCP is OPERABLE if it is capable of being powered and is able to provide forced flow if required.

APPLICABILITY

In MODE 5 with RCS loops filled, this LCO requires forced circulation to remove decay heat from the core and to provide proper boron mixing. One SDC train/RCS loop provides sufficient circulation for these purposes.

Operation in other MODES is covered by:

LCO 3.4.4, "RCS Loops—MODES 1 and 2";
LCO 3.4.5, "RCS Loops—MODE 3";
LCO 3.4.6, "RCS Loops—MODE 4";
LCO 3.4.8, "RCS Loops—MODE 5, Loops Not Filled";
LCO 3.9.4, "Shutdown Cooling (SDC) and Coolant Circulation—High Water Level" (MODE 6); and
LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation—Low Water Level" (MODE 6).

ACTIONS

A.1 and A.2

If the required SDC train/RCS loop is inoperable and any SGs have secondary side water levels < 50% wide range, redundancy for heat removal is lost. Action must be initiated immediately to restore a second SDC train/RCS loop to OPERABLE status or to restore the water level in the required SGs. Either Required Action A.1 or Required Action A.2 will restore redundant decay heat removal paths. The immediate Completion Times reflect the importance of maintaining the availability of two paths for decay heat removal.

B.1 and B.2

If no SDC train/RCS loop is in operation, except as permitted in Note 1, all operations involving the reduction of RCS boron concentration must be suspended. Action to restore one SDC train/RCS loop to operation must be

(continued)

BASES

ACTIONS

B.1 and B.2 (continued)

initiated. Boron dilution requires forced circulation for proper mixing and the margin to criticality must not be reduced in this type of operation. The immediate Completion Times reflect the importance of maintaining operation for decay heat removal.

SURVEILLANCE REQUIREMENTS

SR 3.4.7.1

This SR requires verification every 12 hours that at least one SDC train/RCS loop is in operation. Verification includes flow rate, temperature, or pump status monitoring, which help ensure that forced flow is providing decay heat removal. The 12 hour Frequency has been shown by operating practice to be sufficient to regularly assess degradation and verify operation is within safety analyses assumptions. In addition, control room indication and alarms will normally indicate loop status.

The SDC/RCS flow is established to ensure that core outlet temperature is maintained sufficiently below saturation to allow time for swap over to the standby SDC train/RCS loop should the operating train be lost.

SR 3.4.7.2

Verifying the SGs are OPERABLE by ensuring their secondary side water levels are ≥ 50% wide range ensures that redundant heat removal paths are available if the second SDC train/RCS loop is inoperable. The Surveillance is required to be performed when the LCO requirement is being met by use of the SGs. If both SDC trains are OPERABLE and one SDC train is in operation, this SR is not needed. The 12 hour Frequency has been shown by operating practice to be sufficient to regularly assess degradation and verify operation within safety analyses assumptions.

(continued)

BASES (continued)

LCO

The purpose of this LCO is to require a minimum of two SDC trains be OPERABLE and at least one of these trains be in operation. An OPERABLE train is one that is capable of transferring heat from the reactor coolant at a controlled rate. Heat cannot be removed via the SDC System unless forced flow is used. A minimum of one running SDC pump meets the LCO requirement for one train in operation. An additional SDC train is required to be OPERABLE to meet the single failure criterion.

Note 1 permits the SDC pumps to be de-energized for ≤ 15 minutes when switching from one train to another. The circumstances for stopping both SDC pumps are to be limited to situations when the outage time is short and the core outlet temperature is maintained > 10°F below saturation temperature. The Note prohibits boron dilution or draining operations when SDC forced flow is stopped.

Note 2 specifies the pump providing shutdown cooling may be de-energized for up to 1 hour per 8 hour period provided 1) no operations are permitted that would cause dilution of the reactor coolant system boron concentration, and 2) core sublet temperature is maintained at least 10°F below saturation temperature.

Note 3 allows one SDC train to be inoperable for a period of 2 hours provided that the other train is OPERABLE and in operation. This permits periodic surveillance tests to be performed on the inoperable train during the only time when these tests are safe and possible.

Note 4 specifies that a containment spray pump may be used in place of a low pressure safety injection pump in either or both shutdown cooling trains to provide shutdown cooling flow provided the reactor has been sub-critical for a period greater than 24 hours and the reactor coolant system is fully depressurized and vented in accordance with TS 3.4.12.1.

An OPERABLE SDC train is composed of an OPERABLE SDC pump capable of providing forced flow to an OPERABLE SDC heat exchanger, along with the appropriate flow and temperature instrumentation for control, protection, and indication. SDC pumps are OPERABLE if they are capable of being powered and are able to provide flow if required.

(continued)

BASES (continued)

APPLICABILITY

In MODE 5 with loops not filled, this LCO requires core heat removal and coolant circulation by the SDC System.

Operation in other MODES is covered by:

LCO 3.4.4, "RCS Loops—MODES 1 and 2";
LCO 3.4.5, "RCS Loops—MODE 3";
LCO 3.4.6, "RCS Loops—MODE 4";
LCO 3.4.7, "RCS Loops—MODE 5, Loops Filled";
LCO 3.9.4, "Shutdown Cooling (SDC) and Coolant Circulation—High Water Level" (MODE 6); and
LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation—Low Water Level" (MODE 6).

ACTIONS

A.1

If the required SDC train is inoperable, redundancy for heat removal is lost. Action must be initiated immediately to restore a second train to OPERABLE status. The Completion Time reflects the importance of maintaining the availability of two paths for heat removal.

B.1 and B.2

If no SDC train is OPERABLE or in operation, except as provided in Note 1 or in Note 2, all operations involving the reduction of RCS boron concentration must be suspended. Action to restore one SDC train to OPERABLE status and operation must be initiated immediately. Boron dilution requires forced circulation for proper mixing and the margin to criticality must not be reduced in this type of operation. The immediate Completion Time reflects the importance of maintaining operation for decay heat removal.

(continued)

BASES

ACTIONS (continued)

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

With the offsite circuit not available to the required train (Condition A), the option exists to declare all required features inoperable. Since this option may involve undesired administrative efforts, the allowance for sufficiently conservative actions is made. With the required DG inoperable (Condition B), the minimum required diversity of AC power sources is not available. It is, therefore, required to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions which would exceed limits specified in LCO 3.1.2 or LCO 3.1.9. The Required Action to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory provided the required SDM is maintained.

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

Notwithstanding performance of the conservative Required Actions, the unit is still without sufficient AC power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required AC power sources and continue until the LCO requirements are restored.

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

Pursuant to LCO 3.0.6, the Distribution System's (LCO 3.8.10) ACTIONS are not entered even if all AC sources to it are inoperable, resulting in de-energization. Therefore, the Required Actions of Condition A are modified by a Note to indicate that when Condition A is entered with no AC

(continued)

BASES

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, and A.2.4 (continued)

positive reactivity additions). The Required Action to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory, provided the required SDM is maintained.

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize probability of the occurrence of postulated events.

Notwithstanding performance of the above conservative Required Actions, the unit is still without sufficient DC power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required DC power sources and continue until the LCO requirements are restored.

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

B.1

Condition B represents one train with a loss of ability to completely respond to an event, and a potential loss of ability to remain energized during normal operation. Since eventual failure of the battery to maintain the required battery cell parameters is highly probable, it is imperative that the operator's attention focus on minimizing the potential for complete loss of DC power to the affected train. The additional time provided by the Completion Time is consistent with the battery's capability to maintain its short term capability to respond to a design basis event.

C.1

If the battery cell parameters cannot be maintained within Category A limits, the short term capability of the battery

(continued)

BASES

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, and A.2.4 (continued)

reactivity additions. The Required Action to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory, provided the required SDM is maintained. By the allowance of the option to declare required features inoperable with the associated inverter(s) inoperable, appropriate restrictions will be implemented in accordance with the affected required features LCOs' Required ACTIONS. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions).

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

Notwithstanding performance of the above conservative Required Actions, the unit is still without sufficient AC vital power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required AC vital power source and continue until the LCO requirements are restored.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required inverters should be completed as quickly as possible in order to minimize the time the unit safety systems may be without power or powered from a constant voltage source transformer.

SURVEILLANCE REQUIREMENTS

SR 3.8.8.1

This Surveillance verifies that the inverters are functioning properly with all required circuit breakers closed and AC vital buses energized from the inverter. The

(continued)

BASES (continued)

ACTIONS

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

Although redundant required features may require redundant trains of electrical power distribution subsystems to be OPERABLE, one OPERABLE distribution subsystem train may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS and fuel movement. By allowing the option to declare required features associated with an inoperable distribution subsystem inoperable, appropriate restrictions are implemented in accordance with the affected distribution subsystems LCO's Required Actions. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions).

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

Notwithstanding performance of the above conservative Required Actions, a required shutdown cooling (SDC) subsystem may be inoperable. In this case, these Required Actions of Condition A do not adequately address the concerns relating to coolant circulation and heat removal. Pursuant to LCO 3.0.6, the SDC ACTIONS would not be entered. Therefore, the Required Actions of Condition A direct declaring SDC inoperable, which results in taking the appropriate SDC actions.

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

(continued)

BASES

LCO (continued)	COLR ensures a core k_{eff} of $\leq$ 0.95 is maintained during fuel handling operations. Violation of the LCO could lead to an inadvertent criticality during MODE 6.
APPLICABILITY	This LCO is applicable in MODE 6 to ensure that the fuel in the reactor vessel will remain subcritical. The required boron concentration ensures a $k_{eff} \leq 0.95$. Above MODE 6, LCO 3.1.1, "SHUTDOWN MARGIN (SDM)—T_{avg} > 200°F," and LCO 3.1.2, "SHUTDOWN MARGIN—$T_{avg} \leq$ 200°F," ensure that an adequate amount of negative reactivity is available to shut down the reactor and to maintain it subcritical.

ACTIONS

A.1 and A.2

Continuation of CORE ALTERATIONS or positive reactivity additions (including actions to reduce boron concentration) is contingent upon maintaining the unit in compliance with the LCO. If the boron concentration of any coolant volume in the RCS, or the refueling canal is less than its limit, all operations involving CORE ALTERATIONS or positive reactivity additions must be suspended immediately.

Temperature fluctuations associated with maintaining the plant status are permissible provided they remain within limits established for the plant conditions.

Suspension of CORE ALTERATIONS and positive reactivity additions shall not preclude moving a component to a safe position.

A.3

In addition to immediately suspending CORE ALTERATIONS or positive reactivity additions, boration to restore the concentration must be initiated immediately.

In determining the required combination of boration flow rate and concentration, there is no unique design basis event that must be satisfied. The only requirement is to restore the boron concentration to its required value as

(continued)

BASES (continued)

APPLICABILITY

In MODE 6, the SRMs must be OPERABLE to determine changes in core reactivity. There is no other direct means available to check core reactivity levels.

In MODES 3, 4, and 5, the installed source range detectors and circuitry are required to be OPERABLE by LCO 3.3.13, "Source Range Monitors."

ACTIONS

A.1 and A.2

With only one SRM OPERABLE, redundancy has been lost. Since these instruments are the only direct means of monitoring core reactivity conditions, CORE ALTERATIONS and positive reactivity additions must be suspended immediately. Performance of Required Action A.1 shall not preclude completion of movement of a component to a safe position.

Temperature fluctuations associated with maintaining the plant status are permissible provided they remain within limits established for the plant conditions.

B.1

With no SRM OPERABLE, actions to restore a monitor to OPERABLE status shall be initiated immediately. Once initiated, actions shall be continued until an SRM is restored to OPERABLE status.

B.2

With no SRM OPERABLE, there is no direct means of detecting changes in core reactivity. However, since CORE ALTERATIONS and positive reactivity additions are not to be made, the core reactivity condition is stabilized until the SRMs are OPERABLE. This stabilized condition is determined by performing SR 3.9.1.1 to verify that the required boron concentration exists.

(continued)

BASES (continued)

LCO (continued)

The flow path starts in one of the RCS hot legs and is returned to the RCS cold legs.

The LCO is modified by two Notes. With the upper guide structure removed from the reactor vessel Note 1 allows the required operating SDC loop to be removed from service for up to 2 hours in each 8 hour period, provided that:

a. The maximum RCS temperature is maintained ≤ 140°F.
b. No operations are permitted that would cause a reduction of the RCS boron concentration.
c. The capability to close the containment penetrations with direct access to the outside temperature within the calculated time to boil is maintained.
d. The reactor cavity water level is maintained ≥ 20 feet above the top of the reactor pressure vessel flange, or, for core alterations, ≥ 23 feet above the top of the reactor pressure vessel flange.

This permits operations such as core mapping or alterations in the vicinity of the reactor vessel hot leg nozzles, RCS to SDC isolation valve testing, and inservice testing of LPSI system components. During this 2 hour period, decay heat is removed by natural convection to the large mass of water in the refueling canal.

Note 2 allows Operations to use a containment spray pump in place of a low pressure safety injection pump to provide shutdown cooling flow.

APPLICABILITY

One SDC loop must be in operation in MODE 6, with the water level ≥ 20 ft above the top of the reactor vessel flange, to provide decay heat removal. Requirements for the SDC System in other MODES are covered by LCOs in Section 3.4, Reactor Coolant System (RCS), and Section 3.5, Emergency Core Cooling Systems (ECCS). SDC loop requirements in MODE 6, with the water level < 20 ft above the top of the reactor vessel flange, are located in LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation—Low Water Level."

ACTIONS

SDC loop requirements are met by having one SDC loop OPERABLE and in operation, except as permitted in the Note to the LCO.

(continued)

BASES (continued)

ACTIONS (continued)

A.1

If SDC loop requirements are not met, there will be no forced circulation to provide mixing to establish uniform boron concentrations. Reduced boron concentrations can occur through the addition of water with a lower boron concentration than that contained in the RCS. Therefore, actions that reduce boron concentration shall be suspended immediately.

A.2

If SDC loop requirements are not met, actions shall be taken immediately to suspend loading irradiated fuel assemblies in the core. With no forced circulation cooling, decay heat removal from the core occurs by natural convection to the heat sink provided by the water above the core. A minimum refueling water level of 20 ft above the reactor vessel flange provides an adequate available heat sink. Suspending any operation that would increase the decay heat load, such as loading a fuel assembly, is a prudent action under this condition.

A.3

If SDC loop requirements are not met, actions shall be initiated and continued in order to satisfy SDC loop requirements.

A.4

If SDC loop requirements are not met, all containment penetrations to the outside atmosphere must be closed to prevent fission products, if released by a loss of decay heat event, from escaping the containment building. The 4 hour or within the calculated time to boil Completion Time allows fixing most SDC problems without incurring the additional action of violating the containment atmosphere.

(continued)

BASES (continued)

ACTIONS

A.1 and A.2

When two SDC loops are operable and if one SDC loop becomes inoperable, actions shall be immediately initiated and continued until the SDC loop is restored to OPERABLE status and to operation, or until ≥ 20 ft of water level is established above the reactor vessel flange. When the water level is established at ≥ 20 ft above the reactor vessel flange, the Applicability will change to that of LCO 3.9.4, "Shutdown Cooling and Coolant Circulation – High Water Level," and only one SDC loop is required to be OPERABLE and in operation. An immediate Completion Time is necessary for an operator to initiate corrective actions.

B.1

When one loop of the SDC is operable with requirements 1-8 satisfied and the SDC loop becomes inoperable or any of the 8 requirements are not met, actions shall be immediately initiated to establish a water level > 20 feet above the reactor flange. When the water level is established at > 20 feet above the reactor vessel flange, the applicability will change to that of LCO 3.9.4, "Shutdown Cooling and Coolant Circulation-High Water Level," and only one SDC loop is required to be OPERABLE and in operation. An immediate Completion Time is necessary for an operator to initiate corrective actions.

C.1

If no SDC loop is in operation or no SDC loops are OPERABLE, there will be no forced circulation to provide mixing to establish uniform boron concentrations. Reduced boron concentrations can occur by the addition of water with lower boron concentration than that contained in the RCS. Therefore, actions that reduce boron concentration shall be suspended immediately.

C.2

If no SDC loop is in operation or no SDC loops are OPERABLE, actions shall be initiated immediately and continued without interruption to restore one SDC loop to OPERABLE status and operation. Since the unit is in Conditions A and B

(continued)

ATTACHMENT B

EXISTING TECHNICAL SPECIFICATIONS AND BASES

SONGS UNIT 3

3.1 REACTIVITY CONTROL SYSTEMS

3.1.10 Boration Systems - Shutdown

LCO 3.1.10 One RCS boron injection flow path shall be OPERABLE.

APPLICABILITY: MODES 5 and 6.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. No boron injection flow path OPERABLE.	A.1	Suspend all operations involving CORE ALTERATIONS or positive reactivity changes.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
	------------------NOTE-------------------- Only required when the Refueling Water Storage Tank (RWST) is the source of borated water and the outside temperature is < 40°F or > 100°F. --	
SR 3.1.10.1	Verify RWST temperature is within limits.	24 hours
SR 3.1.10.2	Verify volume of available borated water is within limits.	7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. CRIS Manual Trip, Actuation Logic, or required control room airborne radiation monitors inoperable in MODE 5 or 6, or during movement of irradiated fuel assemblies.	B.1	--------NOTE--------- Place CREACUS in isolation mode if automatic transfer to isolation mode inoperable. ---------------------	
		Place one CREACUS train in emergency mode.	Immediately
	<u>OR</u>		
	B.2.1	Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>		
	B.2.2	Suspend positive reactivity additions.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.9.1	Perform a CHANNEL CHECK on the required control room airborne radiation monitor channel.	12 hours

(continued)

3.3 INSTRUMENTATION

3.3.13 Source Range Monitoring Channels

LCO 3.3.13 Two channels of source range monitoring instrumentation shall be OPERABLE.

APPLICABILITY: MODES 3, 4, and 5, with the reactor trip circuit breakers open or Control Element Assembly (CEA) Drive System not capable of CEA withdrawal.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more required channels inoperable.	A.1	Suspend all operations involving positive reactivity additions.	Immediately
	AND		
	A.2	Perform SDM verification in accordance with SR 3.1.1.2, if T_{avg} > 200°F, or SR 3.1.2.1, if $T_{avg} \leq$ 200°F.	4 hours AND Once per 12 hours thereafter

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.5 RCS Loops—MODE 3

LCO 3.4.5 Two RCS loops shall be OPERABLE and one RCS loop shall be in operation.

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

All reactor coolant pumps may be de-energized for ≤ 1 hour per 8 hour period, provided:

a. No operations are permitted that would cause reduction of the RCS boron concentration; and

b. Core outlet temperature is maintained at least 10°F below saturation temperature.

APPLICABILITY: MODE 3.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One required RCS loop inoperable.	A.1	Restore required RCS loop to OPERABLE status.	72 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1	Be in MODE 4.	12 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. No RCS loop OPERABLE. OR No RCS loop in operation.	C.1 Suspend all operations involving a reduction of RCS boron concentration. AND C.2 Initiate action to restore one RCS loop to OPERABLE status and operation.	Immediately Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.5.1	Verify required RCS loop is in operation.	12 hours
SR 3.4.5.2	Verify secondary side water level in each steam generator ≥ 50% (wide range).	12 hours
SR 3.4.5.3	Verify correct breaker alignment and indicated power available to the required pump that is not in operation.	7 days

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.6 RCS Loops—MODE 4

LCO 3.4.6 Two loops or trains consisting of any combination of RCS loops and shutdown cooling (SDC) trains shall be OPERABLE and at least one loop or train shall be in operation.

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

1. All reactor coolant pumps (RCPs) and SDC pumps may be de-energized for ≤ 1 hour per 8 hour period, provided:

    a. No operations are permitted that would cause reduction of the RCS boron concentration; and

    b. Core outlet temperature is maintained at least 10°F below saturation temperature.

2. No RCP shall be started with any RCS cold leg temperature ≤ 246°F unless:

    a. Pressurizer water volume is < 900 ft^3, or

    b. Secondary side water temperature in each steam generator (SG) is < 100°F above each of the RCS cold leg temperatures.

APPLICABILITY: MODE 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required RCS loop inoperable. AND Two SDC trains inoperable.	A.1 Initiate action to restore a second loop or train to OPERABLE status.	Immediately
B. One required SDC train inoperable. AND Two required RCS loops inoperable.	B.1 Be in MODE 5.	24 hours
C. Required RCS loop(s) or SDC train(s) inoperable. OR No RCS loop or SDC train in operation.	C.1 Suspend all operations involving reduction of RCS boron concentration. AND C.2 Initiate action to restore one loop or train to OPERABLE status and operation.	Immediately Immediately

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.7 RCS Loops—MODE 5, Loops Filled

LCO 3.4.7 At least one of the following loop(s)/trains listed below shall be OPERABLE and in operation:

a. Reactor Coolant Loop 1 and its associated steam generator and at least one associated Reactor Coolant Pump;

b. Reactor Coolant Loop 2 and its associated steam generator and at least one associated Reactor Coolant Pump;

c. Shutdown Cooling Train A; or

d. Shutdown Cooling Train B

One additional Reactor Coolant Loop/shutdown cooling train shall be OPERABLE, or

The secondary side water level of each steam generator shall be greater than 50% (wide range).

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

1. All reactor coolant pumps (RCPs) and pumps providing shutdown cooling may be de-energized for ≤ 1 hour per 8 hour period, provided:

   a. No operations are permitted that would cause reduction of the RCS boron concentration; and

   b. Core outlet temperature is maintained at least 10°F below saturation temperature.

2. One required SDC train may be inoperable for up to 2 hours for surveillance testing provided that the other SDC train or RCS loop is OPERABLE and in operation.

3. One required RCS loop may be inoperable for up to 2 hours for surveillance testing provided that the other RCS loop or SDC train is OPERABLE and in operation.

-- (continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. No SDC train/RCS loop in operation.	B.1 Suspend all operations involving reduction in RCS boron concentration.	Immediately
	AND	
	B.2 Initiate action to restore required SDC train/RCS loop to operation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.7.1	Verify at least one RCS loop or SDC train is in operation.	12 hours
SR 3.4.7.2	Verify required SG secondary side water level is > 50% (wide range).	12 hours
SR 3.4.7.3	Verify the second required RCS loop, SDC train or steam generator secondary is OPERABLE.	7 days

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.8 RCS Loops—MODE 5, Loops Not Filled

LCO 3.4.8 Two shutdown cooling (SDC) trains shall be OPERABLE and at least one SDC train shall be in operation.

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

1. All SDC pumps may be de-energized for ≤ 15 minutes when switching from one train to another provided:

   a. The core outlet temperature is maintained > 10°F below saturation temperature;

   b. No operations are permitted that would cause a reduction of the RCS boron concentration; and

   c. No draining operations to further reduce the RCS water volume are permitted.

2. The pump providing shutdown cooling may be de-energized for ≤ 1 hour per 8 hour period provided:

   a. The core outlet temperature is maintained > 10°F below saturation temperature; and

   b. No operations are permitted that would cause a reduction of the RCS boron concentration.

3. One SDC train may be inoperable for ≤ 2 hours for surveillance testing provided the other SDC train is OPERABLE and in operation.

4. A containment spray pump may be used in place of a low pressure safety injection pump in either or both shutdown cooling trains to provide shutdown cooling flow provided the reactor has been sub-critical for a period > 24 hours and the RCS is fully depressurized and vented in accordance with LCO 3.4.12.1.

APPLICABILITY: MODE 5 with RCS loops not filled.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One SDC train inoperable.	A.1 Initiate action to restore SDC train to OPERABLE status.	Immediately
B. Both SDC trains inoperable. OR No SDC train in operation.	B.1 Suspend all operations involving reduction of RCS boron concentration. AND B.2 Initiate action to restore one SDC train to OPERABLE status and operation.	Immediately Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.8.1	Verify at least one SDC train is in operation.	12 hours
SR 3.4.8.2	Verify correct breaker alignment and indicated power available to the required SDC pump that is not in operation.	7 days

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	AND	
	A.2.3 Initiate action to suspend operations involving positive reactivity additions.	Immediately
	AND	
	A.2.4 Initiate action to restore required offsite power circuit to OPERABLE status.	Immediately
B. One required DG inoperable.	B.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	B.2 Suspend movement of irradiated fuel assemblies.	Immediately
	AND	
	B.3 Initiate action to suspend operations involving positive reactivity additions.	Immediately
	AND	
	B.4 Initiate action to restore required DG to OPERABLE status.	Immediately

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources—Shutdown

LCO 3.8.5 DC electrical power subsystem shall be OPERABLE to support the DC electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems—Shutdown."

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One battery or associated control equipment or cabling inoperable.	A.1 Declare affected required feature(s) inoperable.	Immediately
	OR	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	AND	
	A.2.3 Initiate action to suspend operations involving positive reactivity additions.	Immediately
	AND	
		(continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.8 Inverters—Shutdown

LCO 3.8.8 Required inverters shall be OPERABLE to support the onsite Class 1E AC vital bus electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems—Shutdown."

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more required inverters inoperable.	A.1	Declare affected required feature(s) inoperable.	Immediately
	<u>OR</u>		
	A.2.1	Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>		
	A.2.2	Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>		
	A.2.3	Initiate action to suspend operations involving positive reactivity additions.	Immediately
	<u>AND</u>		
			(continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.10 Distribution Systems—Shutdown

LCO 3.8.10 The necessary portion of AC, DC, and AC vital bus electrical power distribution subsystems shall be OPERABLE to support equipment required to be OPERABLE.

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required AC, DC, or AC vital bus electrical power distribution subsystems inoperable.	A.1 Declare associated supported required feature(s) inoperable.	Immediately
	<u>OR</u>	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>	
	A.2.3 Initiate action to suspend operations involving positive reactivity additions.	Immediately
	<u>AND</u>	
		(continued)

3.9 REFUELING OPERATIONS

3.9.2 Nuclear Instrumentation

LCO 3.9.2 Two source range monitors (SRMs) shall be OPERABLE.

APPLICABILITY: MODE 6.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One SRM inoperable.	A.1 Suspend CORE ALTERATIONS. AND A.2 Suspend positive reactivity additions.	Immediately Immediately
B. Two SRMs inoperable.	B.1 Initiate actions to restore one SRM to OPERABLE status. AND B.2 Perform SR 3.9.1.1.	Immediately 4 hours AND Once per 12 hours thereafter

3.9 REFUELING OPERATIONS

3.9.4 Shutdown Cooling (SDC) and Coolant Circulation—High Water Level

LCO 3.9.4 One SDC loop shall be OPERABLE and in operation.

---------------------------NOTES---------------------------
With the upper guide structure removed from the reactor vessel the required SDC loop may be removed from operation for ≤ 2 hours per 8-hour period, provided:

a. The maximum RCS temperature is maintained ≤ 140°F.
b. No operations are permitted that would cause a reduction of the RCS boron concentration.
c. The capability to close the containment penetrations with direct access to the outside atmosphere within the calculated time to boil is maintained.
d. The reactor cavity water level is maintained ≥ 20 feet above the top of the reactor pressure vessel flange, or, for core alterations, ≥ 23 feet above the top of the reactor pressure vessel flange.

---------------------------NOTE---------------------------
A containment spray pump may be used in place of a low pressure safety injection pump in either or both shutdown cooling loops to provide shutdown cooling flow.

APPLICABILITY: MODE 6 with the water level ≥ 20 ft above the top of reactor vessel flange.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. SDC loop requirements not met.	A.1 Suspend operations involving a reduction in reactor coolant boron concentration. AND	Immediately
		(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One SDC loop inoperable. (Applicable to initial conditions of two shutdown cooling loops OPERABLE)	A.1	Initiate action to restore SDC loop to OPERABLE status.	Immediately
	<u>OR</u>		
	A.2	Initiate actions to establish ≥ 20 ft of water above the top of reactor vessel flange.	Immediately
B. One SDC Loop Operable, less than 20 feet of water above the reactor vessel flange and any of the 8 requirements not met (Applicable to initial conditions of one shutdown cooling loop OPERABLE and operating with requirements 1-8)	B.1	Initiate actions to establish ≥ 20 ft of water	Immediately
C. No SDC loop OPERABLE or in operation.	C.1	Suspend operations involving a reduction in reactor coolant boron concentration.	Immediately
	<u>AND</u>		

(continued)

BASES (continued)

ACTION

A.1

With no boron injection flow path to the reactor coolant System OPERABLE, all operations involving CORE ALTERATIONS or positive reactivity changes shall be suspended immediately without consideration of temperature fluctuations. A boron injection flow path is not OPERABLE if it is not capable of performing its boron injection function. In consideration of the stable reactor configuration and the initial boron concentration, a core alteration is the only possible source for a significant increase in reactivity.

SURVEILLANCE REQUIREMENTS

SR 3.1.10.1, SR 3.1.10.2, and SR 3.1.10.3

SRs 3.1.10.1, 3.1.10.2, and 3.1.10.3, ensure that the required borated water supply is available. SR 3.1.10.1 verifies that the temperature of the boric acid solution in the RWST is ≥ 40°F and ≤ 100°F. The RWST water temperature is not expected to approach 40°F or 100°F, considering local meteorology and the large heat capacity of the RWST. Furthermore, at 40°F boric acid precipitation will not occur below a concentration of 4720 ppm boron. The maximum boric acid concentration in the tanks is 2800 ppm boron. However, SR 3.1.10.1 is only applicable when the RWST is the source of borated water and the outside air temperature is not within the normally expected range of 40 to 100°F.

The solubility of boric acid at 50°F is about 3.5 wt%. There is no similar requirement to verify BAMU Tank temperature 50°F is within the normal operating range of the building.

SR 3.1.10.2 and 3.1.10.3 verify that a sufficient amount of boron is available for RCS injection from either the BAMU tanks or the RWST. This requires a minimum of 4150 gallons of boric acid solution at a concentration of 2350 PPM Boron in either the RWST (15.5%[1] level indication) or a BAMU tank. A maximum boric acid solution concentration of 6119 ppm is specified for the BAMU Tank. The water volume limits are specified relative to the top of the highest suction connection to the tank and considers vortexing, internal structures and instrument errors. The 7 day Surveillance Frequency ensures that a sufficient initial water supply is available for boron injection.

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[1] 15.5% level with tanks T005 and T006 cross connected (Reference 4, CCN-1). 17.0% level with tanks T005 (Reference 6) and T006 (Reference 4, CCN-3) isolated.

(continued)

BASES (continued)

ACTIONS (continued)

Condition B applies to the failure of CRIS Manual Trip, Actuation Logic, and required gaseous radiation monitor channels in Mode 5 or 6, or when moving irradiated assemblies. The Required Actions are immediately taken to place one OPERABLE CREACUS train in the emergency mode, or to suspend positive reactivity additions, and movement of irradiated fuel assemblies. The Completion Time recognizes the fact that the radiation signals are the only Functions available to initiate control room isolation in the event of a fuel handling accident.

SURVEILLANCE REQUIREMENTS

SR 3.3.9.1

Performance of the CHANNEL CHECK once every 12 hours ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value.

Significant deviations between the two instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

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

The Frequency, about once every shift, is based on operating experience that demonstrates the rarity of channel failure. Thus, performance of the CHANNEL CHECK guarantees that undetected overt channel failure is limited to 12 hours. Since the probability of two random failures in redundant channels in any 12 hour period is low, the CHANNEL CHECK minimizes the chance of loss of protective function due to failure of redundant channels. The CHANNEL CHECK supplements less formal, but more frequent, checks of channel OPERABILITY during normal operational use of the displays associated with the LCO required channels.

(continued)

BASES (continued)

LCO

The LCO on the source range monitoring channels ensures that adequate information is available to verify core reactivity conditions while shut down.

A minimum of two source range monitoring channels are required to be OPERABLE.

APPLICABILITY

In MODES 3, 4, and 5, with RTCBs open or the Control Element Assembly (CEA) Drive System not capable of CEA withdrawal, source range monitoring channels must be OPERABLE to monitor core power for reactivity changes. In MODES 1 and 2, and in MODES 3, 4, and 5, with the RTCBs shut and the CEAs capable of withdrawal, the Logarithmic Power Monitoring channels are addressed as part of the RPS in LCO 3.3.1, "Reactor Protective System (RPS) Instrumentation—Operating," and LCO 3.3.2, "Reactor Protective System (RPS) Instrumentation—Shutdown."

The requirements for source range neutron flux monitoring in MODE 6 are addressed in LCO 3.9.2, "Nuclear Instrumentation." The source range nuclear instrumentation channels provide neutron flux coverage extending an additional one to two decades below the logarithmic channels for use during refueling, when neutron flux may be extremely low.

ACTIONS

A channel is inoperable when it does not satisfy the OPERABILITY criteria for the channel's function. These criteria are outlined in the LCO section of the Bases.

A.1 and A.2

With one required channel inoperable, it may not be possible to perform a CHANNEL CHECK to verify that the other required channel is OPERABLE. Therefore, with one or more required channels inoperable, the source range monitoring Function cannot be reliably performed. Consequently, the Required Actions are the same for one required channel inoperable or more than one required channel inoperable. The absence of reliable neutron flux indication makes it difficult to ensure SDM is maintained. Required Action A.1 therefore

(continued)

BASES

ACTIONS

A.1 and A.2 (continued)

requires that all positive reactivity additions that are under operator control, such as boron dilution or Reactor Coolant System temperature changes, be halted immediately, preserving SDM. However, temperature fluctuations associated with maintaining the plant status are permissible provided they remain within limits established for the plant conditions.

SDM must be verified periodically to ensure that it is being maintained. Both required channels must be restored as soon as possible. The initial Completion Time of 4 hours and once every 12 hours thereafter to perform SDM verification takes into consideration that Required Action A.1 eliminates many of the means by which SDM can be reduced. These Completion Times are also based on operating experience in performing the Required Actions and the fact that plant conditions will change slowly.

SURVEILLANCE REQUIREMENTS

SR 3.3.13.1

SR 3.3.13.1 is the performance of a CHANNEL CHECK on each required channel every 12 hours. A CHANNEL CHECK is a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based upon the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying that the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria are determined by the plant staff and should be based on a combination of the channel instrument uncertainties including control isolation, indication, and readability. If a channel is outside of the match criteria, it may be an indication that the transmitter or the signal processing equipment has drifted outside of its limits. If the channels are within the match criteria, it is an indication that the channels are OPERABLE.

The Frequency, about once every shift, is based on operating experience that demonstrates the rarity of channel failure. Thus, the performance of CHANNEL CHECK ensures that

(continued)

BASES

LCO (continued)

of requiring both SGs to be capable (> 50% wide range water level) of transferring heat from the reactor coolant at a controlled rate. Forced reactor coolant flow is the required way to transport heat, although natural circulation flow provides adequate removal. A minimum of one running RCP meets the LCO requirement for one loop in operation.

The Note permits a limited period of operation without RCPs. All RCPs may be de-energized for ≤ 1 hour per 8 hour period. This means that natural circulation has been established. When in natural circulation, a reduction in boron concentration is prohibited because an even concentration distribution throughout the RCS cannot be ensured. Core outlet temperature is to be maintained at least 10°F below the saturation temperature so that no vapor bubble may form and possibly cause a natural circulation flow obstruction.

In MODES 3, 4, and 5, it is sometimes necessary to stop all RCPs or shutdown cooling (SDC) pump forced circulation (e.g., to change operation from one SDC train to the other, to perform surveillance or startup testing, to perform the transition to and from SDC System cooling, or to avoid operation below the RCP minimum net positive suction head limit). The time period is acceptable because natural circulation is adequate for heat removal, or the reactor coolant temperature can be maintained subcooled and boron stratification affecting reactivity control is not expected.

An OPERABLE loop consists of at least one RCP providing forced flow for heat transport and an SG that is OPERABLE in accordance with the Steam Generator Tube Surveillance Program. An RCP is OPERABLE if it is capable of being powered and is able to provide forced flow if required.

APPLICABILITY

In MODE 3, the heat load is lower than at power; therefore, one RCS loop in operation is adequate for transport and heat removal. A second RCS loop is required to be OPERABLE but not in operation for redundant heat removal capability.

Operation in other MODES is covered by:

LCO 3.4.4, "RCS Loops—MODES 1 and 2";
LCO 3.4.6, "RCS Loops—MODE 4";

(continued)

BASES

APPLICABILITY (continued)

LCO 3.4.7, "RCS Loops—MODE 5, Loops Filled";
LCO 3.4.8, "RCS Loops—MODE 5, Loops Not Filled";
LCO 3.9.4, "Shutdown Cooling (SDC) and Coolant Circulation—High Water Level" (MODE 6); and
LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation—Low Water Level" (MODE 6).

ACTIONS

A.1

If one required RCS loop is inoperable, redundancy for forced flow heat removal is lost. The Required Action is restoration of the required RCS loop to OPERABLE status within a Completion Time of 72 hours. This time allowance is a justified period to be without the redundant, nonoperating loop because a single loop in operation has a heat transfer capability greater than that needed to remove the decay heat produced in the reactor core.

B.1

If restoration is not possible within 72 hours, the unit must be placed in MODE 4 within 12 hours. In MODE 4, the plant may be placed on the SDC System. The Completion Time of 12 hours is compatible with required operation to achieve cooldown and depressurization from the existing plant conditions in an orderly manner and without challenging plant systems.

C.1 and C.2

If no RCS loop is in operation, except as provided in Note 1 in the LCO section, all operations involving a reduction of RCS boron concentration must be immediately suspended. This is necessary because boron dilution requires forced circulation for proper homogenization. Action to restore one RCS loop to OPERABLE status and operation shall be initiated immediately and continued until one RCS loop is restored to OPERABLE status and operation. The immediate Completion Times reflect the importance of maintaining operation for decay heat removal.

(continued)

BASES

LCO (continued)

prohibits boron dilution when forced flow is stopped because an even concentration distribution cannot be ensured. Core outlet temperature is to be maintained at least 10°F below saturation temperature so that no vapor bubble may form and possibly cause a natural circulation flow obstruction. The response of the RCS without the RCPs or SDC pumps depends on the core decay heat load and the length of time that the pumps are stopped. As decay heat diminishes, the effects on RCS temperature and pressure diminish. Without cooling by forced flow, higher heat loads will cause the reactor coolant temperature and pressure to increase at a rate proportional to the decay heat load. Because pressure can increase, the applicable system pressure limits (pressure and temperature (P/T) limits or low temperature overpressure protection (LTOP) limits) must be observed and forced SDC flow or heat removal via the SGs must be re-established prior to reaching the pressure limit. The circumstances for stopping both RCPs or SDC pumps are to be limited to situations where:

a. Pressure and temperature increases can be maintained well within the allowable pressure (P/T limits and LTOP) and 10°F subcooling limits; or

b. An alternate heat removal path through the SGs is in operation.

Note 2 requires that either of the following two conditions be satisfied before an RCP may be started with any RCS cold leg temperature ≤ 246°F.

a. Pressurizer water volume is < 900 ft^3; or

b. Secondary side water temperature in each SG is < 100°F above each of the RCS cold leg temperatures.

Satisfying the above condition will preclude a large pressure surge in the RCS when the RCP is started.

An OPERABLE RCS loop consists of at least one OPERABLE RCP and an SG that is OPERABLE in accordance with the Steam Generator Tube Surveillance Program and has the minimum water level specified in SR 3.4.6.2.

(continued)

BASES

ACTIONS

B.1 (continued)

reasonable, based on operating experience, to reach MODE 5 from MODE 4, with only one SDC train operating, in an orderly manner and without challenging plant systems.

C.1 and C.2

If no RCS loops or SDC trains are OPERABLE or in operation, except during conditions permitted by Note 1 in the LCO section, all operations involving reduction of RCS boron concentration must be suspended and action to restore one RCS loop or SDC train to OPERABLE status and operation must be initiated. Boron dilution requires forced circulation for proper mixing, and the margin to criticality must not be reduced in this type of operation. The immediate Completion Times reflect the importance of decay heat removal. The action to restore must continue until one loop or train is restored to operation.

SURVEILLANCE REQUIREMENTS

SR 3.4.6.1

This SR requires verification every 12 hours that one required loop or train is in operation. This ensures forced flow is providing heat removal. Verification includes flow rate, temperature, or pump status monitoring. The 12 hour Frequency has been shown by operating practice to be sufficient to regularly assess RCS loop status. In addition, control room indication and alarms will normally indicate loop status.

SR 3.4.6.2

This SR requires verification every 12 hours of secondary side water level in the required SG(s) $\geq$ 50% (wide range). An adequate SG water level is required in order to have a heat sink for removal of the core decay heat from the reactor coolant. The 12 hour interval has been shown by operating practice to be sufficient to regularly assess degradation and verify operation within safety analyses assumptions.

(continued)

BASES (continued)

LCO

The purpose of this LCO is to require at least one of the SDC trains or RCS loops be OPERABLE and in operation with an additional SDC train or RCS loop OPERABLE or secondary side water level of each SG shall be ≥ 50% wide range. One SDC train or RCS loop provides sufficient forced circulation to perform the safety functions of the reactor coolant under these conditions. The second SDC or RCS loop train is normally maintained OPERABLE as a backup to the operating train/loop to provide redundant paths for decay heat removal. However, if the standby SDC train/RCS loop is not OPERABLE, a sufficient alternate method to provide redundant paths for decay heat removal is two SGs with their secondary side water levels ≥ 50% wide range. Should the operating SDC train/RCS loop fail, the SGs could be used to remove the decay heat.

Note 1 permits all RCPs and SDC pumps to be de-energized ≤ 1 hour per 8 hour period. The circumstances for stopping both SDC trains/RCS loops are to be limited to situations where pressure and temperature increases can be maintained well within the allowable pressure (pressure and temperature and low temperature overpressure protection) and 10°F subcooling limits, or an alternate heat removal path through the SG(s) is in operation.

This LCO is modified by a Note that prohibits boron dilution when forced flow is stopped because an even concentration distribution cannot be ensured. Core outlet temperature is to be maintained at least 10°F below saturation temperature, so that no vapor bubble would form and possibly cause a natural circulation flow obstruction. In this MODE, the SG(s) can be used as the backup for heat removal. To ensure their availability, the RCS loop flow path is to be maintained with subcooled liquid.

In MODE 5, it is sometimes necessary to stop all RCP or SDC forced circulation. This is permitted to change operation from one SDC train or RCS loop to the other, perform surveillance or startup testing, perform the transition to and from the SDC, or to avoid operation below the RCP minimum net positive suction head limit. The time period is acceptable because natural circulation is acceptable for decay heat removal, the reactor coolant temperature can be maintained subcooled, and boron stratification affecting reactivity control is not expected.

(continued)

BASES

LCO (continued)

An OPERABLE RCS loop consists of at least one RCP providing forced flow for heat transport and an SG that is OPERABLE in accordance with the Steam Generator Tube Surveillance Program. An RCP is OPERABLE if it is capable of being powered and is able to provide forced flow if required.

APPLICABILITY

In MODE 5 with RCS loops filled, this LCO requires forced circulation to remove decay heat from the core and to provide proper boron mixing. One SDC train/RCS loop provides sufficient circulation for these purposes.

Operation in other MODES is covered by:

LCO 3.4.4, "RCS Loops—MODES 1 and 2";
LCO 3.4.5, "RCS Loops—MODE 3";
LCO 3.4.6, "RCS Loops—MODE 4";
LCO 3.4.8, "RCS Loops—MODE 5, Loops Not Filled";
LCO 3.9.4, "Shutdown Cooling (SDC) and Coolant Circulation—High Water Level" (MODE 6); and
LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation—Low Water Level" (MODE 6).

ACTIONS

A.1 and A.2

If the required SDC train/RCS loop is inoperable and any SGs have secondary side water levels < 50% wide range, redundancy for heat removal is lost. Action must be initiated immediately to restore a second SDC train/RCS loop to OPERABLE status or to restore the water level in the required SGs. Either Required Action A.1 or Required Action A.2 will restore redundant decay heat removal paths. The immediate Completion Times reflect the importance of maintaining the availability of two paths for decay heat removal.

B.1 and B.2

If no SDC train/RCS loop is in operation, except as permitted in Note 1, all operations involving the reduction of RCS boron concentration must be suspended. Action to restore one SDC train/RCS loop to operation must be

(continued)

BASES

ACTIONS

B.1 and B.2 (continued)

initiated. Boron dilution requires forced circulation for proper mixing and the margin to criticality must not be reduced in this type of operation. The immediate Completion Times reflect the importance of maintaining operation for decay heat removal.

SURVEILLANCE REQUIREMENTS

SR 3.4.7.1

This SR requires verification every 12 hours that at least one SDC train/RCS loop is in operation. Verification includes flow rate, temperature, or pump status monitoring, which help ensure that forced flow is providing decay heat removal. The 12 hour Frequency has been shown by operating practice to be sufficient to regularly assess degradation and verify operation is within safety analyses assumptions. In addition, control room indication and alarms will normally indicate loop status.

The SDC/RCS flow is established to ensure that core outlet temperature is maintained sufficiently below saturation to allow time for swap over to the standby SDC train/RCS loop should the operating train be lost.

SR 3.4.7.2

Verifying the SGs are OPERABLE by ensuring their secondary side water levels are ≥ 50% wide range ensures that redundant heat removal paths are available if the second SDC train/RCS loop is inoperable. The Surveillance is required to be performed when the LCO requirement is being met by use of the SGs. If both SDC trains are OPERABLE and one SDC train is in operation, this SR is not needed. The 12 hour Frequency has been shown by operating practice to be sufficient to regularly assess degradation and verify operation within safety analyses assumptions.

(continued)

BASES (continued)

LCO

The purpose of this LCO is to require a minimum of two SDC trains be OPERABLE and at least one of these trains be in operation. An OPERABLE train is one that is capable of transferring heat from the reactor coolant at a controlled rate. Heat cannot be removed via the SDC System unless forced flow is used. A minimum of one running SDC pump meets the LCO requirement for one train in operation. An additional SDC train is required to be OPERABLE to meet the single failure criterion.

Note 1 permits the SDC pumps to be de-energized for ≤ 15 minutes when switching from one train to another. The circumstances for stopping both SDC pumps are to be limited to situations when the outage time is short and the core outlet temperature is maintained > 10°F below saturation temperature. The Note prohibits boron dilution or draining operations when SDC forced flow is stopped.

Note 2 specifies the pump providing shutdown cooling may be de-energized for up to 1 hour per 8 hour period provided 1) no operations are permitted that would cause dilution of the reactor coolant system boron concentration, and 2) core sublet temperature is maintained at least 10°F below saturation temperature.

Note 3 allows one SDC train to be inoperable for a period of 2 hours provided that the other train is OPERABLE and in operation. This permits periodic surveillance tests to be performed on the inoperable train during the only time when these tests are safe and possible.

Note 4 specifies that a containment spray pump may be used in place of a low pressure safety injection pump in either or both shutdown cooling trains to provide shutdown cooling flow provided the reactor has been sub-critical for a period greater than 24 hours and the reactor coolant system is fully depressurized and vented in accordance with TS 3.4.12.1.

An OPERABLE SDC train is composed of an OPERABLE SDC pump capable of providing forced flow to an OPERABLE SDC heat exchanger, along with the appropriate flow and temperature instrumentation for control, protection, and indication. SDC pumps are OPERABLE if they are capable of being powered and are able to provide flow if required.

(continued)

BASES (continued)

APPLICABILITY

In MODE 5 with loops not filled, this LCO requires core heat removal and coolant circulation by the SDC System.

Operation in other MODES is covered by:

LCO 3.4.4, "RCS Loops—MODES 1 and 2";
LCO 3.4.5, "RCS Loops—MODE 3";
LCO 3.4.6, "RCS Loops—MODE 4";
LCO 3.4.7, "RCS Loops—MODE 5, Loops Filled";
LCO 3.9.4, "Shutdown Cooling (SDC) and Coolant Circulation—High Water Level" (MODE 6); and
LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation—Low Water Level" (MODE 6).

ACTIONS

A.1

If the required SDC train is inoperable, redundancy for heat removal is lost. Action must be initiated immediately to restore a second train to OPERABLE status. The Completion Time reflects the importance of maintaining the availability of two paths for heat removal.

B.1 and B.2

If no SDC train is OPERABLE or in operation, except as provided in Note 1 or in Note 2, all operations involving the reduction of RCS boron concentration must be suspended. Action to restore one SDC train to OPERABLE status and operation must be initiated immediately. Boron dilution requires forced circulation for proper mixing and the margin to criticality must not be reduced in this type of operation. The immediate Completion Time reflects the importance of maintaining operation for decay heat removal.

(continued)

BASES

ACTIONS (continued)

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

With the offsite circuit not available to the required train (Condition A), the option exists to declare all required features inoperable. Since this option may involve undesired administrative efforts, the allowance for sufficiently conservative actions is made. With the required DG inoperable (Condition B), the minimum required diversity of AC power sources is not available. It is, therefore, required to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions which would exceed limits specified in LCO 3.1.2 or LCO 3.1.9. The Required Action to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory provided the required SDM is maintained.

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

Notwithstanding performance of the conservative Required Actions, the unit is still without sufficient AC power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required AC power sources and continue until the LCO requirements are restored.

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

Pursuant to LCO 3.0.6, the Distribution System's (LCO 3.8.10) ACTIONS are not entered even if all AC sources to it are inoperable, resulting in de-energization. Therefore, the Required Actions of Condition A are modified by a Note to indicate that when Condition A is entered with no AC

(continued)

BASES

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, and A.2.4 (continued)

positive reactivity additions). The Required Action to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory, provided the required SDM is maintained.

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize probability of the occurrence of postulated events.

Notwithstanding performance of the above conservative Required Actions, the unit is still without sufficient DC power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required DC power sources and continue until the LCO requirements are restored.

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

B.1

Condition B represents one train with a loss of ability to completely respond to an event, and a potential loss of ability to remain energized during normal operation. Since eventual failure of the battery to maintain the required battery cell parameters is highly probable, it is imperative that the operator's attention focus on minimizing the potential for complete loss of DC power to the affected train. The additional time provided by the Completion Time is consistent with the battery's capability to maintain its short term capability to respond to a design basis event.

C.1

If the battery cell parameters cannot be maintained within Category A limits, the short term capability of the battery

(continued)

BASES

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, and A.2.4 (continued)

reactivity additions. The Required Action to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory, provided the required SDM is maintained. By the allowance of the option to declare required features inoperable with the associated inverter(s) inoperable, appropriate restrictions will be implemented in accordance with the affected required features LCOs' Required ACTIONS. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions).

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

Notwithstanding performance of the above conservative Required Actions, the unit is still without sufficient AC vital power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required AC vital power source and continue until the LCO requirements are restored.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required inverters should be completed as quickly as possible in order to minimize the time the unit safety systems may be without power or powered from a constant voltage source transformer.

SURVEILLANCE REQUIREMENTS

SR 3.8.8.1

This Surveillance verifies that the inverters are functioning properly with all required circuit breakers closed and AC vital buses energized from the inverter. The

(continued)

BASES (continued)

ACTIONS

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

Although redundant required features may require redundant trains of electrical power distribution subsystems to be OPERABLE, one OPERABLE distribution subsystem train may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS and fuel movement. By allowing the option to declare required features associated with an inoperable distribution subsystem inoperable, appropriate restrictions are implemented in accordance with the affected distribution subsystems LCO's Required Actions. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions).

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

Notwithstanding performance of the above conservative Required Actions, a required shutdown cooling (SDC) subsystem may be inoperable. In this case, these Required Actions of Condition A do not adequately address the concerns relating to coolant circulation and heat removal. Pursuant to LCO 3.0.6, the SDC ACTIONS would not be entered. Therefore, the Required Actions of Condition A direct declaring SDC inoperable, which results in taking the appropriate SDC actions.

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

(continued)

BASES

LCO (continued)

COLR ensures a core k_{eff} of ≤ 0.95 is maintained during fuel handling operations. Violation of the LCO could lead to an inadvertent criticality during MODE 6.

APPLICABILITY

This LCO is applicable in MODE 6 to ensure that the fuel in the reactor vessel will remain subcritical. The required boron concentration ensures a $k_{eff} \leq 0.95$. Above MODE 6, LCO 3.1.1, "SHUTDOWN MARGIN (SDM)—$T_{avg} > 200°F$," and LCO 3.1.2, "SHUTDOWN MARGIN—$T_{avg} \leq 200°F$," ensure that an adequate amount of negative reactivity is available to shut down the reactor and to maintain it subcritical.

ACTIONS

A.1 and A.2

Continuation of CORE ALTERATIONS or positive reactivity additions (including actions to reduce boron concentration) is contingent upon maintaining the unit in compliance with the LCO. If the boron concentration of any coolant volume in the RCS, or the refueling canal is less than its limit, all operations involving CORE ALTERATIONS or positive reactivity additions must be suspended immediately.

Temperature fluctuations associated with maintaining the plant status are permissible provided they remain within limits established for the plant conditions.

Suspension of CORE ALTERATIONS and positive reactivity additions shall not preclude moving a component to a safe position.

A.3

In addition to immediately suspending CORE ALTERATIONS or positive reactivity additions, boration to restore the concentration must be initiated immediately.

In determining the required combination of boration flow rate and concentration, there is no unique design basis event that must be satisfied. The only requirement is to restore the boron concentration to its required value as

(continued)

BASES (continued)

APPLICABILITY

In MODE 6, the SRMs must be OPERABLE to determine changes in core reactivity. There is no other direct means available to check core reactivity levels.

In MODES 3, 4, and 5, the installed source range detectors and circuitry are required to be OPERABLE by LCO 3.3.13, "Source Range Monitors."

ACTIONS

A.1 and A.2

With only one SRM OPERABLE, redundancy has been lost. Since these instruments are the only direct means of monitoring core reactivity conditions, CORE ALTERATIONS and positive reactivity additions must be suspended immediately. Performance of Required Action A.1 shall not preclude completion of movement of a component to a safe position.

Temperature fluctuations associated with maintaining the plant status are permissible provided they remain within limits established for the plant conditions.

B.1

With no SRM OPERABLE, actions to restore a monitor to OPERABLE status shall be initiated immediately. Once initiated, actions shall be continued until an SRM is restored to OPERABLE status.

B.2

With no SRM OPERABLE, there is no direct means of detecting changes in core reactivity. However, since CORE ALTERATIONS and positive reactivity additions are not to be made, the core reactivity condition is stabilized until the SRMs are OPERABLE. This stabilized condition is determined by performing SR 3.9.1.1 to verify that the required boron concentration exists.

(continued)

BASES

LCO (continued)

The flow path starts in one of the RCS hot legs and is returned to the RCS cold legs.

The LCO is modified by two Notes. With the upper guide structure removed from the reactor vessel Note 1 allows the required operating SDC loop to be removed from service for up to 2 hours in each 8 hour period, provided that:

a. The maximum RCS temperature is maintained ≤ 140°F.
b. No operations are permitted that would cause a reduction of the RCS boron concentration.
c. The capability to close the containment penetrations with direct access to the outside temperature within the calculated time to boil is maintained.
d. The reactor cavity water level is maintained ≥ 20 feet above the top of the reactor pressure vessel flange, or, for core alterations, ≥ 23 feet above the top of the reactor pressure vessel flange.

This permits operations such as core mapping or alterations in the vicinity of the reactor vessel hot leg nozzles, RCS to SDC isolation valve testing, and inservice testing of LPSI system components. During this 2 hour period, decay heat is removed by natural convection to the large mass of water in the refueling canal.

Note 2 allows Operations to use a containment spray pump in place of a low pressure safety injection pump to provide shutdown cooling flow.

APPLICABILITY

One SDC loop must be in operation in MODE 6, with the water level ≥ 20 ft above the top of the reactor vessel flange, to provide decay heat removal. Requirements for the SDC System in other MODES are covered by LCOs in Section 3.4, Reactor Coolant System (RCS), and Section 3.5, Emergency Core Cooling Systems (ECCS). SDC loop requirements in MODE 6, with the water level < 20 ft above the top of the reactor vessel flange, are located in LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation—Low Water Level."

ACTIONS

SDC loop requirements are met by having one SDC loop OPERABLE and in operation, except as permitted in the Note to the LCO.

(continued)

BASES (continued)

ACTIONS (continued)

A.1

If SDC loop requirements are not met, there will be no forced circulation to provide mixing to establish uniform boron concentrations. Reduced boron concentrations can occur through the addition of water with a lower boron concentration than that contained in the RCS. Therefore, actions that reduce boron concentration shall be suspended immediately.

A.2

If SDC loop requirements are not met, actions shall be taken immediately to suspend loading irradiated fuel assemblies in the core. With no forced circulation cooling, decay heat removal from the core occurs by natural convection to the heat sink provided by the water above the core. A minimum refueling water level of 20 ft above the reactor vessel flange provides an adequate available heat sink. Suspending any operation that would increase the decay heat load, such as loading a fuel assembly, is a prudent action under this condition.

A.3

If SDC loop requirements are not met, actions shall be initiated and continued in order to satisfy SDC loop requirements.

A.4

If SDC loop requirements are not met, all containment penetrations to the outside atmosphere must be closed to prevent fission products, if released by a loss of decay heat event, from escaping the containment building. The 4 hour or within the calculated time to boil Completion Time allows fixing most SDC problems without incurring the additional action of violating the containment atmosphere.

(continued)

BASES (continued)

ACTIONS

A.1 and A.2

When two SDC loops are operable and if one SDC loop becomes inoperable, actions shall be immediately initiated and continued until the SDC loop is restored to OPERABLE status and to operation, or until ≥ 20 ft of water level is established above the reactor vessel flange. When the water level is established at ≥ 20 ft above the reactor vessel flange, the Applicability will change to that of LCO 3.9.4, "Shutdown Cooling and Coolant Circulation—High Water Level," and only one SDC loop is required to be OPERABLE and in operation. An immediate Completion Time is necessary for an operator to initiate corrective actions.

B.1

When one loop of the SDC is operable with requirements 1-8 satisfied and the SDC loop becomes inoperable or any of the 8 requirements are not met, actions shall be immediately initiated to establish a water level > 20 feet above the reactor flange. When the water level is established at > 20 feet above the reactor vessel flange, the applicability will change to that of LCO 3.9.4, "Shutdown Cooling and Coolant Circulation-High Water Level," and only one SDC loop is required to be OPERABLE and in operation. An immediate Completion Time is necessary for an operator to initiate corrective actions.

C.1

If no SDC loop is in operation or no SDC loops are OPERABLE, there will be no forced circulation to provide mixing to establish uniform boron concentrations. Reduced boron concentrations can occur by the addition of water with lower boron concentration than that contained in the RCS. Therefore, actions that reduce boron concentration shall be suspended immediately.

C.2

If no SDC loop is in operation or no SDC loops are OPERABLE, actions shall be initiated immediately and continued without interruption to restore one SDC loop to OPERABLE status and operation. Since the unit is in Conditions A and B

(continued)

ATTACHMENT C

PROPOSED TECHNICAL SPECIFICATIONS AND BASES

(Redline and Strikeout)

SONGS UNIT 2

3.1 REACTIVITY CONTROL SYSTEMS

3.1.10 Boration Systems - Shutdown

LCO 3.1.10 One RCS boron injection flow path shall be OPERABLE.

APPLICABILITY: MODES 5 and 6.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. No boron injection flow path OPERABLE.	A.1 --------NOTE-------- Plant temperature changes are allowed provided the temperature change is accounted for in the calculated SDM. -------------------- Suspend all operations involving CORE ALTERATIONS or positive reactivity changes.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
	------------------NOTE-------------------- Only required when the Refueling Water Storage Tank (RWST) is the source of borated water and the outside temperature is < 40°F or > 100°F. ---	
SR 3.1.10.1	Verify RWST temperature is within limits.	24 hours
SR 3.1.10.2	Verify volume of available borated water is within limits.	7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. CRIS Manual Trip, Actuation Logic, or required control room airborne radiation monitors inoperable in MODE 5 or 6, or during movement of irradiated fuel assemblies.	B.1	--------NOTE--------- Place CREACUS in isolation mode if automatic transfer to isolation mode inoperable. --------------------- Place one CREACUS train in emergency mode.	Immediately
	<u>OR</u>		
	B.2.1	Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>		
	B.2.2	--------NOTE--------- Limited plant control operations are allowed provided the changes are accounted for in the calculated SDM. --------------------- Suspend positive reactivity additions.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.9.1	Perform a CHANNEL CHECK on the required control room airborne radiation monitor channel.	12 hours

(continued)

3.3 INSTRUMENTATION

3.3.13 Source Range Monitoring Channels

LCO 3.3.13 Two channels of source range monitoring instrumentation shall be OPERABLE.

APPLICABILITY: MODES 3, 4, and 5, with the reactor trip circuit breakers open or Control Element Assembly (CEA) Drive System not capable of CEA withdrawal.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more required channels inoperable.	A.1	--------NOTE--------- Limited plant control operations are allowed provided the changes are accounted for in the calculated SDM. --------------------- Suspend all operations involving positive reactivity additions.	Immediately
	AND		
	A.2	Perform SDM verification in accordance with SR 3.1.1.2, if $T_{avg} > 200°F$, or SR 3.1.2.1, if $T_{avg} \leq 200°F$.	4 hours AND Once per 12 hours thereafter

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.5 RCS Loops – MODE 3

LCO 3.4.5 Two RCS loops shall be OPERABLE and one RCS loop shall be in operation.

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

All reactor coolant pumps may be de-energized for ≤ 1 hour per 8 hour period, provided:

a. ~~No operations are permitted that would cause reduction of the RCS boron concentration; and~~No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.1; and

b. Core outlet temperature is maintained at least 10°F below saturation temperature.

APPLICABILITY: MODE 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required RCS loop inoperable.	A.1 Restore required RCS loop to OPERABLE status.	72 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Be in MODE 4.	12 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. No RCS loop OPERABLE. OR No RCS loop in operation.	C.1 ~~Suspend all operations involving a reduction of RCS boron concentration.~~ Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet SDM of LCO 3.1.1.	Immediately
	AND	
	C.2 Initiate action to restore one RCS loop to OPERABLE status and operation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.5.1	Verify required RCS loop is in operation.	12 hours
SR 3.4.5.2	Verify secondary side water level in each steam generator ≥ 50% (wide range).	12 hours
SR 3.4.5.3	Verify correct breaker alignment and indicated power available to the required pump that is not in operation.	7 days

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.6 RCS Loops – MODE 4

LCO 3.4.6 Two loops or trains consisting of any combination of RCS loops and shutdown cooling (SDC) trains shall be OPERABLE and at least one loop or train shall be in operation.

---NOTES---

1. All reactor coolant pumps (RCPs) and SDC pumps may be de-energized for ≤ 1 hour per 8 hour period, provided:

    a. ~~No operations are permitted that would cause reduction of the RCS boron concentration; and~~No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.1; and

    b. Core outlet temperature is maintained at least 10°F below saturation temperature.

2. No RCP shall be started with any RCS cold leg temperature ≤ 256°F unless:

    a. Pressurizer water volume is < 900 ft^3, or

    b. Secondary side water temperature in each steam generator (SG) is < 100°F above each of the RCS cold leg temperatures.

APPLICABILITY: MODE 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required RCS loop inoperable. AND Two SDC trains inoperable.	A.1 Initiate action to restore a second loop or train to OPERABLE status.	Immediately
B. One required SDC train inoperable. AND Two required RCS loops inoperable.	B.1 Be in MODE 5.	24 hours
C. Required RCS loop(s) or SDC train(s) inoperable. OR No RCS loop or SDC train in operation.	C.1 ~~Suspend all operations involving reduction of RCS boron concentration.~~ Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet SDM of LCO 3.1.1. AND C.2 Initiate action to restore one loop or train to OPERABLE status and operation.	Immediately Immediately

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.7 RCS Loops – MODE 5, Loops Filled

LCO 3.4.7 At least one of the following loop(s)/trains listed below shall be OPERABLE and in operation:

a. Reactor Coolant Loop 1 and its associated steam generator and at least one associated Reactor Coolant Pump;

b. Reactor Coolant Loop 2 and its associated steam generator and at least one associated Reactor Coolant Pump;

c. Shutdown Cooling Train A; or

d. Shutdown Cooling Train B

One additional Reactor Coolant Loop/shutdown cooling train shall be OPERABLE, or

The secondary side water level of each steam generator shall be greater than 50% (wide range).

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

1. All reactor coolant pumps (RCPs) and pumps providing shutdown cooling may be de-energized for ≤ 1 hour per 8 hour period, provided:

   a. ~~No operations are permitted that would cause reduction of the RCS boron concentration; and~~No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.2; and

   b. Core outlet temperature is maintained at least 10°F below saturation temperature.

2. One required SDC train may be inoperable for up to 2 hours for surveillance testing provided that the other SDC train or RCS loop is OPERABLE and in operation.

3. One required RCS loop may be inoperable for up to 2 hours for surveillance testing provided that the other RCS loop or SDC train is OPERABLE and in operation.

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. No SDC train/RCS loop in operation.	B.1 ~~Suspend all operations involving reduction in RCS boron concentration.~~ Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet SDM of LCO 3.1.2.	Immediately
	<u>AND</u>	
	B.2 Initiate action to restore required SDC train/RCS loop to operation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.7.1	Verify at least one RCS loop or SDC train is in operation.	12 hours
SR 3.4.7.2	Verify required SG secondary side water level is > 50% (wide range).	12 hours
SR 3.4.7.3	Verify the second required RCS loop, SDC train or steam generator secondary is OPERABLE.	7 days

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.8 RCS Loops – MODE 5, Loops Not Filled

LCO 3.4.8 Two shutdown cooling (SDC) trains shall be OPERABLE and at least one SDC train shall be in operation.

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

1. All SDC pumps may be de-energized for ≤ 15 minutes when switching from one train to another provided:

   a. The core outlet temperature is maintained > 10°F below saturation temperature;

   b. ~~No operations are permitted that would cause a reduction of the RCS boron concentration; and~~No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.2; and

   c. No draining operations to further reduce the RCS water volume are permitted.

2. The pump providing shutdown cooling may be de-energized for ≤ 1 hour per 8 hour period provided:

   a. The core outlet temperature is maintained > 10°F below saturation temperature; and

   b. ~~No operations are permitted that would cause a reduction of the RCS boron concentration.~~No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.2.

3. One SDC train may be inoperable for ≤ 2 hours for surveillance testing provided the other SDC train is OPERABLE and in operation.

4. A containment spray pump may be used in place of a low pressure safety injection pump in either or both shutdown cooling trains to provide shutdown cooling flow provided the reactor has been sub-critical for a period > 24 hours and the RCS is fully depressurized and vented in accordance with LCO 3.4.12.1.

APPLICABILITY: MODE 5 with RCS loops not filled.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One SDC train inoperable.	A.1	Initiate action to restore SDC train to OPERABLE status.	Immediately
B. Both SDC trains inoperable. <u>OR</u> No SDC train in operation.	B.1	~~Suspend all operations involving reduction of RCS boron concentration.~~ Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet SDM of LCO 3.1.2.	Immediately
	<u>AND</u>		
	B.2	Initiate action to restore one SDC train to OPERABLE status and operation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.8.1	Verify at least one SDC train is in operation.	12 hours
SR 3.4.8.2	Verify correct breaker alignment and indicated power available to the required SDC pump that is not in operation.	7 days

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.2.2	Suspend movement of irradiated fuel assemblies.	Immediately
	AND		
	A.2.3	~~Initiate action to suspend operations involving positive reactivity additions.~~ Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	AND		
	A.2.4	Initiate action to restore required offsite power circuit to OPERABLE status.	Immediately

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. One required DG inoperable.	B.1	Suspend CORE ALTERATIONS.	Immediately
	AND		
	B.2	Suspend movement of irradiated fuel assemblies.	Immediately
	AND		
	B.3	~~Initiate action to suspend operations involving positive reactivity additions.~~ Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	AND		
	B.4	Initiate action to restore required DG to OPERABLE status.	Immediately

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources – Shutdown

LCO 3.8.5 DC electrical power subsystem shall be OPERABLE to support the DC electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems – Shutdown."

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One battery or associated control equipment or cabling inoperable.	A.1 Declare affected required feature(s) inoperable.	Immediately
	<u>OR</u>	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>	
	A.2.3 ~~Initiate action to suspend operations involving positive reactivity additions.~~ Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	<u>AND</u>	(continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.8 Inverters – Shutdown

LCO 3.8.8 Required inverters shall be OPERABLE to support the onsite Class 1E AC vital bus electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems – Shutdown."

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required inverters inoperable.	A.1 Declare affected required feature(s) inoperable.	Immediately
	OR	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	AND	
	A.2.3 ~~Initiate action to suspend operations involving positive reactivity additions.~~ Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	AND	(continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.10 Distribution Systems – Shutdown

LCO 3.8.10 The necessary portion of AC, DC, and AC vital bus electrical power distribution subsystems shall be OPERABLE to support equipment required to be OPERABLE.

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required AC, DC, or AC vital bus electrical power distribution subsystems inoperable.	A.1 Declare associated supported required feature(s) inoperable.	Immediately
	<u>OR</u>	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>	
	A.2.3 ~~Initiate action to suspend operations involving positive reactivity additions.~~ Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	<u>AND</u>	(continued)

3.9 REFUELING OPERATIONS

3.9.2 Nuclear Instrumentation

LCO 3.9.2 Two source range monitors (SRMs) shall be OPERABLE.

APPLICABILITY: MODE 6.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One SRM inoperable.	A.1	Suspend CORE ALTERATIONS.	Immediately
	AND		
	A.2	~~Suspend positive reactivity additions.~~ Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet the boron concentration of LCO 3.9.1.	Immediately
B. Two SRMs inoperable.	B.1	Initiate actions to restore one SRM to OPERABLE status.	Immediately
	AND		
	B.2	Perform SR 3.9.1.1.	4 hours AND Once per 12 hours thereafter

3.9 REFUELING OPERATIONS

3.9.4 Shutdown Cooling (SDC) and Coolant Circulation—High Water Level

LCO 3.9.4 One SDC loop shall be OPERABLE and in operation.

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

With the upper guide structure removed from the reactor vessel the required SDC loop may be removed from operation for ≤ 2 hours per 8-hour period, provided:

a. The maximum RCS temperature is maintained ≤ 140°F.
b. No operations are permitted that would cause ~~a reduction~~introduction into ~~of~~ the RCS, coolant with boron concentration less than that required to meet the minimum required boron concentration of LCO 3.9.1.
c. The capability to close the containment penetrations with direct access to the outside atmosphere within the calculated time to boil is maintained.
d. The reactor cavity water level is maintained ≥ 20 feet above the top of the reactor pressure vessel flange, or, for core alterations, ≥ 23 feet above the top of the reactor pressure vessel flange.

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

A containment spray pump may be used in place of a low pressure safety injection pump in either or both shutdown cooling loops to provide shutdown cooling flow.

APPLICABILITY: MODE 6 with the water level ≥ 20 ft above the top of reactor vessel flange.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. SDC loop requirements not met.	A.1 ~~Suspend operations involving a reduction in reactor coolant boron concentration.~~ Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet the boron concentration of LCO 3.9.1. AND	Immediately (continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One SDC loop inoperable. (Applicable to initial conditions of two shutdown cooling loops OPERABLE)	A.1 Initiate action to restore SDC loop to OPERABLE status. <u>OR</u> A.2 Initiate actions to establish ≥ 20 ft of water above the top of reactor vessel flange.	Immediately Immediately
B. One SDC loop operable, less than 20 feet of water above the reactor vessel flange and any of the 8 requirements not met (Applicable to initial conditions of one shutdown cooling loop OPERABLE and operating with requirements 1-8)	B.1 Initiate actions to establish ≥ 20 feet of water.	Immediately
C. No SDC loop OPERABLE or in operation.	C.1 ~~Suspend operations involving a reduction in reactor coolant boron concentration.~~ Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet the boron concentration of LCO 3.9.1. <u>AND</u>	Immediately (continued)

BASES (continued)

ACTION

A.1

With no boron injection flow path to the reactor coolant System OPERABLE, all operations involving CORE ALTERATIONS or positive reactivity changes shall be suspended immediately ~~without consideration of temperature fluctuations~~. Required Action A.1 is modified by a note which permits plant temperature changes provided the temperature change is accounted for in the calculated SDM. Introduction of temperature changes, including temperature increases when a positive MTC exists, must be evaluated to ensure they do not result in a loss of required SDM.

A boron injection flow path is not OPERABLE if it is not capable of performing its boron injection function. In consideration of the stable reactor configuration and the initial boron concentration, a core alteration is the only possible source for a significant increase in reactivity.

SURVEILLANCE REQUIREMENTS

SR 3.1.10.1, SR 3.1.10.2, and SR 3.1.10.3

SRs 3.1.10.1, 3.1.10.2, and 3.1.10.3, ensure that the required borated water supply is available. SR 3.1.10.1 verifies that the temperature of the boric acid solution in the RWST is ≥ 40°F and ≤ 100°F. The RWST water temperature is not expected to approach 40°F or 100°F, considering local meteorology and the large heat capacity of the RWST. Furthermore, at 40°F boric acid precipitation will not occur below a concentration of 4720 ppm boron. The maximum boric acid concentration in the tanks is 2800 ppm boron. However, SR 3.1.10.1 is only applicable when the RWST is the source of borated water and the outside air temperature is not within the normally expected range of 40 to 100°F.

The solubility of boric acid at 50°F is about 3.5 wt%. There is no similar requirement to verify BAMU Tank temperature 50°F is within the normal operating range of the building.

SR 3.1.10.2 and 3.1.10.3 verify that a sufficient amount of boron is available for RCS injection from either the BAMU tanks or the RWST. This requires a minimum of 4150 gallons of boric acid solution at a concentration of 2350 PPM Boron in either the RWST (15.5%[1] level indication) or a BAMU tank. A maximum boric acid solution concentration of 6119 ppm is specified for the BAMU Tank. The water volume limits are

1 15.5% level with tanks T005 and T006 cross connected (Reference 4, CCN-1). 17.0% level with tanks T005 (Reference 6) and T006 (Reference 4, CCN-3) isolated.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.1.10.1, SR 3.1.10.2, and SR 3.1.10.3 (continued)

specified relative to the top of the highest suction connection to the tank and considers vortexing, internal structures and instrument errors. The 7 day Surveillance Frequency ensures that a sufficient initial water supply is available for boron injection.

SR 3.1.10.4

These SRs demonstrate that each automatic boration system pump and valve is operable and actuates as required. In response to an actual or simulated SIAS the charging pumps start, the VCT is isolated, and the charging pumps take suction from the OPERABLE BAMU tank(s) and RWST. Verification of the correct alignment for manual, power operated, and automatic valves in the Boration System Flow paths provides assurance that proper boration flow paths are available. These SRs do not apply to valves that are locked, sealed, or otherwise secured in position, because these valves were previously verified to be in the correct position.

1. A flow path from either boric acid makeup tank with a minimum boron concentration of 2350 ppm and a minimum borated water volume of 4150 gallons, via either one of the boric acid makeup pumps, the blending tee or the gravity feed connection and any charging pump to the RCS, or;

2. The flow path from the RWST with a minimum borated water level of 15.5%[1] (includes TLU and Design Basis Document margin), a minimum boron concentration of 2350 ppm, and a solution temperature ≥ 40°F and ≤ 100°F via either a charging pump or a high pressure safety injection pump to the RCS.

[1] 15.5% level with tanks T005 and T006 cross connected (Reference 4, CCN-1). 17.0% level with tanks T005 (Reference 6) and T006 (Reference 4, CCN-3) isolated.

(continued)

REFERENCES

1. 10 CFR 50, Appendix A, GDC 26.

2. 10 CFR 50, Appendix A, GDC 27.

3. 10 CFR 50, Appendix A, GDC 33.

4. J-BHB-029, "RWST Minimum Level to Maintain Safety Analysis Assumptions, Including TLU."

5. J-BGB-002, "TLU for Boric Acid Makeup Level Loops 2(3)LI0206C and 2(3)LI0208C."

6. J-BHB-021, "RWST 2(3)T005 & T006 Level Loop Uncertainties and Minimum Level Required During Modes 5 & 6."

ACTIONS (continued)

Condition B applies to the failure of CRIS Manual Trip, Actuation Logic, and required gaseous radiation monitor channels in Mode 5 or 6, or when moving irradiated assemblies. The Required Actions are immediately taken to place one OPERABLE CREACUS train in the emergency mode, or to suspend positive reactivity additions, and movement of irradiated fuel assemblies. The Completion Time recognizes the fact that the radiation signals are the only Functions available to initiate control room isolation in the event of a fuel handling accident.

Required Action B.2.2 is modified by a note to indicate that normal plant control operations that individually add limited positive reactivity (e.g., temperature or boron fluctuations associated with RCS inventory management or temperature control) are not precluded by this Action, provided they are accounted for in the calculated SDM.

SURVEILLANCE REQUIREMENTS

SR 3.3.9.1

Performance of the CHANNEL CHECK once every 12 hours ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value.

Significant deviations between the two instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

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

The Frequency, about once every shift, is based on operating experience that demonstrates the rarity of channel failure. Thus, performance of the CHANNEL CHECK guarantees that undetected overt channel failure is limited to 12 hours. Since the probability of two random failures in redundant channels in any 12 hour period is low, the CHANNEL CHECK minimizes the chance of loss of protective function due to failure of redundant channels. The CHANNEL CHECK

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.3.9.1 (continued)

supplements less formal, but more frequent, checks of channel OPERABILITY during normal operational use of the displays associated with the LCO required channels.

SR 3.3.9.2

A CHANNEL FUNCTIONAL TEST is performed on the required control room radiation monitoring channel to ensure the entire channel will perform its intended function. As found and as left setpoints are recorded.

The Frequency of 92 days is based on plant operating experience with regard to channel OPERABILITY and drift, which demonstrates that failure of more than one channel of a given Function in any 92 day interval is a rare event.

SR 3.3.9.3

Proper operation of the individual initiation relays is verified by de-energizing these relays during the CHANNEL FUNCTIONAL TEST of the Actuation Logic every 18 months. This will actuate the Function, operating all associated equipment. Proper operation of the equipment actuated by each train is thus verified.

The Frequency of 18 months is based on plant operating experience with regard to channel OPERABILITY, which demonstrates that failure of more than one channel of a given Function in any 18 month interval is a rare event.

A Note indicates this Surveillance includes verification of operation for each initiation relay.

SR 3.3.9.4

CHANNEL CALIBRATION is a complete check of the instrument channel including the sensor. The Surveillance verifies that the channel responds to a measured parameter within the necessary range and accuracy.

The Frequency of an 18 month calibration interval is based on experience with the magnitude of equipment drift in this period.

(continued)

BASES (continued)

LCO

The LCO on the source range monitoring channels ensures that adequate information is available to verify core reactivity conditions while shut down.

A minimum of two source range monitoring channels are required to be OPERABLE.

APPLICABILITY

In MODES 3, 4, and 5, with RTCBs open or the Control Element Assembly (CEA) Drive System not capable of CEA withdrawal, source range monitoring channels must be OPERABLE to monitor core power for reactivity changes. In MODES 1 and 2, and in MODES 3, 4, and 5, with the RTCBs shut and the CEAs capable of withdrawal, the Logarithmic Power Monitoring channels are addressed as part of the RPS in LCO 3.3.1, "Reactor Protective System (RPS) Instrumentation – Operating," and LCO 3.3.2, "Reactor Protective System (RPS) Instrumentation – Shutdown."

The requirements for source range neutron flux monitoring in MODE 6 are addressed in LCO 3.9.2, "Nuclear Instrumentation." The source range nuclear instrumentation channels provide neutron flux coverage extending an additional one to two decades below the logarithmic channels for use during refueling, when neutron flux may be extremely low.

ACTIONS

A channel is inoperable when it does not satisfy the OPERABILITY criteria for the channel's function. These criteria are outlined in the LCO section of the Bases.

A.1 and A.2

With one required channel inoperable, it may not be possible to perform a CHANNEL CHECK to verify that the other required channel is OPERABLE. Therefore, with one or more required channels inoperable, the source range monitoring Function cannot be reliably performed. Consequently, the Required Actions are the same for one required channel inoperable or more than one required channel inoperable. The absence of reliable neutron flux indication makes it difficult to ensure SDM is maintained. ~~Required Action A.1 therefore requires that all positive reactivity additions that are under operator control, such as boron dilution or Reactor Coolant System temperature changes, be halted immediately, preserving SDM. However, temperature fluctuations~~

(continued)

BASES (continued)

ACTIONS

A.1 and A.2 (continued)

~~associated with maintaining the plant status are permissible provided they remain within limits established for the plant conditions.~~ Required Action A.1 is modified by a note to indicate that normal plant control operations that individually add limited positive reactivity (e.g., temperature or boron fluctuations associated with RCS inventory management or temperature control) are not precluded by this Action, provided they are accounted for in the calculated SDM.

SDM must be verified periodically to ensure that it is being maintained. Both required channels must be restored as soon as possible. The initial Completion Time of 4 hours and once every 12 hours thereafter to perform SDM verification takes into consideration that Required Action A.1 eliminates many of the means by which SDM can be reduced. These Completion Times are also based on operating experience in performing the Required Actions and the fact that plant conditions will change slowly.

SURVEILLANCE REQUIREMENTS

SR 3.3.13.1

SR 3.3.13.1 is the performance of a CHANNEL CHECK on each required channel every 12 hours. A CHANNEL CHECK is a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based upon the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying that the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria are determined by the plant staff and should be based on a combination of the channel instrument uncertainties including control isolation, indication, and readability. If a channel is outside of the match criteria, it may be an indication that the transmitter or the signal processing equipment has drifted outside of its limits. If the channels are within the match criteria, it is an indication that the channels are OPERABLE.

The Frequency, about once every shift, is based on operating experience that demonstrates the rarity of channel failure.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.3.13.1 (continued)

Thus, the performance of CHANNEL CHECK ensures that undetected overt channel failure is limited to 12 hours.

Since the probability of two random failures in redundant channels in any 12 hour period is extremely low, CHANNEL CHECK minimizes the chance of loss of protective function due to failure of redundant channels. CHANNEL CHECK supplements less formal, but more frequent, checks of channel OPERABILITY during normal operational use of displays associated with the LCO required channels.

SR 3.3.13.2

A CHANNEL FUNCTIONAL TEST is performed every 92 days to ensure that the entire channel is capable of properly indicating neutron flux. Internal test circuitry is used to feed test signals into the signal processor to verify channel alignment. It is not necessary to test the detector, because generating a meaningful test signal is difficult; the detectors are of simple construction, and any failures in the detectors will be apparent as change in channel output. This Frequency is the same as that employed for the same channels in the other applicable MODES.

SR 3.3.13.3

SR 3.3.13.3 is the performance of a CHANNEL CALIBRATION. A CHANNEL CALIBRATION is performed every 24 months. The Surveillance is a complete check and readjustment of the source range channel from the preamplifier input through to the remote indicators. The Surveillance verifies that the channel responds to a measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drift between successive calibrations to ensure that the channel remains operational. Measurement error determination, setpoint error determination, and calibration adjustment must be performed consistent with the plant specific setpoint analysis. The channel shall be left calibrated consistent with the assumptions of the current plant specific setpoint analysis.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.3.13.3 (continued)

This SR is modified by a Note to indicate that it is not necessary to test the detector, because generating a meaningful test signal is difficult; the detectors are of simple construction, and any failures in the detectors will be apparent as change in channel output. This test interval is the same as that employed for the same channels in the other applicable MODES.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 13.

2. SONGS Units 2 and 3 UFSAR, Chapter 7 and Chapter 15.

BASES (continued)

LCO (continued)

of requiring both SGs to be capable (> 50% wide range water level) of transferring heat from the reactor coolant at a controlled rate. Forced reactor coolant flow is the required way to transport heat, although natural circulation flow provides adequate removal. A minimum of one running RCP meets the LCO requirement for one loop in operation.

The Note permits a limited period of operation without RCPs. All RCPs may be de-energized for ≤ 1 hour per 8 hour period. This means that natural circulation has been established. When in natural circulation, a reduction in boron concentration with coolant at boron concentrations less than required to assure the SDM of LCO 3.1.1 is maintained is prohibited because an even concentration distribution throughout the RCS cannot be ensured. Core outlet temperature is to be maintained at least 10°F below the saturation temperature so that no vapor bubble may form and possibly cause a natural circulation flow obstruction.

In MODES 3, 4, and 5, it is sometimes necessary to stop all RCPs or shutdown cooling (SDC) pump forced circulation (e.g., to change operation from one SDC train to the other, to perform surveillance or startup testing, to perform the transition to and from SDC System cooling, or to avoid operation below the RCP minimum net positive suction head limit). The time period is acceptable because natural circulation is adequate for heat removal, or the reactor coolant temperature can be maintained subcooled and boron stratification affecting reactivity control is not expected.

An OPERABLE loop consists of at least one RCP providing forced flow for heat transport and an SG that is OPERABLE in accordance with the Steam Generator Tube Surveillance Program. An RCP is OPERABLE if it is capable of being powered and is able to provide forced flow if required.

APPLICABILITY

In MODE 3, the heat load is lower than at power; therefore, one RCS loop in operation is adequate for transport and heat removal. A second RCS loop is required to be OPERABLE but not in operation for redundant heat removal capability.

Operation in other MODES is covered by:

LCO 3.4.4, "RCS Loops – MODES 1 and 2";
LCO 3.4.6, "RCS Loops – MODE 4";

(continued)

BASES (continued)

APPLICABILITY (continued)	LCO 3.4.7, "RCS Loops – MODE 5, Loops Filled"; LCO 3.4.8, "RCS Loops – MODE 5, Loops Not Filled"; LCO 3.9.4, "Shutdown Cooling (SDC) and Coolant Circulation – High Water Level" (MODE 6); and LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation – Low Water Level" (MODE 6).

ACTIONS

A.1

If one required RCS loop is inoperable, redundancy for forced flow heat removal is lost. The Required Action is restoration of the required RCS loop to OPERABLE status within a Completion Time of 72 hours. This time allowance is a justified period to be without the redundant, nonoperating loop because a single loop in operation has a heat transfer capability greater than that needed to remove the decay heat produced in the reactor core.

B.1

If restoration is not possible within 72 hours, the unit must be placed in MODE 4 within 12 hours. In MODE 4, the plant may be placed on the SDC System. The Completion Time of 12 hours is compatible with required operation to achieve cooldown and depressurization from the existing plant conditions in an orderly manner and without challenging plant systems.

C.1 and C.2

If no RCS loop is in operation, except as provided in Note 1 in the LCO section, all operations involving ~~a reduction of RCS boron concentration must be immediately suspended. This is necessary because boron dilution requires forced circulation for proper homogenization~~ introduction of coolant into the RCS with boron concentration less than required to meet the minimum SDM of LCO 3.1.1 must be immediately suspended. Action to restore one RCS loop to OPERABLE status and operation shall be initiated immediately and continued until one RCS loop is restored to OPERABLE status and operation. Suspending the introduction into the RCS of coolant with boron concentration less than required to meet the minimum SDM of LCO 3.1.1 is required to assure continued safe operation. With coolant added without forced circulation, unmixed coolant could be

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

C.1 and C.2 (continued)

introduced to the core. however coolant added with boron concentration meeting the minimum SDM maintains acceptable margin to subcritical operations. The immediate Completion Times reflect the importance of maintaining operation for decay heat removal.

SR 3.4.5.1

This SR requires verification every 12 hours that the required number of RCS loops are in operation. Verification includes flow rate, temperature, or pump status monitoring, which help ensure that forced flow is providing heat removal. The 12 hour interval has been shown by operating practice to be sufficient to regularly assess degradation and verify operation within safety analyses assumptions. In addition, control room indication and alarms will normally indicate loop status.

SR 3.4.5.2

This SR requires verification every 12 hours that the secondary side water level in each SG is ≥ 50% wide range. An adequate SG water level is required in order to have a heat sink for removal of the core decay heat from the reactor coolant. The 12 hour interval has been shown by operating practice to be sufficient to regularly assess degradation and verify operation within the safety analyses assumptions.

SR 3.4.5.3

Verification that the required number of RCPs are OPERABLE ensures that the single failure criterion is met and that an additional RCS loop can be placed in operation, if needed, to maintain decay heat removal and reactor coolant circulation. Verification is performed by verifying proper breaker alignment and power availability to the required RCPs. The Frequency of 7 days is considered reasonable in view of other administrative controls available and has been shown to be acceptable by operating experience.

REFERENCES

1. UFSAR, Section 15.3.

BASES (continued)

LCO (continued)

prohibits boron dilution with coolant at boron concentrations less than required to assure the SDM of LCO 3.1.1 is maintained when forced flow is stopped because an even concentration distribution cannot be ensured. Core outlet temperature is to be maintained at least 10°F below saturation temperature so that no vapor bubble may form and possibly cause a natural circulation flow obstruction. The response of the RCS without the RCPs or SDC pumps depends on the core decay heat load and the length of time that the pumps are stopped. As decay heat diminishes, the effects on RCS temperature and pressure diminish. Without cooling by forced flow, higher heat loads will cause the reactor coolant temperature and pressure to increase at a rate proportional to the decay heat load. Because pressure can increase, the applicable system pressure limits (pressure and temperature (P/T) limits or low temperature overpressure protection (LTOP) limits) must be observed and forced SDC flow or heat removal via the SGs must be re-established prior to reaching the pressure limit. The circumstances for stopping both RCPs or SDC pumps are to be limited to situations where:

a. Pressure and temperature increases can be maintained well within the allowable pressure (P/T limits and LTOP) and 10°F subcooling limits; or

b. An alternate heat removal path through the SGs is in operation.

Note 2 requires that either of the following two conditions be satisfied before an RCP may be started with any RCS cold leg temperature ≤ 256°F.

a. Pressurizer water volume is < 900 ft^3; or

b. Secondary side water temperature in each SG is < 100°F above each of the RCS cold leg temperatures.

Satisfying the above condition will preclude a large pressure surge in the RCS when the RCP is started.

An OPERABLE RCS loop consists of at least one OPERABLE RCP and an SG that is OPERABLE in accordance with the Steam Generator Tube Surveillance Program and has the minimum water level specified in SR 3.4.6.2.

(continued)

BASES (continued)

ACTIONS

B.1 (continued)

reasonable, based on operating experience, to reach MODE 5 from MODE 4, with only one SDC train operating, in an orderly manner and without challenging plant systems.

C.1 and C.2

If no RCS loops or SDC trains are OPERABLE or in operation, except during conditions permitted by Note 1 in the LCO section, all operations involving introduction of coolant into the RCS with boron concentration less than required to meet the minimum SDM of LCO 3.1.1 ~~reduction of RCS boron concentration~~ must be suspended and action to restore one RCS loop or SDC train to OPERABLE status and operation must be initiated. ~~Boron dilution requires forced circulation for proper mixing, and t~~The required margin to criticality must not be reduced in this type of operation. Suspending the introduction into the RCS of coolant with boron concentration less than required to meet the minimum SDM of LCO 3.1.1 is required to assure continued safe operation. With coolant added without forced circulation, unmixed coolant could be introduced to the core, however coolant added with boron concentration meeting the minimum SDM maintains acceptable margin to subcritical operations. The immediate Completion Times reflect the importance of decay heat removal. The action to restore must continue until one loop or train is restored to operation.

SURVEILLANCE REQUIREMENTS

SR 3.4.6.1

This SR requires verification every 12 hours that one required loop or train is in operation. This ensures forced flow is providing heat removal. Verification includes flow rate, temperature, or pump status monitoring. The 12 hour Frequency has been shown by operating practice to be sufficient to regularly assess RCS loop status. In addition, control room indication and alarms will normally indicate loop status.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.4.6.2

This SR requires verification every 12 hours of secondary side water level in the required SG(s) ≥ 50% (wide range). An adequate SG water level is required in order to have a heat sink for removal of the core decay heat from the reactor coolant. The 12 hour interval has been shown by operating practice to be sufficient to regularly assess degradation and verify operation within safety analyses assumptions.

SR 3.4.6.3

Verification that the required pump is OPERABLE ensures that an additional RCS loop or SDC train can be placed in operation, if needed to maintain decay heat removal and reactor coolant circulation. Verification is performed by verifying proper breaker alignment and power available to the required pumps. The Frequency of 7 days is considered reasonable in view of other administrative controls available and has been shown to be acceptable by operating experience.

REFERENCES

1. UFSAR, Section 15.4.1.4.

BASES (continued)

LCO

The purpose of this LCO is to require at least one of the SDC trains or RCS loops be OPERABLE and in operation with an additional SDC train or RCS loop OPERABLE or secondary side water level of each SG shall be ≥ 50% wide range. One SDC train or RCS loop provides sufficient forced circulation to perform the safety functions of the reactor coolant under these conditions. The second SDC or RCS loop train is normally maintained OPERABLE as a backup to the operating train/loop to provide redundant paths for decay heat removal. However, if the standby SDC train/RCS loop is not OPERABLE, a sufficient alternate method to provide redundant paths for decay heat removal is two SGs with their secondary side water levels ≥ 50% wide range. Should the operating SDC train/RCS loop fail, the SGs could be used to remove the decay heat.

Note 1 permits all RCPs and SDC pumps to be de-energized ≤ 1 hour per 8 hour period. The circumstances for stopping both SDC trains/RCS loops are to be limited to situations where pressure and temperature increases can be maintained well within the allowable pressure (pressure and temperature and low temperature overpressure protection) and 10°F subcooling limits, or an alternate heat removal path through the SG(s) is in operation.

This LCO is modified by a Note that prohibits boron dilution with coolant at boron concentrations less than required to assure the SDM of LCO 3.1.2 is maintained when forced flow is stopped because an even concentration distribution cannot be ensured. Core outlet temperature is to be maintained at least 10°F below saturation temperature, so that no vapor bubble would form and possibly cause a natural circulation flow obstruction. In this MODE, the SG(s) can be used as the backup for heat removal. To ensure their availability, the RCS loop flow path is to be maintained with subcooled liquid.

In MODE 5, it is sometimes necessary to stop all RCP or SDC forced circulation. This is permitted to change operation from one SDC train or RCS loop to the other, perform surveillance or startup testing, perform the transition to and from the SDC, or to avoid operation below the RCP minimum net positive suction head limit. The time period is acceptable because natural circulation is acceptable for decay heat removal, the reactor coolant temperature can be

(continued)

BASES (continued)

LCO (continued)

maintained subcooled, and boron stratification affecting reactivity control is not expected.

Note 2 allows one SDC train to be inoperable for a period of up to 2 hours provided that the other SDC train is OPERABLE and in operation. This permits periodic surveillance tests to be performed on the inoperable train during the only time when such testing is safe and possible.

Note 3 allows one RCS loop to be inoperable for a period of up to 2 hours provided that the other RCS loop is OPERABLE and in operation. This permits periodic surveillance tests to be performed on the inoperable loop during the only time when such testing is safe and possible.

Note 4 requires that either of the following two conditions be satisfied before an RCP may be started:

a. Pressurizer water volume must be < 900 ft^3; or

b. Secondary side water temperature in each SG must be < 100°F above each of the RCS cold leg temperatures.

Satisfying either of the above conditions will preclude a low temperature overpressure event due to a thermal transient when the RCP is started.

Note 5 specifies that a containment spray (CS) pump may be used in place of a low pressure safety injection (LPSI) pump in either or both shutdown cooling trains to provide shutdown cooling (SDC) flow based on the calculated heat load of the core 24 hours after the reactor is sub-critical with the reactor coolant system (RCS) fully depressurized and vented in accordance with TS 3.4.12.

Note 6 provides for an orderly transition from MODE 5 to MODE 4 during a planned heatup by permitting removal of SDC trains from operation when at least one RCP is in operation.

An OPERABLE SDC train is composed of an OPERABLE SDC pump and an OPERABLE SDC heat exchanger.

SDC pumps are OPERABLE if they are capable of being powered and are able to provide flow if required. An OPERABLE RCS loop consists of at least one OPERABLE RCP and an OPERABLE SG. An OPERABLE SG can perform as a heat sink when it has

(continued)

BASES (continued)

LCO (continued)

an adequate water level and is OPERABLE in accordance with the SG Tube Surveillance Program.

An OPERABLE RCS loop consists of at least one RCP providing forced flow for heat transport and an SG that is OPERABLE in accordance with the Steam Generator Tube Surveillance Program. An RCP is OPERABLE if it is capable of being powered and is able to provide forced flow if required.

APPLICABILITY

In MODE 5 with RCS loops filled, this LCO requires forced circulation to remove decay heat from the core and to provide proper boron mixing. One SDC train/RCS loop provides sufficient circulation for these purposes.

Operation in other MODES is covered by:

LCO 3.4.4, "RCS Loops – MODES 1 and 2";
LCO 3.4.5, "RCS Loops – MODE 3";
LCO 3.4.6, "RCS Loops – MODE 4";
LCO 3.4.8, "RCS Loops – MODE 5, Loops Not Filled";
LCO 3.9.4, "Shutdown Cooling (SDC) and Coolant Circulation – High Water Level" (MODE 6); and
LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation – Low Water Level" (MODE 6).

ACTIONS

A.1 and A.2

If the required SDC train/RCS loop is inoperable and any SGs have secondary side water levels < 50% wide range, redundancy for heat removal is lost. Action must be initiated immediately to restore a second SDC train/RCS loop to OPERABLE status or to restore the water level in the required SGs. Either Required Action A.1 or Required Action A.2 will restore redundant decay heat removal paths. The immediate Completion Times reflect the importance of maintaining the availability of two paths for decay heat removal.

B.1 and B.2

If no SDC train/RCS loop is in operation, except as permitted in Note 1, all operations involving ~~the reduction of RCS boron concentration~~ introduction of coolant into the RCS with boron concentration less than required to meet the

(continued)

BASES (continued)

ACTIONS

B.1 and B.2 (continued)

minimum SDM of LCO 3.1.2 must be suspended. Action to restore one SDC train/RCS loop to operation must be initiated. ~~Boron dilution requires forced circulation for proper mixing and t~~The required margin to criticality must not be reduced in this type of operation. Suspending the introduction into the RCS of coolant with boron concentration less than required to meet the minimum SDM of LCO 3.1.2 is required to assure continued safe operation. With coolant added without forced circulation, unmixed coolant could be introduced to the core, however coolant added with boron concentration meeting the minimum SDM maintains acceptable margin to subcritical operations. The immediate Completion Times reflect the importance of maintaining operation for decay heat removal.

SURVEILLANCE REQUIREMENTS

SR 3.4.7.1

This SR requires verification every 12 hours that at least one SDC train/RCS loop is in operation. Verification includes flow rate, temperature, or pump status monitoring, which help ensure that forced flow is providing decay heat removal. The 12 hour Frequency has been shown by operating practice to be sufficient to regularly assess degradation and verify operation is within safety analyses assumptions. In addition, control room indication and alarms will normally indicate loop status.

The SDC/RCS flow is established to ensure that core outlet temperature is maintained sufficiently below saturation to allow time for swap over to the standby SDC train/RCS loop should the operating train be lost.

SR 3.4.7.2

Verifying the SGs are OPERABLE by ensuring their secondary side water levels are ≥ 50% wide range ensures that redundant heat removal paths are available if the second SDC train/RCS loop is inoperable. The Surveillance is required to be performed when the LCO requirement is being met by use of the SGs. If both SDC trains are OPERABLE and one SDC train is in operation, this SR is not needed. The 12 hour Frequency has been shown by operating practice to be sufficient to regularly assess degradation and verify operation within safety analyses assumptions.

(continued)

BASES (continued)

LCO

The purpose of this LCO is to require a minimum of two SDC trains be OPERABLE and at least one of these trains be in operation. An OPERABLE train is one that is capable of transferring heat from the reactor coolant at a controlled rate. Heat cannot be removed via the SDC System unless forced flow is used. A minimum of one running SDC pump meets the LCO requirement for one train in operation. An additional SDC train is required to be OPERABLE to meet the single failure criterion.

Note 1 permits the SDC pumps to be de-energized for ≤ 15 minutes when switching from one train to another. The circumstances for stopping both SDC pumps are to be limited to situations when the outage time is short and the core outlet temperature is maintained > 10°F below saturation temperature. The Note prohibits boron dilution with coolant at boron concentrations less than required to assure the SDM of LCO 3.1.2 is maintained or draining operations when SDC forced flow is stopped.

Note 2 specifies the pump providing shutdown cooling may be de-energized for up to 1 hour per 8 hour period provided 1) ~~no operations are permitted that would cause dilution of the reactor coolant system boron concentration~~ no operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.2, and 2) core ~~sublet~~outlet temperature is maintained at least 10°F below saturation temperature.

Note 3 allows one SDC train to be inoperable for a period of 2 hours provided that the other train is OPERABLE and in operation. This permits periodic surveillance tests to be performed on the inoperable train during the only time when these tests are safe and possible.

Note 4 specifies that a containment spray pump may be used in place of a low pressure safety injection pump in either or both shutdown cooling trains to provide shutdown cooling flow provided the reactor has been sub-critical for a period greater than 24 hours and the reactor coolant system is fully depressurized and vented in accordance with TS 3.4.12.1.

(continued)

BASES (continued)

LCO (continued)

An OPERABLE SDC train is composed of an OPERABLE SDC pump capable of providing forced flow to an OPERABLE SDC heat exchanger, along with the appropriate flow and temperature instrumentation for control, protection, and indication. SDC pumps are OPERABLE if they are capable of being powered and are able to provide flow if required.

APPLICABILITY

In MODE 5 with loops not filled, this LCO requires core heat removal and coolant circulation by the SDC System.

Operation in other MODES is covered by:

LCO 3.4.4, "RCS Loops – MODES 1 and 2";
LCO 3.4.5, "RCS Loops – MODE 3";
LCO 3.4.6, "RCS Loops – MODE 4";
LCO 3.4.7, "RCS Loops – MODE 5, Loops Filled";
LCO 3.9.4, "Shutdown Cooling (SDC) and Coolant Circulation – High Water Level" (MODE 6); and
LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation – Low Water Level" (MODE 6).

ACTIONS

A.1

If the required SDC train is inoperable, redundancy for heat removal is lost. Action must be initiated immediately to restore a second train to OPERABLE status. The Completion Time reflects the importance of maintaining the availability of two paths for heat removal.

B.1 and B.2

If no SDC train is OPERABLE or in operation, except as provided in Note 1 or in Note 2, all operations involving introduction of coolant into the RCS with boron concentration less than required to meet the minimum SDM of LCO 3.1.2 ~~the reduction of RCS boron concentration~~ must be suspended. Action to restore one SDC train to OPERABLE status and operation must be initiated immediately. ~~Boron dilution requires forced circulation for proper mixing and t~~The required margin to criticality must not be reduced in this type of operation. Suspending the introduction into the RCS of coolant with boron concentration less than required to meet the minimum SDM of LCO 3.1.2 is

(continued)

BASES (continued)

ACTIONS

B.1 and B.2 (continued)

required to assure continued safe operation. With coolant added without forced circulation, unmixed coolant could be introduced to the core, however coolant added with boron concentration meeting the minimum SDM maintains acceptable margin to subcritical operations. The immediate Completion Time reflects the importance of maintaining operation for decay heat removal.

SURVEILLANCE REQUIREMENTS

SR 3.4.8.1

This SR requires verification every 12 hours that at least one SDC train is in operation. Verification includes flow rate, temperature, or pump status monitoring, which help ensure that forced flow is providing decay heat removal. The 12 hour Frequency has been shown by operating practice to be sufficient to regularly assess degradation and verify operation is within safety analyses assumptions.

SR 3.4.8.2

Verification that the required number of trains are OPERABLE ensures that redundant paths for heat removal are available and that additional trains can be placed in operation, if needed, to maintain decay heat removal and reactor coolant circulation. Verification is performed by verifying proper breaker alignment and indicated power available to the required pumps. The Frequency of 7 days is considered reasonable in view of other administrative controls available and has been shown to be acceptable by operating experience.

REFERENCES

1. UFSAR, Section 5.4.7.

BASES (continued)

ACTIONS (continued)

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

With the offsite circuit not available to the required train (Condition A), the option exists to declare all required features inoperable. Since this option may involve undesired administrative efforts, the allowance for sufficiently conservative actions is made. With the required DG inoperable (Condition B), the minimum required diversity of AC power sources is not available. It is, therefore, required to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions ~~which would exceed limits specified in LCO 3.1.2 or LCO 3.1.9. The Required Action to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory provided the required SDM is maintained.~~ that could result in loss of required SDM (Mode 5) or boron concentration (Mode 6). Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM.

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

Notwithstanding performance of the conservative Required Actions, the unit is still without sufficient AC power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required AC power sources and continue until the LCO requirements are restored.

(continued)

BASES (continued)

ACTIONS

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

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

Pursuant to LCO 3.0.6, the Distribution System's (LCO 3.8.10) ACTIONS are not entered even if all AC sources to it are inoperable, resulting in de-energization. Therefore, the Required Actions of Condition A are modified by a Note to indicate that when Condition A is entered with no AC power to one ESF bus, the ACTIONS for LCO 3.8.10 must be immediately entered. This Note allows Condition A to provide requirements for the loss of the offsite circuit, whether or not a train is de-energized. LCO 3.8.10 provides the appropriate restrictions for the situation involving a de-energized train.

SURVEILLANCE REQUIREMENTS

SR 3.8.2.1

SR 3.8.2.1 requires the SRs from LCO 3.8.1 that are necessary for ensuring the OPERABILITY of the AC sources in other than MODES 1, 2, 3, and 4. SR 3.8.1.17 is not required to be met because the required OPERABLE DG is not required to undergo periods of being synchronized to the offsite circuit. SR 3.8.1.20 is excepted because starting independence is not required with DG(s) that are not required to be OPERABLE.

This SR is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE DG from being paralleled with the offsite power network or otherwise rendered inoperable. With limited AC Sources available, a single event could unnecessarily compromise both the required circuit and the DG. The SRs listed in the Note are not required to be performed for the OPERABLE AC sources during Modes 5 and 6, and during movement of irradiated fuel assemblies. However, these AC sources are presumed to be able to meet these surveillances. If it is discovered (through analysis or unplanned events, for example) that the required AC sources could not meet these surveillances, then the equipment must be considered inoperable. Refer to the corresponding Bases for LCO 3.8.1 for a discussion of each SR.

(continued)

REFERENCES	1.	UFSAR, Chapter 15.

BASES

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, and A.2.4 (continued)

positive reactivity additions~~). The Required Action to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory, provided the required SDM is maintained.~~ that could result in loss of required SDM (Mode 5) or boron concentration (Mode 6)). Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM.

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize probability of the occurrence of postulated events.

Notwithstanding performance of the above conservative Required Actions, the unit is still without sufficient DC power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required DC power sources and continue until the LCO requirements are restored.

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

B.1

Condition B represents one train with a loss of ability to completely respond to an event, and a potential loss of ability to remain energized during normal operation. Since eventual failure of the battery to maintain the required

(continued)

BASES

ACTIONS

B.1 (continued)

battery cell parameters is highly probable, it is imperative that the operator's attention focus on minimizing the potential for complete loss of DC power to the affected train. The additional time provided by the Completion Time is consistent with the battery's capability to maintain its short term capability to respond to a design basis event.

C.1

If the battery cell parameters cannot be maintained within Category A limits, the short term capability of the battery is also degraded and the battery must be declared inoperable.

SURVEILLANCE REQUIREMENTS

SR 3.8.5.1

SR 3.8.5.1 states that Surveillances required by SR 3.8.4.1 through SR 3.8.4.8 are applicable in these MODES. See the corresponding Bases for LCO 3.8.4 for a discussion of each SR.

This SR is modified by a Note which indicates that SR 3.8.4.6 (battery charger capacity), SR 3.8.4.7 (battery service test), and SR 3.8.4.8 (battery performance test), if expired, are not required to be performed for the OPERABLE DC subsystems in Modes 5 and 6, and during movement of irradiated fuel assemblies. However, the DC subsystems are presumed to be able to meet these surveillances. If it is discovered (through analysis or unplanned events, for example) that the charger and/or battery could not meet these surveillances, then the equipment must be considered inoperable.

REFERENCES

1. UFSAR, Chapter 6.

2. UFSAR, Chapter 15.

BASES (continued)

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, and A.2.4 (continued)

reactivity additions that could result in loss of required SDM (Mode 5) or boron concentration (Mode 6). Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM.~~. The Required Action to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory, provided the required SDM is maintained.~~ By the allowance of the option to declare required features inoperable with the associated inverter(s) inoperable, appropriate restrictions will be implemented in accordance with the affected required features LCOs' Required ACTIONS. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions).

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

Notwithstanding performance of the above conservative Required Actions, the unit is still without sufficient AC vital power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required AC vital power source and continue until the LCO requirements are restored.

(continued)

BASES (continued)

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, and A.2.4 (continued)

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required inverters should be completed as quickly as possible in order to minimize the time the unit safety systems may be without power or powered from a constant voltage source transformer.

SURVEILLANCE REQUIREMENTS

SR 3.8.8.1

This Surveillance verifies that the inverters are functioning properly with all required circuit breakers closed and AC vital buses energized from the inverter. The verification of proper voltage output ensures that the required power is readily available for the instrumentation connected to the AC vital buses. The 7 day Frequency takes into account the redundant capability of the inverters and other indications available in the control room that alert the operator to inverter malfunctions.

REFERENCES

1. UFSAR, Chapter 6.

2. UFSAR, Chapter 15.

BASES (continued)

ACTIONS

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

Although redundant required features may require redundant trains of electrical power distribution subsystems to be OPERABLE, one OPERABLE distribution subsystem train may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS and fuel movement. By allowing the option to declare required features associated with an inoperable distribution subsystem inoperable, appropriate restrictions are implemented in accordance with the affected distribution subsystems LCO's Required Actions. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions~~).~~ that could result in loss of required SDM (Mode 5) or boron concentration (Mode 6)). Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM.

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

Notwithstanding performance of the above conservative Required Actions, a required shutdown cooling (SDC) subsystem may be inoperable. In this case, these Required Actions of Condition A do not adequately address the concerns relating to coolant circulation and heat removal. Pursuant to LCO 3.0.6, the SDC ACTIONS would not be entered.

(continued)

BASES (continued)

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, A.2.4, and A.2.5 (continued)

Therefore, the Required Actions of Condition A direct declaring SDC inoperable, which results in taking the appropriate SDC actions.

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

SURVEILLANCE REQUIREMENTS

SR 3.8.10.1

This Surveillance verifies that the AC, DC, and AC vital bus electrical power distribution system is functioning properly, with all the buses energized. The verification of proper voltage availability on the buses ensures that the required power is readily available for motive as well as control functions for critical system loads connected to these buses. The 7 day Frequency takes into account the redundant capability of the electrical power distribution subsystems, and other indications available in the control room that alert the operator to subsystem malfunctions.

REFERENCES

1. UFSAR, Chapter 6.

2. UFSAR, Chapter 15.

BASES (continued)

LCO (continued)

COLR ensures a core k_{eff} of ≤ 0.95 is maintained during fuel handling operations. Violation of the LCO could lead to an inadvertent criticality during MODE 6.

APPLICABILITY

This LCO is applicable in MODE 6 to ensure that the fuel in the reactor vessel will remain subcritical. The required boron concentration ensures a $k_{eff} \leq 0.95$. Above MODE 6, LCO 3.1.1, "SHUTDOWN MARGIN (SDM) – $T_{avg} > 200°F$," and LCO 3.1.2, "SHUTDOWN MARGIN – $T_{avg} \leq 200°F$," ensure that an adequate amount of negative reactivity is available to shut down the reactor and to maintain it subcritical.

ACTIONS

A.1 and A.2

Continuation of CORE ALTERATIONS or positive reactivity additions (including actions to reduce boron concentration) is contingent upon maintaining the unit in compliance with the LCO. If the boron concentration of any coolant volume in the RCS, or the refueling canal is less than its limit, all operations involving CORE ALTERATIONS or positive reactivity additions must be suspended immediately. Operations that individually add limited positive reactivity (e.g., temperature fluctuations from inventory addition or temperature control fluctuations), but when combined with all other operations affecting core reactivity (e.g., intentional boration) result in overall net negative reactivity addition, are not precluded by this action.

~~Temperature fluctuations associated with maintaining the plant status are permissible provided they remain within limits established for the plant conditions.~~

Suspension of CORE ALTERATIONS and positive reactivity additions shall not preclude moving a component to a safe position.

A.3

In addition to immediately suspending CORE ALTERATIONS ~~or~~ and positive reactivity additions, boration to restore the concentration must be initiated immediately.

In determining the required combination of boration flow rate and concentration, there is no unique design basis event that must be satisfied. The only requirement is to restore the boron concentration to its required value as

(continued)

BASES (continued)

APPLICABILITY

In MODE 6, the SRMs must be OPERABLE to determine changes in core reactivity. There is no other direct means available to check core reactivity levels.

In MODES 3, 4, and 5, the installed source range detectors and circuitry are required to be OPERABLE by LCO 3.3.13, "Source Range Monitors."

ACTIONS

A.1 and A.2

With only one SRM OPERABLE, redundancy has been lost. Since these instruments are the only direct means of monitoring core reactivity conditions, CORE ALTERATIONS and ~~positive reactivity additions~~introduction of coolant into the RCS with boron concentration less than required to meet the minimum boron concentration of LCO 3.9.1 must be suspended immediately. Suspending positive reactivity additions that could result in failure to meet the minimum boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Performance of Required Action A.1 shall not preclude completion of movement of a component to a safe position.

Temperature fluctuations associated with maintaining the plant status are permissible provided they remain within limits established for the plant conditions.

B.1

With no SRM OPERABLE, actions to restore a monitor to OPERABLE status shall be initiated immediately. Once initiated, actions shall be continued until an SRM is restored to OPERABLE status.

B.2

With no SRM OPERABLE, there is no direct means of detecting changes in core reactivity. However, since CORE ALTERATIONS and positive reactivity additions are not to be made, the core reactivity condition is stabilized until the SRMs are OPERABLE. This stabilized condition is determined by performing SR 3.9.1.1 to verify that the required boron concentration exists.

(continued)

BASES (continued)

LCO (continued)

The flow path starts in one of the RCS hot legs and is returned to the RCS cold legs.

The LCO is modified by two Notes. With the upper guide structure removed from the reactor vessel Note 1 allows the required operating SDC loop to be removed from service for up to 2 hours in each 8 hour period, provided that:

a. The maximum RCS temperature is maintained ≤ 140°F.
b. No operations are permitted that would ~~cause a reduction of~~dilute the RCS boron concentration to less than that required to meet the minimum required boron concentration of LCO 3.9.1.
c. The capability to close the containment penetrations with direct access to the outside temperature within the calculated time to boil is maintained.
d. The reactor cavity water level is maintained ≥ 20 feet above the top of the reactor pressure vessel flange, or, for core alterations, ≥ 23 feet above the top of the reactor pressure vessel flange.

This permits operations such as core mapping or alterations in the vicinity of the reactor vessel hot leg nozzles, RCS to SDC isolation valve testing, and inservice testing of LPSI system components. During this 2 hour period, decay heat is removed by natural convection to the large mass of water in the refueling canal.

Note 2 allows Operations to use a containment spray pump in place of a low pressure safety injection pump to provide shutdown cooling flow.

APPLICABILITY

One SDC loop must be in operation in MODE 6, with the water level ≥ 20 ft above the top of the reactor vessel flange, to provide decay heat removal. Requirements for the SDC System in other MODES are covered by LCOs in Section 3.4, Reactor Coolant System (RCS), and Section 3.5, Emergency Core Cooling Systems (ECCS). SDC loop requirements in MODE 6, with the water level < 20 ft above the top of the reactor vessel flange, are located in LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation – Low Water Level."

ACTIONS

SDC loop requirements are met by having one SDC loop OPERABLE and in operation, except as permitted in the Note to the LCO.

(continued)

BASES (continued)

ACTIONS (continued)

A.1

If SDC loop requirements are not met, there will be no forced circulation to provide mixing to establish uniform boron concentrations. Suspending positive reactivity additions that could result in failure to meet the minimum boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation.~~Reduced boron concentrations can occur through the addition of water with a lower boron concentration than that contained in the RCS. Therefore, actions that reduce boron concentration shall be suspended immediately.~~

A.2

If SDC loop requirements are not met, actions shall be taken immediately to suspend loading irradiated fuel assemblies in the core. With no forced circulation cooling, decay heat removal from the core occurs by natural convection to the heat sink provided by the water above the core. A minimum refueling water level of 20 ft above the reactor vessel flange provides an adequate available heat sink. Suspending any operation that would increase the decay heat load, such as loading a fuel assembly, is a prudent action under this condition.

A.3

If SDC loop requirements are not met, actions shall be initiated and continued in order to satisfy SDC loop requirements.

A.4

If SDC loop requirements are not met, all containment penetrations to the outside atmosphere must be closed to prevent fission products, if released by a loss of decay heat event, from escaping the containment building. The 4 hour or within the calculated time to boil Completion Time allows fixing most SDC problems without incurring the additional action of violating the containment atmosphere.

(continued)

BASES (continued)

ACTIONS

A.1 and A.2

When two SDC loops are operable and if one SDC loop becomes inoperable, actions shall be immediately initiated and continued until the SDC loop is restored to OPERABLE status and to operation, or until ≥ 20 ft of water level is established above the reactor vessel flange. When the water level is established at ≥ 20 ft above the reactor vessel flange, the Applicability will change to that of LCO 3.9.4, "Shutdown Cooling and Coolant Circulation – High Water Level," and only one SDC loop is required to be OPERABLE and in operation. An immediate Completion Time is necessary for an operator to initiate corrective actions.

B.1

When one loop of the SDC is operable with requirements 1-8 satisfied and the SDC loop becomes inoperable or any of the 8 requirements are not met, actions shall be immediately initiated to establish a water level > 20 feet above the reactor flange. When the water level is established at > 20 feet above the reactor vessel flange, the applicability will change to that of LCO 3.9.4, "Shutdown Cooling and Coolant Circulation-High Water Level," and only one SDC loop is required to be OPERABLE and in operation. An immediate Completion Time is necessary for an operator to initiate corrective actions.

C.1

If no SDC loop is in operation or no SDC loops are OPERABLE, there will be no forced circulation to provide mixing to establish uniform boron concentrations. ~~Reduced boron concentrations can occur by the addition of water with lower boron concentration than that contained in the RCS. Therefore, actions that reduce boron concentration shall be suspended immediately.~~Suspending positive reactivity additions that could result in failure to meet the minimum boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation.

(continued)

BASES (continued)

ACTIONS (continued)

C.2

If no SDC loop is in operation or no SDC loops are OPERABLE, actions shall be initiated immediately and continued without interruption to restore one SDC loop to OPERABLE status and operation. Since the unit is in Conditions A and B concurrently, the restoration of two OPERABLE SDC loops and one operating SDC loop should be accomplished expeditiously.

C.3

If SDC loops requirements are not met, all containment penetrations to the outside atmosphere must be closed to prevent fission products, if released by a loss of decay heat event, from escaping the containment building. The 4 hour or within the calculated time to boil Completion Time allows fixing most SDC problems without incurring the additional action of violating the containment atmosphere.

SURVEILLANCE REQUIREMENTS

SR 3.9.5.1

This Surveillance demonstrates that one SDC loop is operating and circulating reactor coolant. The flow rate is determined by the flow rate necessary to provide sufficient decay heat removal capability and to prevent thermal and boron stratification in the core. In addition, this Surveillance demonstrates that the other SDC loop is OPERABLE.

In addition, during operation of the SDC loop with the water level in the vicinity of the reactor vessel nozzles, the SDC loop flow rate determination must also consider the SDC pump suction requirements. The Frequency of 12 hours is sufficient, considering the flow, temperature, pump control, and alarm indications available to the operator to monitor the SDC System in the control room.

Verification that the required loops are OPERABLE and in operation ensures that loops can be placed in operation as needed, to maintain decay heat and retain forced circulation. The Frequency of 12 hours is considered reasonable, since other administrative controls are available and have proven to be acceptable by operating experience.

REFERENCE

1. UFSAR, Section 7.4.

ATTACHMENT D

PROPOSED TECHNICAL SPECIFICATIONS AND BASES

(Redline and Strikeout)

SONGS UNIT 3

3.1 REACTIVITY CONTROL SYSTEMS

3.1.10 Boration Systems - Shutdown

LCO 3.1.10 One RCS boron injection flow path shall be OPERABLE.

APPLICABILITY: MODES 5 and 6.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. No boron injection flow path OPERABLE.	A.1 --------NOTE-------- Plant temperature changes are allowed provided the temperature change is accounted for in the calculated SDM. --------------------- Suspend all operations involving CORE ALTERATIONS or positive reactivity changes.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
	------------------NOTE-------------------- Only required when the Refueling Water Storage Tank (RWST) is the source of borated water and the outside temperature is < 40°F or > 100°F. --	
SR 3.1.10.1	Verify RWST temperature is within limits.	24 hours
SR 3.1.10.2	Verify volume of available borated water is within limits.	7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. CRIS Manual Trip, Actuation Logic, or required control room airborne radiation monitors inoperable in MODE 5 or 6, or during movement of irradiated fuel assemblies.	B.1 ---------NOTE--------- Place CREACUS in isolation mode if automatic transfer to isolation mode inoperable. --------------------- Place one CREACUS train in emergency mode.	Immediately
	<u>OR</u>	
	B.2.1 Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>	
	B.2.2 ---------NOTE--------- Limited plant control operations are allowed provided the changes are accounted for in the calculated SDM. --------------------- Suspend positive reactivity additions.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.9.1	Perform a CHANNEL CHECK on the required control room airborne radiation monitor channel.	12 hours

(continued)

3.3 INSTRUMENTATION

3.3.13 Source Range Monitoring Channels

LCO 3.3.13 Two channels of source range monitoring instrumentation shall be OPERABLE.

APPLICABILITY: MODES 3, 4, and 5, with the reactor trip circuit breakers open or Control Element Assembly (CEA) Drive System not capable of CEA withdrawal.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more required channels inoperable.	A.1	--------NOTE--------- Limited plant control operations are allowed provided the changes are accounted for in the calculated SDM. --------------------- Suspend all operations involving positive reactivity additions.	Immediately
	AND		
	A.2	Perform SDM verification in accordance with SR 3.1.1.2, if T_{avg} > 200°F, or SR 3.1.2.1, if $T_{avg} \leq$ 200°F.	4 hours AND Once per 12 hours thereafter

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.5 RCS Loops — MODE 3

LCO 3.4.5 Two RCS loops shall be OPERABLE and one RCS loop shall be in operation.

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

All reactor coolant pumps may be de-energized for ≤ 1 hour per 8 hour period, provided:

a. ~~No operations are permitted that would cause reduction of the RCS boron concentration; and~~No operations are permitted that would cause introduction into the RCS coolant with boron concentration less than required to meet the SDM of LCO 3.1.1; and

b. Core outlet temperature is maintained at least 10°F below saturation temperature.

APPLICABILITY: MODE 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required RCS loop inoperable.	A.1 Restore required RCS loop to OPERABLE status.	72 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Be in MODE 4.	12 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. No RCS loop OPERABLE. OR No RCS loop in operation.	C.1 ~~Suspend all operations involving a reduction of RCS boron concentration.~~ Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet SDM of LCO 3.1.1.	Immediately
	AND	
	C.2 Initiate action to restore one RCS loop to OPERABLE status and operation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.5.1	Verify required RCS loop is in operation.	12 hours
SR 3.4.5.2	Verify secondary side water level in each steam generator ≥ 50% (wide range).	12 hours
SR 3.4.5.3	Verify correct breaker alignment and indicated power available to the required pump that is not in operation.	7 days

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.6 RCS Loops — MODE 4

LCO 3.4.6 Two loops or trains consisting of any combination of RCS loops and shutdown cooling (SDC) trains shall be OPERABLE and at least one loop or train shall be in operation.

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

1. All reactor coolant pumps (RCPs) and SDC pumps may be de-energized for ≤ 1 hour per 8 hour period, provided:

   a. ~~No operations are permitted that would cause reduction of the RCS boron concentration; and~~No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.1; and

   b. Core outlet temperature is maintained at least 10°F below saturation temperature.

2. No RCP shall be started with any RCS cold leg temperature ≤ 246°F unless:

   a. Pressurizer water volume is < 900 ft^3, or

   b. Secondary side water temperature in each steam generator (SG) is < 100°F above each of the RCS cold leg temperatures.

APPLICABILITY: MODE 4.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One required RCS loop inoperable. AND Two SDC trains inoperable.	A.1	Initiate action to restore a second loop or train to OPERABLE status.	Immediately
B. One required SDC train inoperable. AND Two required RCS loops inoperable.	B.1	Be in MODE 5.	24 hours
C. Required RCS loop(s) or SDC train(s) inoperable. OR No RCS loop or SDC train in operation.	C.1	~~Suspend all operations involving reduction of RCS boron concentration.~~ Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet SDM of LCO 3.1.1.	Immediately
	AND		
	C.2	Initiate action to restore one loop or train to OPERABLE status and operation.	Immediately

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.7 RCS Loops – MODE 5, Loops Filled

LCO 3.4.7 At least one of the following loop(s)/trains listed below shall be OPERABLE and in operation:

a. Reactor Coolant Loop 1 and its associated steam generator and at least one associated Reactor Coolant Pump;

b. Reactor Coolant Loop 2 and its associated steam generator and at least one associated Reactor Coolant Pump;

c. Shutdown Cooling Train A; or

d. Shutdown Cooling Train B

One additional Reactor Coolant Loop/shutdown cooling train shall be OPERABLE, or

The secondary side water level of each steam generator shall be greater than 50% (wide range).

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

1. All reactor coolant pumps (RCPs) and pumps providing shutdown cooling may be de-energized for ≤ 1 hour per 8 hour period, provided:

   a. ~~No operations are permitted that would cause reduction of the RCS boron concentration; and~~No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.2; and

   b. Core outlet temperature is maintained at least 10°F below saturation temperature.

2. One required SDC train may be inoperable for up to 2 hours for surveillance testing provided that the other SDC train or RCS loop is OPERABLE and in operation.

3. One required RCS loop may be inoperable for up to 2 hours for surveillance testing provided that the other RCS loop or SDC train is OPERABLE and in operation.

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. No SDC train/RCS loop in operation.	B.1 ~~Suspend all operations involving reduction in RCS boron concentration.~~ Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet SDM of LCO 3.1.2.	Immediately
	AND	
	B.2 Initiate action to restore required SDC train/RCS loop to operation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.7.1	Verify at least one RCS loop or SDC train is in operation.	12 hours
SR 3.4.7.2	Verify required SG secondary side water level is > 50% (wide range).	12 hours
SR 3.4.7.3	Verify the second required RCS loop, SDC train or steam generator secondary is OPERABLE.	7 days

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.8 RCS Loops – MODE 5, Loops Not Filled

LCO 3.4.8 Two shutdown cooling (SDC) trains shall be OPERABLE and at least one SDC train shall be in operation.

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

1. All SDC pumps may be de-energized for ≤ 15 minutes when switching from one train to another provided:
   a. The core outlet temperature is maintained > 10°F below saturation temperature;
   b. ~~No operations are permitted that would cause a reduction of the RCS boron concentration; and~~No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.2; and
   c. No draining operations to further reduce the RCS water volume are permitted.
2. The pump providing shutdown cooling may be de-energized for ≤ 1 hour per 8 hour period provided:
   a. The core outlet temperature is maintained > 10°F below saturation temperature; and
   b. ~~No operations are permitted that would cause a reduction of the RCS boron concentration.~~No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.2.
3. One SDC train may be inoperable for ≤ 2 hours for surveillance testing provided the other SDC train is OPERABLE and in operation.
4. A containment spray pump may be used in place of a low-pressure safety injection pump in either or both shutdown cooling trains to provide shutdown cooling flow provided the reactor has been sub-critical for a period > 24 hours and the RCS is fully depressurized and vented in accordance with LCO 3.4.12.1.

APPLICABILITY: MODE 5 with RCS loops not filled.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One SDC train inoperable.	A.1	Initiate action to restore SDC train to OPERABLE status.	Immediately
B. Both SDC trains inoperable. <u>OR</u> No SDC train in operation.	B.1	~~Suspend all operations involving reduction of RCS boron concentration.~~ Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet SDM of LCO 3.1.2.	Immediately
	<u>AND</u>		
	B.2	Initiate action to restore one SDC train to OPERABLE status and operation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.8.1	Verify at least one SDC train is in operation.	12 hours
SR 3.4.8.2	Verify correct breaker alignment and indicated power available to the required SDC pump that is not in operation.	7 days

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	AND	
	A.2.3 ~~Initiate action to suspend operations involving positive reactivity additions.~~ Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	AND	
	A.2.4 Initiate action to restore required offsite power circuit to OPERABLE status.	Immediately

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. One required DG inoperable.	B.1	Suspend CORE ALTERATIONS.	Immediately
	AND		
	B.2	Suspend movement of irradiated fuel assemblies.	Immediately
	AND		
	B.3	~~Initiate action to suspend operations involving positive reactivity additions.~~ Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	AND		
	B.4	Initiate action to restore required DG to OPERABLE status.	Immediately

ACTIONS (continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources – Shutdown

LCO 3.8.5 DC electrical power subsystem shall be OPERABLE to support the DC electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems – Shutdown."

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One battery or associated control equipment or cabling inoperable.	A.1 Declare affected required feature(s) inoperable.	Immediately
	<u>OR</u>	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>	
	A.2.3 ~~Initiate action to suspend operations involving positive reactivity additions.~~ Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	<u>AND</u>	(continued)

ACTIONS (continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.8 Inverters – Shutdown

LCO 3.8.8 Required inverters shall be OPERABLE to support the onsite Class 1E AC vital bus electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems – Shutdown."

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required inverters inoperable.	A.1 Declare affected required feature(s) inoperable.	Immediately
	OR	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	AND	
	A.2.3 ~~Initiate action to suspend operations involving positive reactivity additions.~~ Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	AND	(continued)

ACTIONS (continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.10 Distribution Systems – Shutdown

LCO 3.8.10 The necessary portion of AC, DC, and AC vital bus electrical power distribution subsystems shall be OPERABLE to support equipment required to be OPERABLE.

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required AC, DC, or AC vital bus electrical power distribution subsystems inoperable.	A.1 Declare associated supported required feature(s) inoperable.	Immediately
	OR	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	AND	
	A.2.3 ~~Initiate action to suspend operations involving positive reactivity additions.~~ Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	AND	(continued)

ACTIONS (continued)

3.9 REFUELING OPERATIONS

3.9.2 Nuclear Instrumentation

LCO 3.9.2 Two source range monitors (SRMs) shall be OPERABLE.

APPLICABILITY: MODE 6.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One SRM inoperable.	A.1	Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>		
	A.2	~~Suspend positive reactivity additions.~~ Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet the boron concentration of LCO 3.9.1.	Immediately
B. Two SRMs inoperable.	B.1	Initiate actions to restore one SRM to OPERABLE status.	Immediately
	<u>AND</u>		
	B.2	Perform SR 3.9.1.1.	4 hours <u>AND</u> Once per 12 hours thereafter

3.9 REFUELING OPERATIONS

3.9.4 Shutdown Cooling (SDC) and Coolant Circulation—High Water Level

LCO 3.9.4 One SDC loop shall be OPERABLE and in operation.

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

With the upper guide structure removed from the reactor vessel the required SDC loop may be removed from operation for ≤ 2 hours per 8-hour period, provided:

a. The maximum RCS temperature is maintained ≤ 140°F.
b. No operations are permitted that would cause ~~a reduction of~~introduction into the RCS, coolant with boron concentration less than that required to meet the minimum required boron concentration of LCO 3.9.1.
c. The capability to close the containment penetrations with direct access to the outside atmosphere within the calculated time to boil is maintained.
d. The reactor cavity water level is maintained ≥ 20 feet above the top of the reactor pressure vessel flange, or, for core alterations, ≥ 23 feet above the top of the reactor pressure vessel flange.

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

A containment spray pump may be used in place of a low pressure safety injection pump in either or both shutdown cooling loops to provide shutdown cooling flow.

APPLICABILITY: MODE 6 with the water level ≥ 20 ft above the top of reactor vessel flange.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. SDC loop requirements not met.	A.1 ~~Suspend operations involving a reduction in reactor coolant boron concentration.~~ Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet the boron concentration of LCO 3.9.1. AND	Immediately (continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One SDC loop inoperable. (Applicable to initial conditions of two shutdown cooling loops OPERABLE)	A.1	Initiate action to restore SDC loop to OPERABLE status.	Immediately
	OR		
	A.2	Initiate actions to establish ≥ 20 ft of water above the top of reactor vessel flange.	Immediately
B. One SDC loop operable, less than 20 feet of water above the reactor vessel flange and any of the 8 requirements not met (Applicable to initial conditions of one shutdown cooling loop OPERABLE and operating with requirements 1-8)	B.1	Initiate actions to establish ≥ 20 feet of water.	Immediately
C. No SDC loop OPERABLE or in operation.	C.1	~~Suspend operations involving a reduction in reactor coolant boron concentration.~~ Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet the boron concentration of LCO 3.9.1.	Immediately
	AND		(continued)

BASES (continued)

ACTION

A.1

With no boron injection flow path to the reactor coolant System OPERABLE, all operations involving CORE ALTERATIONS or positive reactivity changes shall be suspended immediately ~~without consideration of temperature fluctuations~~. Required Action A.1 is modified by a note which permits plant temperature changes provided the temperature change is accounted for in the calculated SDM. Introduction of temperature changes, including temperature increases when a positive MTC exists, must be evaluated to ensure they do not result in a loss of required SDM.

A boron injection flow path is not OPERABLE if it is not capable of performing its boron injection function. In consideration of the stable reactor configuration and the initial boron concentration, a core alteration is the only possible source for a significant increase in reactivity.

SURVEILLANCE REQUIREMENTS

SR 3.1.10.1, SR 3.1.10.2, and SR 3.1.10.3

SRs 3.1.10.1, 3.1.10.2, and 3.1.10.3, ensure that the required borated water supply is available. SR 3.1.10.1 verifies that the temperature of the boric acid solution in the RWST is ≥ 40°F and ≤ 100°F. The RWST water temperature is not expected to approach 40°F or 100°F, considering local meteorology and the large heat capacity of the RWST. Furthermore, at 40°F boric acid precipitation will not occur below a concentration of 4720 ppm boron. The maximum boric acid concentration in the tanks is 2800 ppm boron. However, SR 3.1.10.1 is only applicable when the RWST is the source of borated water and the outside air temperature is not within the normally expected range of 40 to 100°F.

The solubility of boric acid at 50°F is about 3.5 wt%. There is no similar requirement to verify BAMU Tank temperature 50°F is within the normal operating range of the building.

SR 3.1.10.2 and 3.1.10.3 verify that a sufficient amount of boron is available for RCS injection from either the BAMU tanks or the RWST. This requires a minimum of 4150 gallons of boric acid solution at a concentration of 2350 PPM Boron in either the RWST (15.5%[1] level indication) or a BAMU tank. A maximum boric acid solution concentration of 6119 ppm is specified for the BAMU Tank. The water volume limits are

[1] 15.5% level with tanks T005 and T006 cross connected (Reference 4, CCN-1). 17.0% level with tanks T005 (Reference 6) and T006 (Reference 4, CCN-3) isolated.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.1.10.1, SR 3.1.10.2, and SR 3.1.10.3 (continued)

specified relative to the top of the highest suction connection to the tank and considers vortexing, internal structures and instrument errors. The 7 day Surveillance Frequency ensures that a sufficient initial water supply is available for boron injection.

SR 3.1.10.4

These SRs demonstrate that each automatic boration system pump and valve is operable and actuates as required. In response to an actual or simulated SIAS the charging pumps start, the VCT is isolated, and the charging pumps take suction from the OPERABLE BAMU tank(s) and RWST. Verification of the correct alignment for manual, power operated, and automatic valves in the Boration System Flow paths provides assurance that proper boration flow paths are available. These SRs do not apply to valves that are locked, sealed, or otherwise secured in position, because these valves were previously verified to be in the correct position.

1. A flow path from either boric acid makeup tank with a minimum boron concentration of 2350 ppm and a minimum borated water volume of 4150 gallons, via either one of the boric acid makeup pumps, the blending tee or the gravity feed connection and any charging pump to the RCS, or;

2. The flow path from the RWST with a minimum borated water level of 15.5%[1] (includes TLU and Design Basis Document margin), a minimum boron concentration of 2350 ppm, and a solution temperature ≥ 40°F and ≤ 100°F via either a charging pump or a high pressure safety injection pump to the RCS.

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1 15.5% level with tanks T005 and T006 cross connected (Reference 4, CCN-1). 17.0% level with tanks T005 (Reference 6) and T006 (Reference 4, CCN-3) isolated.

(continued)

REFERENCES

1. 10 CFR 50, Appendix A, GDC 26.
2. 10 CFR 50, Appendix A, GDC 27.
3. 10 CFR 50, Appendix A, GDC 33.
4. J-BHB-029, "RWST Minimum Level to Maintain Safety Analysis Assumptions, Including TLU."
5. J-BGB-002, "TLU for Boric Acid Makeup Level Loops 2(3)LI0206C and 2(3)LI0208C."
6. J-BHB-021, "RWST 2(3)T005 & T006 Level Loop Uncertainties and Minimum Level Required During Modes 5 & 6."

ACTIONS (continued)

Condition B applies to the failure of CRIS Manual Trip, Actuation Logic, and required gaseous radiation monitor channels in Mode 5 or 6, or when moving irradiated assemblies. The Required Actions are immediately taken to place one OPERABLE CREACUS train in the emergency mode, or to suspend positive reactivity additions, and movement of irradiated fuel assemblies. The Completion Time recognizes the fact that the radiation signals are the only Functions available to initiate control room isolation in the event of a fuel handling accident.

Required Action B.2.2 is modified by a note to indicate that normal plant control operations that individually add limited positive reactivity (e.g., temperature or boron fluctuations associated with RCS inventory management or temperature control) are not precluded by this Action, provided they are accounted for in the calculated SDM.

SURVEILLANCE REQUIREMENTS

SR 3.3.9.1

Performance of the CHANNEL CHECK once every 12 hours ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value.

Significant deviations between the two instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

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

The Frequency, about once every shift, is based on operating experience that demonstrates the rarity of channel failure. Thus, performance of the CHANNEL CHECK guarantees that undetected overt channel failure is limited to 12 hours. Since the probability of two random failures in redundant channels in any 12 hour period is low, the CHANNEL CHECK minimizes the chance of loss of protective function due to failure of redundant channels. The CHANNEL CHECK

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.3.9.1 (continued)

supplements less formal, but more frequent, checks of channel OPERABILITY during normal operational use of the displays associated with the LCO required channels.

SR 3.3.9.2

A CHANNEL FUNCTIONAL TEST is performed on the required control room radiation monitoring channel to ensure the entire channel will perform its intended function. As found and as left setpoints are recorded.

The Frequency of 92 days is based on plant operating experience with regard to channel OPERABILITY and drift, which demonstrates that failure of more than one channel of a given Function in any 92 day interval is a rare event.

SR 3.3.9.3

Proper operation of the individual initiation relays is verified by de-energizing these relays during the CHANNEL FUNCTIONAL TEST of the Actuation Logic every 18 months. This will actuate the Function, operating all associated equipment. Proper operation of the equipment actuated by each train is thus verified.

The Frequency of 18 months is based on plant operating experience with regard to channel OPERABILITY, which demonstrates that failure of more than one channel of a given Function in any 18 month interval is a rare event.

A Note indicates this Surveillance includes verification of operation for each initiation relay.

SR 3.3.9.4

CHANNEL CALIBRATION is a complete check of the instrument channel including the sensor. The Surveillance verifies that the channel responds to a measured parameter within the necessary range and accuracy.

The Frequency of an 18 month calibration interval is based on experience with the magnitude of equipment drift in this period.

(continued)

BASES (continued)

LCO

The LCO on the source range monitoring channels ensures that adequate information is available to verify core reactivity conditions while shut down.

A minimum of two source range monitoring channels are required to be OPERABLE.

APPLICABILITY

In MODES 3, 4, and 5, with RTCBs open or the Control Element Assembly (CEA) Drive System not capable of CEA withdrawal, source range monitoring channels must be OPERABLE to monitor core power for reactivity changes. In MODES 1 and 2, and in MODES 3, 4, and 5, with the RTCBs shut and the CEAs capable of withdrawal, the Logarithmic Power Monitoring channels are addressed as part of the RPS in LCO 3.3.1, "Reactor Protective System (RPS) Instrumentation – Operating," and LCO 3.3.2, "Reactor Protective System (RPS) Instrumentation – Shutdown."

The requirements for source range neutron flux monitoring in MODE 6 are addressed in LCO 3.9.2, "Nuclear Instrumentation." The source range nuclear instrumentation channels provide neutron flux coverage extending an additional one to two decades below the logarithmic channels for use during refueling, when neutron flux may be extremely low.

ACTIONS

A channel is inoperable when it does not satisfy the OPERABILITY criteria for the channel's function. These criteria are outlined in the LCO section of the Bases.

A.1 and A.2

With one required channel inoperable, it may not be possible to perform a CHANNEL CHECK to verify that the other required channel is OPERABLE. Therefore, with one or more required channels inoperable, the source range monitoring Function cannot be reliably performed. Consequently, the Required Actions are the same for one required channel inoperable or more than one required channel inoperable. The absence of reliable neutron flux indication makes it difficult to ensure SDM is maintained. ~~Required Action A.1 therefore requires that all positive reactivity additions that are under operator control, such as boron dilution or Reactor Coolant System temperature changes, be halted immediately, preserving SDM. However, temperature fluctuations~~

(continued)

BASES (continued)

ACTIONS

A.1 and A.2 (continued)

~~associated with maintaining the plant status are permissible provided they remain within limits established for the plant conditions.~~Required Action A.1 is modified by a note to indicate that normal plant control operations that individually add limited positive reactivity (e.g., temperature or boron fluctuations associated with RCS inventory management or temperature control) are not precluded by this Action, provided they are accounted for in the calculated SDM.

SDM must be verified periodically to ensure that it is being maintained. Both required channels must be restored as soon as possible. The initial Completion Time of 4 hours and once every 12 hours thereafter to perform SDM verification takes into consideration that Required Action A.1 eliminates many of the means by which SDM can be reduced. These Completion Times are also based on operating experience in performing the Required Actions and the fact that plant conditions will change slowly.

SURVEILLANCE REQUIREMENTS

SR 3.3.13.1

SR 3.3.13.1 is the performance of a CHANNEL CHECK on each required channel every 12 hours. A CHANNEL CHECK is a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based upon the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying that the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria are determined by the plant staff and should be based on a combination of the channel instrument uncertainties including control isolation, indication, and readability. If a channel is outside of the match criteria, it may be an indication that the transmitter or the signal processing equipment has drifted outside of its limits. If the channels are within the match criteria, it is an indication that the channels are OPERABLE.

The Frequency, about once every shift, is based on operating experience that demonstrates the rarity of channel failure.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.3.13.1 (continued)

Thus, the performance of CHANNEL CHECK ensures that undetected overt channel failure is limited to 12 hours.

Since the probability of two random failures in redundant channels in any 12 hour period is extremely low, CHANNEL CHECK minimizes the chance of loss of protective function due to failure of redundant channels. CHANNEL CHECK supplements less formal, but more frequent, checks of channel OPERABILITY during normal operational use of displays associated with the LCO required channels.

SR 3.3.13.2

A CHANNEL FUNCTIONAL TEST is performed every 92 days to ensure that the entire channel is capable of properly indicating neutron flux. Internal test circuitry is used to feed test signals into the signal processor to verify channel alignment. It is not necessary to test the detector, because generating a meaningful test signal is difficult; the detectors are of simple construction, and any failures in the detectors will be apparent as change in channel output. This Frequency is the same as that employed for the same channels in the other applicable MODES.

SR 3.3.13.3

SR 3.3.13.3 is the performance of a CHANNEL CALIBRATION. A CHANNEL CALIBRATION is performed every 24 months. The Surveillance is a complete check and readjustment of the source range channel from the preamplifier input through to the remote indicators. The Surveillance verifies that the channel responds to a measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drift between successive calibrations to ensure that the channel remains operational. Measurement error determination, setpoint error determination, and calibration adjustment must be performed consistent with the plant specific setpoint analysis. The channel shall be left calibrated consistent with the assumptions of the current plant specific setpoint analysis.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.3.13.3 (continued)

This SR is modified by a Note to indicate that it is not necessary to test the detector, because generating a meaningful test signal is difficult; the detectors are of simple construction, and any failures in the detectors will be apparent as change in channel output. This test interval is the same as that employed for the same channels in the other applicable MODES.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 13.

2. SONGS Units 2 and 3 UFSAR, Chapter 7 and Chapter 15.

BASES

LCO (continued)

of requiring both SGs to be capable (> 50% wide range water level) of transferring heat from the reactor coolant at a controlled rate. Forced reactor coolant flow is the required way to transport heat, although natural circulation flow provides adequate removal. A minimum of one running RCP meets the LCO requirement for one loop in operation.

The Note permits a limited period of operation without RCPs. All RCPs may be de-energized for ≤ 1 hour per 8 hour period. This means that natural circulation has been established. When in natural circulation, a reduction in boron concentration with coolant at boron concentrations less than required to assure the SDM of LCO 3.1.1 is maintained is prohibited because an even concentration distribution throughout the RCS cannot be ensured. Core outlet temperature is to be maintained at least 10°F below the saturation temperature so that no vapor bubble may form and possibly cause a natural circulation flow obstruction.

In MODES 3, 4, and 5, it is sometimes necessary to stop all RCPs or shutdown cooling (SDC) pump forced circulation (e.g., to change operation from one SDC train to the other, to perform surveillance or startup testing, to perform the transition to and from SDC System cooling, or to avoid operation below the RCP minimum net positive suction head limit). The time period is acceptable because natural circulation is adequate for heat removal, or the reactor coolant temperature can be maintained subcooled and boron stratification affecting reactivity control is not expected.

An OPERABLE loop consists of at least one RCP providing forced flow for heat transport and an SG that is OPERABLE in accordance with the Steam Generator Tube Surveillance Program. An RCP is OPERABLE if it is capable of being powered and is able to provide forced flow if required.

APPLICABILITY

In MODE 3, the heat load is lower than at power; therefore, one RCS loop in operation is adequate for transport and heat removal. A second RCS loop is required to be OPERABLE but not in operation for redundant heat removal capability.

Operation in other MODES is covered by:

LCO 3.4.4, "RCS Loops – MODES 1 and 2";
LCO 3.4.6, "RCS Loops – MODE 4";

(continued)

BASES

APPLICABILITY (continued)

LCO 3.4.7, "RCS Loops – MODE 5, Loops Filled";
LCO 3.4.8, "RCS Loops – MODE 5, Loops Not Filled";
LCO 3.9.4, "Shutdown Cooling (SDC) and Coolant Circulation – High Water Level" (MODE 6); and
LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation – Low Water Level" (MODE 6).

ACTIONS

A.1

If one required RCS loop is inoperable, redundancy for forced flow heat removal is lost. The Required Action is restoration of the required RCS loop to OPERABLE status within a Completion Time of 72 hours. This time allowance is a justified period to be without the redundant, nonoperating loop because a single loop in operation has a heat transfer capability greater than that needed to remove the decay heat produced in the reactor core.

B.1

If restoration is not possible within 72 hours, the unit must be placed in MODE 4 within 12 hours. In MODE 4, the plant may be placed on the SDC System. The Completion Time of 12 hours is compatible with required operation to achieve cooldown and depressurization from the existing plant conditions in an orderly manner and without challenging plant systems.

C.1 and C.2

If no RCS loop is in operation, except as provided in Note 1 in the LCO section, all operations involving ~~a reduction of RCS boron concentration must be immediately suspended. This is necessary because boron dilution requires forced circulation for proper homogenization.~~ introduction of coolant into the RCS with boron concentration less than required to meet the minimum SDM of LCO 3.1.1 must be immediately suspended. Action to restore one RCS loop to OPERABLE status and operation shall be initiated immediately and continued until one RCS loop is restored to OPERABLE status and operation. Suspending the introduction into the RCS of coolant with boron concentration less than required to meet the minimum SDM of LCO 3.1.1 is required to assure continued safe operation. With coolant added without forced circulation, unmixed coolant could be

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

C.1 and C.2 (continued)

introduced to the core. however coolant added with boron concentration meeting the minimum SDM maintains acceptable margin to subcritical operations. The immediate Completion Times reflect the importance of maintaining operation for decay heat removal.

SR 3.4.5.1

This SR requires verification every 12 hours that the required number of RCS loops are in operation. Verification includes flow rate, temperature, or pump status monitoring, which help ensure that forced flow is providing heat removal. The 12 hour interval has been shown by operating practice to be sufficient to regularly assess degradation and verify operation within safety analyses assumptions. In addition, control room indication and alarms will normally indicate loop status.

SR 3.4.5.2

This SR requires verification every 12 hours that the secondary side water level in each SG is ≥ 50% wide range. An adequate SG water level is required in order to have a heat sink for removal of the core decay heat from the reactor coolant. The 12 hour interval has been shown by operating practice to be sufficient to regularly assess degradation and verify operation within the safety analyses assumptions.

SR 3.4.5.3

Verification that the required number of RCPs are OPERABLE ensures that the single failure criterion is met and that an additional RCS loop can be placed in operation, if needed, to maintain decay heat removal and reactor coolant circulation. Verification is performed by verifying proper breaker alignment and power availability to the required RCPs. The Frequency of 7 days is considered reasonable in view of other administrative controls available and has been shown to be acceptable by operating experience.

REFERENCES

1. UFSAR, Section 15.3.

BASES (continued)

LCO (continued)

prohibits boron dilution with coolant at boron concentrations less than required to assure the SDM of LCO 3.1.1 is maintained when forced flow is stopped because an even concentration distribution cannot be ensured. Core outlet temperature is to be maintained at least 10°F below saturation temperature so that no vapor bubble may form and possibly cause a natural circulation flow obstruction. The response of the RCS without the RCPs or SDC pumps depends on the core decay heat load and the length of time that the pumps are stopped. As decay heat diminishes, the effects on RCS temperature and pressure diminish. Without cooling by forced flow, higher heat loads will cause the reactor coolant temperature and pressure to increase at a rate proportional to the decay heat load. Because pressure can increase, the applicable system pressure limits (pressure and temperature (P/T) limits or low temperature overpressure protection (LTOP) limits) must be observed and forced SDC flow or heat removal via the SGs must be re-established prior to reaching the pressure limit. The circumstances for stopping both RCPs or SDC pumps are to be limited to situations where:

a. Pressure and temperature increases can be maintained well within the allowable pressure (P/T limits and LTOP) and 10°F subcooling limits; or

b. An alternate heat removal path through the SGs is in operation.

Note 2 requires that either of the following two conditions be satisfied before an RCP may be started with any RCS cold leg temperature ≤ 256°F.

a. Pressurizer water volume is < 900 ft^3; or

b. Secondary side water temperature in each SG is < 100°F above each of the RCS cold leg temperatures.

Satisfying the above condition will preclude a large pressure surge in the RCS when the RCP is started.

An OPERABLE RCS loop consists of at least one OPERABLE RCP and an SG that is OPERABLE in accordance with the Steam Generator Tube Surveillance Program and has the minimum water level specified in SR 3.4.6.2.

(continued)

BASES (continued)

ACTIONS

B.1 (continued)

reasonable, based on operating experience, to reach MODE 5 from MODE 4, with only one SDC train operating, in an orderly manner and without challenging plant systems.

C.1 and C.2

If no RCS loops or SDC trains are OPERABLE or in operation, except during conditions permitted by Note 1 in the LCO section, all operations involving ~~reduction of RCS boron concentration~~ introduction of coolant into the RCS with boron concentration less than required to meet the minimum SDM of LCO 3.1.1 must be suspended and action to restore one RCS loop or SDC train to OPERABLE status and operation must be initiated. ~~Boron dilution requires forced circulation for proper mixing, and t~~The required margin to criticality must not be reduced in this type of operation. Suspending the introduction into the RCS of coolant with boron concentration less than required to meet the minimum SDM of LCO 3.1.1 is required to assure continued safe operation. With coolant added without forced circulation, unmixed coolant could be introduced to the core, however coolant added with boron concentration meeting the minimum SDM maintains acceptable margin to subcritical operations. The immediate Completion Times reflect the importance of decay heat removal. The action to restore must continue until one loop or train is restored to operation.

SURVEILLANCE REQUIREMENTS

SR 3.4.6.1

This SR requires verification every 12 hours that one required loop or train is in operation. This ensures forced flow is providing heat removal. Verification includes flow rate, temperature, or pump status monitoring. The 12 hour Frequency has been shown by operating practice to be sufficient to regularly assess RCS loop status. In addition, control room indication and alarms will normally indicate loop status.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.4.6.2

This SR requires verification every 12 hours of secondary side water level in the required SG(s) ≥ 50% (wide range). An adequate SG water level is required in order to have a heat sink for removal of the core decay heat from the reactor coolant. The 12 hour interval has been shown by operating practice to be sufficient to regularly assess degradation and verify operation within safety analyses assumptions.

SR 3.4.6.3

Verification that the required pump is OPERABLE ensures that an additional RCS loop or SDC train can be placed in operation, if needed to maintain decay heat removal and reactor coolant circulation. Verification is performed by verifying proper breaker alignment and power available to the required pumps. The Frequency of 7 days is considered reasonable in view of other administrative controls available and has been shown to be acceptable by operating experience.

REFERENCES

1. UFSAR, Section 15.4.1.4.

BASES (continued)

LCO

The purpose of this LCO is to require at least one of the SDC trains or RCS loops be OPERABLE and in operation with an additional SDC train or RCS loop OPERABLE or secondary side water level of each SG shall be ≥ 50% wide range. One SDC train or RCS loop provides sufficient forced circulation to perform the safety functions of the reactor coolant under these conditions. The second SDC or RCS loop train is normally maintained OPERABLE as a backup to the operating train/loop to provide redundant paths for decay heat removal. However, if the standby SDC train/RCS loop is not OPERABLE, a sufficient alternate method to provide redundant paths for decay heat removal is two SGs with their secondary side water levels ≥ 50% wide range. Should the operating SDC train/RCS loop fail, the SGs could be used to remove the decay heat.

Note 1 permits all RCPs and SDC pumps to be de-energized ≤ 1 hour per 8 hour period. The circumstances for stopping both SDC trains/RCS loops are to be limited to situations where pressure and temperature increases can be maintained well within the allowable pressure (pressure and temperature and low temperature overpressure protection) and 10°F subcooling limits, or an alternate heat removal path through the SG(s) is in operation.

This LCO is modified by a Note that prohibits boron dilution with coolant at boron concentrations less than required to assure the SDM of LCO 3.1.2 is maintained when forced flow is stopped because an even concentration distribution cannot be ensured. Core outlet temperature is to be maintained at least 10°F below saturation temperature, so that no vapor bubble would form and possibly cause a natural circulation flow obstruction. In this MODE, the SG(s) can be used as the backup for heat removal. To ensure their availability, the RCS loop flow path is to be maintained with subcooled liquid.

In MODE 5, it is sometimes necessary to stop all RCP or SDC forced circulation. This is permitted to change operation from one SDC train or RCS loop to the other, perform surveillance or startup testing, perform the transition to and from the SDC, or to avoid operation below the RCP minimum net positive suction head limit. The time period is acceptable because natural circulation is acceptable for decay heat removal, the reactor coolant temperature can be

(continued)

BASES (continued)

LCO (continued)

maintained subcooled, and boron stratification affecting reactivity control is not expected.

Note 2 allows one SDC train to be inoperable for a period of up to 2 hours provided that the other SDC train is OPERABLE and in operation. This permits periodic surveillance tests to be performed on the inoperable train during the only time when such testing is safe and possible.

Note 3 allows one RCS loop to be inoperable for a period of up to 2 hours provided that the other RCS loop is OPERABLE and in operation. This permits periodic surveillance tests to be performed on the inoperable loop during the only time when such testing is safe and possible.

Note 4 requires that either of the following two conditions be satisfied before an RCP may be started:

a. Pressurizer water volume must be < 900 ft^3; or

b. Secondary side water temperature in each SG must be < 100°F above each of the RCS cold leg temperatures.

Satisfying either of the above conditions will preclude a low temperature overpressure event due to a thermal transient when the RCP is started.

Note 5 specifies that a containment spray (CS) pump may be used in place of a low pressure safety injection (LPSI) pump in either or both shutdown cooling trains to provide shutdown cooling (SDC) flow based on the calculated heat load of the core 24 hours after the reactor is sub-critical with the reactor coolant system (RCS) fully depressurized and vented in accordance with TS 3.4.12.

Note 6 provides for an orderly transition from MODE 5 to MODE 4 during a planned heatup by permitting removal of SDC trains from operation when at least one RCP is in operation.

An OPERABLE SDC train is composed of an OPERABLE SDC pump and an OPERABLE SDC heat exchanger.

SDC pumps are OPERABLE if they are capable of being powered and are able to provide flow if required. An OPERABLE RCS loop consists of at least one OPERABLE RCP and an OPERABLE SG. An OPERABLE SG can perform as a heat sink when it has

(continued)

BASES (continued)

LCO (continued)

an adequate water level and is OPERABLE in accordance with the SG Tube Surveillance Program.

An OPERABLE RCS loop consists of at least one RCP providing forced flow for heat transport and an SG that is OPERABLE in accordance with the Steam Generator Tube Surveillance Program. An RCP is OPERABLE if it is capable of being powered and is able to provide forced flow if required.

APPLICABILITY

In MODE 5 with RCS loops filled, this LCO requires forced circulation to remove decay heat from the core and to provide proper boron mixing. One SDC train/RCS loop provides sufficient circulation for these purposes.

Operation in other MODES is covered by:

LCO 3.4.4, "RCS Loops – MODES 1 and 2";
LCO 3.4.5, "RCS Loops – MODE 3";
LCO 3.4.6, "RCS Loops – MODE 4";
LCO 3.4.8, "RCS Loops – MODE 5, Loops Not Filled";
LCO 3.9.4, "Shutdown Cooling (SDC) and Coolant Circulation – High Water Level" (MODE 6); and
LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation – Low Water Level" (MODE 6).

ACTIONS

A.1 and A.2

If the required SDC train/RCS loop is inoperable and any SGs have secondary side water levels < 50% wide range, redundancy for heat removal is lost. Action must be initiated immediately to restore a second SDC train/RCS loop to OPERABLE status or to restore the water level in the required SGs. Either Required Action A.1 or Required Action A.2 will restore redundant decay heat removal paths. The immediate Completion Times reflect the importance of maintaining the availability of two paths for decay heat removal.

B.1 and B.2

If no SDC train/RCS loop is in operation, except as permitted in Note 1, all operations involving ~~the reduction of RCS boron concentration~~ introduction of coolant into the RCS with boron concentration less than required to meet the

(continued)

BASES (continued)

ACTIONS

B.1 and B.2 (continued)

minimum SDM of LCO 3.1.2 must be suspended. Action to restore one SDC train/RCS loop to operation must be initiated. ~~Boron dilution requires forced circulation for proper mixing and t~~The required margin to criticality must not be reduced in this type of operation. Suspending the introduction into the RCS of coolant with boron concentration less than required to meet the minimum SDM of LCO 3.1.2 is required to assure continued safe operation. With coolant added without forced circulation, unmixed coolant could be introduced to the core, however coolant added with boron concentration meeting the minimum SDM maintains acceptable margin to subcritical operations. The immediate Completion Times reflect the importance of maintaining operation for decay heat removal.

SURVEILLANCE REQUIREMENTS

SR 3.4.7.1

This SR requires verification every 12 hours that at least one SDC train/RCS loop is in operation. Verification includes flow rate, temperature, or pump status monitoring, which help ensure that forced flow is providing decay heat removal. The 12 hour Frequency has been shown by operating practice to be sufficient to regularly assess degradation and verify operation is within safety analyses assumptions. In addition, control room indication and alarms will normally indicate loop status.

The SDC/RCS flow is established to ensure that core outlet temperature is maintained sufficiently below saturation to allow time for swap over to the standby SDC train/RCS loop should the operating train be lost.

SR 3.4.7.2

Verifying the SGs are OPERABLE by ensuring their secondary side water levels are ≥ 50% wide range ensures that redundant heat removal paths are available if the second SDC train/RCS loop is inoperable. The Surveillance is required to be performed when the LCO requirement is being met by use of the SGs. If both SDC trains are OPERABLE and one SDC train is in operation, this SR is not needed. The 12 hour Frequency has been shown by operating practice to be sufficient to regularly assess degradation and verify operation within safety analyses assumptions.

(continued)

BASES (continued)

LCO

The purpose of this LCO is to require a minimum of two SDC trains be OPERABLE and at least one of these trains be in operation. An OPERABLE train is one that is capable of transferring heat from the reactor coolant at a controlled rate. Heat cannot be removed via the SDC System unless forced flow is used. A minimum of one running SDC pump meets the LCO requirement for one train in operation. An additional SDC train is required to be OPERABLE to meet the single failure criterion.

Note 1 permits the SDC pumps to be de-energized for ≤ 15 minutes when switching from one train to another. The circumstances for stopping both SDC pumps are to be limited to situations when the outage time is short and the core outlet temperature is maintained > 10°F below saturation temperature. The Note prohibits boron dilution with coolant at boron concentrations less than required to assure the SDM of LCO 3.1.2 is maintained or draining operations when SDC forced flow is stopped.

Note 2 specifies the pump providing shutdown cooling may be de-energized for up to 1 hour per 8 hour period provided 1) ~~no operations are permitted that would cause dilution of the reactor coolant system boron concentration~~ no operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.2, and 2) core ~~sublet~~outlet temperature is maintained at least 10°F below saturation temperature.

Note 3 allows one SDC train to be inoperable for a period of 2 hours provided that the other train is OPERABLE and in operation. This permits periodic surveillance tests to be performed on the inoperable train during the only time when these tests are safe and possible.

Note 4 specifies that a containment spray pump may be used in place of a low pressure safety injection pump in either or both shutdown cooling trains to provide shutdown cooling flow provided the reactor has been sub-critical for a period greater than 24 hours and the reactor coolant system is fully depressurized and vented in accordance with TS 3.4.12.1.

(continued)

BASES (continued)

LCO (continued)

An OPERABLE SDC train is composed of an OPERABLE SDC pump capable of providing forced flow to an OPERABLE SDC heat exchanger, along with the appropriate flow and temperature instrumentation for control, protection, and indication. SDC pumps are OPERABLE if they are capable of being powered and are able to provide flow if required.

APPLICABILITY

In MODE 5 with loops not filled, this LCO requires core heat removal and coolant circulation by the SDC System.

Operation in other MODES is covered by:

LCO 3.4.4, "RCS Loops — MODES 1 and 2";
LCO 3.4.5, "RCS Loops — MODE 3";
LCO 3.4.6, "RCS Loops — MODE 4";
LCO 3.4.7, "RCS Loops — MODE 5, Loops Filled";
LCO 3.9.4, "Shutdown Cooling (SDC) and Coolant Circulation — High Water Level" (MODE 6); and
LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation — Low Water Level" (MODE 6).

ACTIONS

A.1

If the required SDC train is inoperable, redundancy for heat removal is lost. Action must be initiated immediately to restore a second train to OPERABLE status. The Completion Time reflects the importance of maintaining the availability of two paths for heat removal.

B.1 and B.2

If no SDC train is OPERABLE or in operation, except as provided in Note 1 or in Note 2, all operations involving ~~the reduction of RCS boron concentration~~ introduction of coolant into the RCS with boron concentration less than required to meet the minimum SDM of LCO 3.1.2 must be suspended. Action to restore one SDC train to OPERABLE status and operation must be initiated immediately. ~~Boron dilution requires forced circulation for proper mixing and t~~The required margin to criticality must not be reduced in this type of operation. Suspending the introduction into the RCS of coolant with boron concentration less than required to meet the minimum SDM of LCO 3.1.2 is

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

B.1 and B.2 (continued)

required to assure continued safe operation. With coolant added without forced circulation, unmixed coolant could be introduced to the core, however coolant added with boron concentration meeting the minimum SDM maintains acceptable margin to subcritical operations. The immediate Completion Time reflects the importance of maintaining operation for decay heat removal.

SR 3.4.8.1

This SR requires verification every 12 hours that at least one SDC train is in operation. Verification includes flow rate, temperature, or pump status monitoring, which help ensure that forced flow is providing decay heat removal. The 12 hour Frequency has been shown by operating practice to be sufficient to regularly assess degradation and verify operation is within safety analyses assumptions.

SR 3.4.8.2

Verification that the required number of trains are OPERABLE ensures that redundant paths for heat removal are available and that additional trains can be placed in operation, if needed, to maintain decay heat removal and reactor coolant circulation. Verification is performed by verifying proper breaker alignment and indicated power available to the required pumps. The Frequency of 7 days is considered reasonable in view of other administrative controls available and has been shown to be acceptable by operating experience.

REFERENCES

1. UFSAR, Section 5.4.7.

BASES (continued)

ACTIONS (continued)

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

With the offsite circuit not available to the required train (Condition A), the option exists to declare all required features inoperable. Since this option may involve undesired administrative efforts, the allowance for sufficiently conservative actions is made. With the required DG inoperable (Condition B), the minimum required diversity of AC power sources is not available. It is, therefore, required to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions ~~which would exceed limits specified in LCO 3.1.2 or LCO 3.1.9. The Required Action to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory provided the required SDM is maintained.~~ that could result in loss of required SDM (Mode 5) or boron concentration (Mode 6). Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM.

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

Notwithstanding performance of the conservative Required Actions, the unit is still without sufficient AC power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required AC power sources and continue until the LCO requirements are restored.

(continued)

BASES (continued)

ACTIONS

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

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

Pursuant to LCO 3.0.6, the Distribution System's (LCO 3.8.10) ACTIONS are not entered even if all AC sources to it are inoperable, resulting in de-energization. Therefore, the Required Actions of Condition A are modified by a Note to indicate that when Condition A is entered with no AC power to one ESF bus, the ACTIONS for LCO 3.8.10 must be immediately entered. This Note allows Condition A to provide requirements for the loss of the offsite circuit, whether or not a train is de-energized. LCO 3.8.10 provides the appropriate restrictions for the situation involving a de-energized train.

SURVEILLANCE REQUIREMENTS

SR 3.8.2.1

SR 3.8.2.1 requires the SRs from LCO 3.8.1 that are necessary for ensuring the OPERABILITY of the AC sources in other than MODES 1, 2, 3, and 4. SR 3.8.1.17 is not required to be met because the required OPERABLE DG is not required to undergo periods of being synchronized to the offsite circuit. SR 3.8.1.20 is excepted because starting independence is not required with DG(s) that are not required to be OPERABLE.

This SR is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE DG from being paralleled with the offsite power network or otherwise rendered inoperable. With limited AC Sources available, a single event could unnecessarily compromise both the required circuit and the DG. The SRs listed in the Note are not required to be performed for the OPERABLE AC sources during Modes 5 and 6, and during movement of irradiated fuel assemblies. However, these AC sources are presumed to be able to meet these surveillances. If it is discovered (through analysis or unplanned events, for example) that the required AC sources could not meet these surveillances, then the equipment must be considered inoperable. Refer to the corresponding Bases for LCO 3.8.1 for a discussion of each SR.

(continued)

REFERENCES	1.	UFSAR, Chapter 15.

BASES (continued)

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, and A.2.4 (continued)

positive reactivity additions~~). The Required Action to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory, provided the required SDM is maintained.~~ that could result in loss of required SDM (Mode 5) or boron concentration (Mode 6)). Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM.

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize probability of the occurrence of postulated events.

Notwithstanding performance of the above conservative Required Actions, the unit is still without sufficient DC power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required DC power sources and continue until the LCO requirements are restored.

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

B.1

Condition B represents one train with a loss of ability to completely respond to an event, and a potential loss of ability to remain energized during normal operation. Since eventual failure of the battery to maintain the required

(continued)

BASES (continued)

ACTIONS

B.1 (continued)

battery cell parameters is highly probable, it is imperative that the operator's attention focus on minimizing the potential for complete loss of DC power to the affected train. The additional time provided by the Completion Time is consistent with the battery's capability to maintain its short term capability to respond to a design basis event.

C.1

If the battery cell parameters cannot be maintained within Category A limits, the short term capability of the battery is also degraded and the battery must be declared inoperable.

SURVEILLANCE REQUIREMENTS

SR 3.8.5.1

SR 3.8.5.1 states that Surveillances required by SR 3.8.4.1 through SR 3.8.4.8 are applicable in these MODES. See the corresponding Bases for LCO 3.8.4 for a discussion of each SR.

This SR is modified by a Note which indicates that SR 3.8.4.6 (battery charger capacity), SR 3.8.4.7 (battery service test), and SR 3.8.4.8 (battery performance test), if expired, are not required to be performed for the OPERABLE DC subsystems in Modes 5 and 6, and during movement of irradiated fuel assemblies. However, the DC subsystems are presumed to be able to meet these surveillances. If it is discovered (through analysis or unplanned events, for example) that the charger and/or battery could not meet these surveillances, then the equipment must be considered inoperable.

REFERENCES

1. UFSAR, Chapter 6.

2. UFSAR, Chapter 15.

BASES (continued)

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, and A.2.4 (continued)

reactivity additions~~. The Required Action to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory, provided the required SDM is maintained.~~ that could result in loss of required SDM (Mode 5) or boron concentration (Mode 6). Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM. By the allowance of the option to declare required features inoperable with the associated inverter(s) inoperable, appropriate restrictions will be implemented in accordance with the affected required features LCOs' Required ACTIONS. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions).

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

Notwithstanding performance of the above conservative Required Actions, the unit is still without sufficient AC vital power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required AC vital power source and continue until the LCO requirements are restored.

(continued)

BASES (continued)

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, and A.2.4 (continued)

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required inverters should be completed as quickly as possible in order to minimize the time the unit safety systems may be without power or powered from a constant voltage source transformer.

SURVEILLANCE REQUIREMENTS

SR 3.8.8.1

This Surveillance verifies that the inverters are functioning properly with all required circuit breakers closed and AC vital buses energized from the inverter. The verification of proper voltage output ensures that the required power is readily available for the instrumentation connected to the AC vital buses. The 7 day Frequency takes into account the redundant capability of the inverters and other indications available in the control room that alert the operator to inverter malfunctions.

REFERENCES

1. UFSAR, Chapter 6.
2. UFSAR, Chapter 15.

BASES (continued)

ACTIONS

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

Although redundant required features may require redundant trains of electrical power distribution subsystems to be OPERABLE, one OPERABLE distribution subsystem train may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS and fuel movement. By allowing the option to declare required features associated with an inoperable distribution subsystem inoperable, appropriate restrictions are implemented in accordance with the affected distribution subsystems LCO's Required Actions. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions~~).~~ that could result in loss of required SDM (Mode 5) or boron concentration (Mode 6)). Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM.

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

Notwithstanding performance of the above conservative Required Actions, a required shutdown cooling (SDC) subsystem may be inoperable. In this case, these Required Actions of Condition A do not adequately address the concerns relating to coolant circulation and heat removal. Pursuant to LCO 3.0.6, the SDC ACTIONS would not be entered.

(continued)

BASES (continued)

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, A.2.4, and A.2.5 (continued)

Therefore, the Required Actions of Condition A direct declaring SDC inoperable, which results in taking the appropriate SDC actions.

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

SURVEILLANCE REQUIREMENTS

SR 3.8.10.1

This Surveillance verifies that the AC, DC, and AC vital bus electrical power distribution system is functioning properly, with all the buses energized. The verification of proper voltage availability on the buses ensures that the required power is readily available for motive as well as control functions for critical system loads connected to these buses. The 7 day Frequency takes into account the redundant capability of the electrical power distribution subsystems, and other indications available in the control room that alert the operator to subsystem malfunctions.

REFERENCES

1. UFSAR, Chapter 6.
2. UFSAR, Chapter 15.

BASES (continued)

LCO (continued)

COLR ensures a core k_{eff} of ≤ 0.95 is maintained during fuel handling operations. Violation of the LCO could lead to an inadvertent criticality during MODE 6.

APPLICABILITY

This LCO is applicable in MODE 6 to ensure that the fuel in the reactor vessel will remain subcritical. The required boron concentration ensures a $k_{eff} \leq 0.95$. Above MODE 6, LCO 3.1.1, "SHUTDOWN MARGIN (SDM) – $T_{avg} > 200°F$," and LCO 3.1.2, "SHUTDOWN MARGIN – $T_{avg} \leq 200°F$," ensure that an adequate amount of negative reactivity is available to shut down the reactor and to maintain it subcritical.

ACTIONS

A.1 and A.2

Continuation of CORE ALTERATIONS or positive reactivity additions (including actions to reduce boron concentration) is contingent upon maintaining the unit in compliance with the LCO. If the boron concentration of any coolant volume in the RCS, or the refueling canal is less than its limit, all operations involving CORE ALTERATIONS or positive reactivity additions must be suspended immediately. Operations that individually add limited positive reactivity (e.g., temperature fluctuations from inventory addition or temperature control fluctuations), but when combined with all other operations affecting core reactivity (e.g., intentional boration) result in overall net negative reactivity addition, are not precluded by this action.

~~Temperature fluctuations associated with maintaining the plant status are permissible provided they remain within limits established for the plant conditions.~~

Suspension of CORE ALTERATIONS and positive reactivity additions shall not preclude moving a component to a safe position.

A.3

In addition to immediately suspending CORE ALTERATIONS ~~or~~and positive reactivity additions, boration to restore the concentration must be initiated immediately.

In determining the required combination of boration flow rate and concentration, there is no unique design basis event that must be satisfied. The only requirement is to restore the boron concentration to its required value as

(continued)

BASES (continued)

APPLICABILITY

In MODE 6, the SRMs must be OPERABLE to determine changes in core reactivity. There is no other direct means available to check core reactivity levels.

In MODES 3, 4, and 5, the installed source range detectors and circuitry are required to be OPERABLE by LCO 3.3.13, "Source Range Monitors."

ACTIONS

A.1 and A.2

With only one SRM OPERABLE, redundancy has been lost. Since these instruments are the only direct means of monitoring core reactivity conditions. CORE ALTERATIONS and ~~positive reactivity additions~~introduction of coolant into the RCS with boron concentration less than required to meet the minimum boron concentration of LCO 3.9.1 must be suspended immediately. Suspending positive reactivity additions that could result in failure to meet the minimum boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Performance of Required Action A.1 shall not preclude completion of movement of a component to a safe position.

Temperature fluctuations associated with maintaining the plant status are permissible provided they remain within limits established for the plant conditions.

B.1

With no SRM OPERABLE, actions to restore a monitor to OPERABLE status shall be initiated immediately. Once initiated, actions shall be continued until an SRM is restored to OPERABLE status.

B.2

With no SRM OPERABLE, there is no direct means of detecting changes in core reactivity. However, since CORE ALTERATIONS and positive reactivity additions are not to be made, the core reactivity condition is stabilized until the SRMs are OPERABLE. This stabilized condition is determined by performing SR 3.9.1.1 to verify that the required boron concentration exists.

(continued)

BASES (continued)

LCO (continued)

The flow path starts in one of the RCS hot legs and is returned to the RCS cold legs.

The LCO is modified by two Notes. With the upper guide structure removed from the reactor vessel Note 1 allows the required operating SDC loop to be removed from service for up to 2 hours in each 8 hour period, provided that:

a. The maximum RCS temperature is maintained ≤ 140°F.
b. No operations are permitted that would ~~cause a reduction of~~dilute the RCS boron concentration to less than that required to meet the minimum required boron concentration of LCO 3.9.1.
c. The capability to close the containment penetrations with direct access to the outside temperature within the calculated time to boil is maintained.
d. The reactor cavity water level is maintained ≥ 20 feet above the top of the reactor pressure vessel flange, or, for core alterations, ≥ 23 feet above the top of the reactor pressure vessel flange.

This permits operations such as core mapping or alterations in the vicinity of the reactor vessel hot leg nozzles, RCS to SDC isolation valve testing, and inservice testing of LPSI system components. During this 2 hour period, decay heat is removed by natural convection to the large mass of water in the refueling canal.

Note 2 allows Operations to use a containment spray pump in place of a low pressure safety injection pump to provide shutdown cooling flow.

APPLICABILITY

One SDC loop must be in operation in MODE 6, with the water level ≥ 20 ft above the top of the reactor vessel flange, to provide decay heat removal. Requirements for the SDC System in other MODES are covered by LCOs in Section 3.4, Reactor Coolant System (RCS), and Section 3.5, Emergency Core Cooling Systems (ECCS). SDC loop requirements in MODE 6, with the water level < 20 ft above the top of the reactor vessel flange, are located in LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation – Low Water Level."

ACTIONS

SDC loop requirements are met by having one SDC loop OPERABLE and in operation, except as permitted in the Note to the LCO.

(continued)

BASES (continued)

ACTIONS (continued)

A.1

If SDC loop requirements are not met, there will be no forced circulation to provide mixing to establish uniform boron concentrations. ~~Reduced boron concentrations can occur through the addition of water with a lower boron concentration than that contained in the RCS. Therefore, actions that reduce boron concentration shall be suspended immediately.~~ Suspending positive reactivity additions that could result in failure to meet the minimum boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation.

A.2

If SDC loop requirements are not met, actions shall be taken immediately to suspend loading irradiated fuel assemblies in the core. With no forced circulation cooling, decay heat removal from the core occurs by natural convection to the heat sink provided by the water above the core. A minimum refueling water level of 20 ft above the reactor vessel flange provides an adequate available heat sink. Suspending any operation that would increase the decay heat load, such as loading a fuel assembly, is a prudent action under this condition.

A.3

If SDC loop requirements are not met, actions shall be initiated and continued in order to satisfy SDC loop requirements.

A.4

If SDC loop requirements are not met, all containment penetrations to the outside atmosphere must be closed to prevent fission products, if released by a loss of decay heat event, from escaping the containment building. The 4 hour or within the calculated time to boil Completion Time allows fixing most SDC problems without incurring the additional action of violating the containment atmosphere.

(continued)

BASES (continued)

ACTIONS

A.1 and A.2

When two SDC loops are operable and if one SDC loop becomes inoperable, actions shall be immediately initiated and continued until the SDC loop is restored to OPERABLE status and to operation, or until ≥ 20 ft of water level is established above the reactor vessel flange. When the water level is established at ≥ 20 ft above the reactor vessel flange, the Applicability will change to that of LCO 3.9.4, "Shutdown Cooling and Coolant Circulation — High Water Level," and only one SDC loop is required to be OPERABLE and in operation. An immediate Completion Time is necessary for an operator to initiate corrective actions.

B.1

When one loop of the SDC is operable with requirements 1-8 satisfied and the SDC loop becomes inoperable or any of the 8 requirements are not met, actions shall be immediately initiated to establish a water level > 20 feet above the reactor flange. When the water level is established at > 20 feet above the reactor vessel flange, the applicability will change to that of LCO 3.9.4, "Shutdown Cooling and Coolant Circulation-High Water Level," and only one SDC loop is required to be OPERABLE and in operation. An immediate Completion Time is necessary for an operator to initiate corrective actions.

C.1

If no SDC loop is in operation or no SDC loops are OPERABLE, there will be no forced circulation to provide mixing to establish uniform boron concentrations. ~~Reduced boron concentrations can occur by the addition of water with lower boron concentration than that contained in the RCS. Therefore, actions that reduce boron concentration shall be suspended immediately.~~ Suspending positive reactivity additions that could result in failure to meet the minimum boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation.

(continued)

BASES (continued)

ACTIONS (continued)

C.2

If no SDC loop is in operation or no SDC loops are OPERABLE, actions shall be initiated immediately and continued without interruption to restore one SDC loop to OPERABLE status and operation. Since the unit is in Conditions A and B concurrently, the restoration of two OPERABLE SDC loops and one operating SDC loop should be accomplished expeditiously.

C.3

If SDC loops requirements are not met, all containment penetrations to the outside atmosphere must be closed to prevent fission products, if released by a loss of decay heat event, from escaping the containment building. The 4 hour or within the calculated time to boil Completion Time allows fixing most SDC problems without incurring the additional action of violating the containment atmosphere.

SURVEILLANCE REQUIREMENTS

SR 3.9.5.1

This Surveillance demonstrates that one SDC loop is operating and circulating reactor coolant. The flow rate is determined by the flow rate necessary to provide sufficient decay heat removal capability and to prevent thermal and boron stratification in the core. In addition, this Surveillance demonstrates that the other SDC loop is OPERABLE.

In addition, during operation of the SDC loop with the water level in the vicinity of the reactor vessel nozzles, the SDC loop flow rate determination must also consider the SDC pump suction requirements. The Frequency of 12 hours is sufficient, considering the flow, temperature, pump control, and alarm indications available to the operator to monitor the SDC System in the control room.

Verification that the required loops are OPERABLE and in operation ensures that loops can be placed in operation as needed, to maintain decay heat and retain forced circulation. The Frequency of 12 hours is considered reasonable, since other administrative controls are available and have proven to be acceptable by operating experience.

REFERENCE

1. UFSAR, Section 7.4.

ATTACHMENT E

PROPOSED TECHNICAL SPECIFICATIONS AND BASES

SONGS UNIT 2

3.1 REACTIVITY CONTROL SYSTEMS

3.1.10 Boration Systems - Shutdown

LCO 3.1.10 One RCS boron injection flow path shall be OPERABLE.

APPLICABILITY: MODES 5 and 6.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. No boron injection flow path OPERABLE.	A.1 --------NOTE-------- Plant temperature changes are allowed provided the temperature change is accounted for in the calculated SDM. -------------------- Suspend all operations involving CORE ALTERATIONS or positive reactivity changes.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
	-----------------NOTE-------------------- Only required when the Refueling Water Storage Tank (RWST) is the source of borated water and the outside temperature is < 40°F or > 100°F. --	
SR 3.1.10.1	Verify RWST temperature is within limits.	24 hours
SR 3.1.10.2	Verify volume of available borated water is within limits.	7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. CRIS Manual Trip, Actuation Logic, or required control room airborne radiation monitors inoperable in MODE 5 or 6, or during movement of irradiated fuel assemblies.	B.1	--------NOTE-------- Place CREACUS in isolation mode if automatic transfer to isolation mode inoperable. --------------------- Place one CREACUS train in emergency mode.	Immediately
	<u>OR</u>		
	B.2.1	Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>		
	B.2.2	--------NOTE-------- Limited plant control operations are allowed provided the changes are accounted for in the calculated SDM. --------------------- Suspend positive reactivity additions.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.9.1	Perform a CHANNEL CHECK on the required control room airborne radiation monitor channel.	12 hours

(continued)

3.3 INSTRUMENTATION

3.3.13 Source Range Monitoring Channels

LCO 3.3.13 Two channels of source range monitoring instrumentation shall be OPERABLE.

APPLICABILITY: MODES 3, 4, and 5, with the reactor trip circuit breakers open or Control Element Assembly (CEA) Drive System not capable of CEA withdrawal.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more required channels inoperable.	A.1	--------NOTE--------- Limited plant control operations are allowed provided the changes are accounted for in the calculated SDM. --------------------- Suspend all operations involving positive reactivity additions.	Immediately
	<u>AND</u>		
	A.2	Perform SDM verification in accordance with SR 3.1.1.2, if T_{avg} > 200°F, or SR 3.1.2.1, if $T_{avg} \leq$ 200°F.	4 hours <u>AND</u> Once per 12 hours thereafter

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.5 RCS Loops – MODE 3

LCO 3.4.5 Two RCS loops shall be OPERABLE and one RCS loop shall be in operation.

-----------------------------NOTE-----------------------------
All reactor coolant pumps may be de-energized for ≤ 1 hour per 8 hour period, provided:

a. No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.1; and

b. Core outlet temperature is maintained at least 10°F below saturation temperature.

APPLICABILITY: MODE 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required RCS loop inoperable.	A.1 Restore required RCS loop to OPERABLE status.	72 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Be in MODE 4.	12 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. No RCS loop OPERABLE. OR No RCS loop in operation.	C.1	Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet SDM of LCO 3.1.1.	Immediately
	AND		
	C.2	Initiate action to restore one RCS loop to OPERABLE status and operation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.5.1	Verify required RCS loop is in operation.	12 hours
SR 3.4.5.2	Verify secondary side water level in each steam generator ≥ 50% (wide range).	12 hours
SR 3.4.5.3	Verify correct breaker alignment and indicated power available to the required pump that is not in operation.	7 days

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.6 RCS Loops – MODE 4

LCO 3.4.6 Two loops or trains consisting of any combination of RCS loops and shutdown cooling (SDC) trains shall be OPERABLE and at least one loop or train shall be in operation.

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

1. All reactor coolant pumps (RCPs) and SDC pumps may be de-energized for ≤ 1 hour per 8 hour period, provided:

   a. No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.1; and

   b. Core outlet temperature is maintained at least 10°F below saturation temperature.

2. No RCP shall be started with any RCS cold leg temperature ≤ 256°F unless:

   a. Pressurizer water volume is < 900 ft^3, or

   b. Secondary side water temperature in each steam generator (SG) is < 100°F above each of the RCS cold leg temperatures.

APPLICABILITY: MODE 4.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One required RCS loop inoperable. AND Two SDC trains inoperable.	A.1	Initiate action to restore a second loop or train to OPERABLE status.	Immediately
B. One required SDC train inoperable. AND Two required RCS loops inoperable.	B.1	Be in MODE 5.	24 hours
C. Required RCS loop(s) or SDC train(s) inoperable. OR No RCS loop or SDC train in operation.	C.1	Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet SDM of LCO 3.1.1.	Immediately
	AND		
	C.2	Initiate action to restore one loop or train to OPERABLE status and operation.	Immediately

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.7 RCS Loops – MODE 5, Loops Filled

LCO 3.4.7 At least one of the following loop(s)/trains listed below shall be OPERABLE and in operation:

a. Reactor Coolant Loop 1 and its associated steam generator and at least one associated Reactor Coolant Pump;

b. Reactor Coolant Loop 2 and its associated steam generator and at least one associated Reactor Coolant Pump;

c. Shutdown Cooling Train A; or

d. Shutdown Cooling Train B

One additional Reactor Coolant Loop/shutdown cooling train shall be OPERABLE, or

The secondary side water level of each steam generator shall be greater than 50% (wide range).

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

1. All reactor coolant pumps (RCPs) and pumps providing shutdown cooling may be de-energized for ≤ 1 hour per 8 hour period, provided:

   a. No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.2; and

   b. Core outlet temperature is maintained at least 10°F below saturation temperature.

2. One required SDC train may be inoperable for up to 2 hours for surveillance testing provided that the other SDC train or RCS loop is OPERABLE and in operation.

3. One required RCS loop may be inoperable for up to 2 hours for surveillance testing provided that the other RCS loop or SDC train is OPERABLE and in operation.

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. No SDC train/RCS loop in operation.	B.1	Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet SDM of LCO 3.1.2.	Immediately
	AND		
	B.2	Initiate action to restore required SDC train/RCS loop to operation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.7.1	Verify at least one RCS loop or SDC train is in operation.	12 hours
SR 3.4.7.2	Verify required SG secondary side water level is > 50% (wide range).	12 hours
SR 3.4.7.3	Verify the second required RCS loop, SDC train or steam generator secondary is OPERABLE.	7 days

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.8 RCS Loops – MODE 5, Loops Not Filled

LCO 3.4.8 Two shutdown cooling (SDC) trains shall be OPERABLE and at least one SDC train shall be in operation.

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

1. All SDC pumps may be de-energized for ≤ 15 minutes when switching from one train to another provided:

   a. The core outlet temperature is maintained > 10°F below saturation temperature;

   b. No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.2; and

   c. No draining operations to further reduce the RCS water volume are permitted.

2. The pump providing shutdown cooling may be de-energized for ≤ 1 hour per 8 hour period provided:

   a. The core outlet temperature is maintained > 10°F below saturation temperature; and

   b. No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.2.

3. One SDC train may be inoperable for ≤ 2 hours for surveillance testing provided the other SDC train is OPERABLE and in operation.

4. A containment spray pump may be used in place of a low pressure safety injection pump in either or both shutdown cooling trains to provide shutdown cooling flow provided the reactor has been sub-critical for a period > 24 hours and the RCS is fully depressurized and vented in accordance with LCO 3.4.12.1.

APPLICABILITY: MODE 5 with RCS loops not filled.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One SDC train inoperable.	A.1 Initiate action to restore SDC train to OPERABLE status.	Immediately
B. Both SDC trains inoperable. OR No SDC train in operation.	B.1 Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet SDM of LCO 3.1.2. AND B.2 Initiate action to restore one SDC train to OPERABLE status and operation.	Immediately Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.8.1	Verify at least one SDC train is in operation.	12 hours
SR 3.4.8.2	Verify correct breaker alignment and indicated power available to the required SDC pump that is not in operation.	7 days

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>	
	A.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	<u>AND</u>	
	A.2.4 Initiate action to restore required offsite power circuit to OPERABLE status.	Immediately
B. One required DG inoperable.	B.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	B.2 Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>	
	B.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	<u>AND</u>	
	B.4 Initiate action to restore required DG to OPERABLE status.	Immediately

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources – Shutdown

LCO 3.8.5 DC electrical power subsystem shall be OPERABLE to support the DC electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems – Shutdown."

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One battery or associated control equipment or cabling inoperable.	A.1 Declare affected required feature(s) inoperable.	Immediately
	<u>OR</u>	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>	
	A.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	<u>AND</u>	
		(continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.8 Inverters – Shutdown

LCO 3.8.8 Required inverters shall be OPERABLE to support the onsite Class 1E AC vital bus electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems – Shutdown."

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more required inverters inoperable.	A.1	Declare affected required feature(s) inoperable.	Immediately
	<u>OR</u>		
	A.2.1	Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>		
	A.2.2	Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>		
	A.2.3	Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	<u>AND</u>		
			(continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.10 Distribution Systems – Shutdown

LCO 3.8.10 The necessary portion of AC, DC, and AC vital bus electrical power distribution subsystems shall be OPERABLE to support equipment required to be OPERABLE.

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required AC, DC, or AC vital bus electrical power distribution subsystems inoperable.	A.1 Declare associated supported required feature(s) inoperable.	Immediately
	<u>OR</u>	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>	
	A.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	<u>AND</u>	
		(continued)

3.9 REFUELING OPERATIONS

3.9.2 Nuclear Instrumentation

LCO 3.9.2 Two source range monitors (SRMs) shall be OPERABLE.

APPLICABILITY: MODE 6.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One SRM inoperable.	A.1	Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>		
	A.2	Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet the boron concentration of LCO 3.9.1.	Immediately
B. Two SRMs inoperable.	B.1	Initiate actions to restore one SRM to OPERABLE status.	Immediately
	<u>AND</u>		
	B.2	Perform SR 3.9.1.1.	4 hours <u>AND</u> Once per 12 hours thereafter

3.9 REFUELING OPERATIONS

3.9.4 Shutdown Cooling (SDC) and Coolant Circulation – High Water Level

LCO 3.9.4 One SDC loop shall be OPERABLE and in operation.

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

With the upper guide structure removed from the reactor vessel the required SDC loop may be removed from operation for ≤ 2 hours per 8-hour period, provided:

a. The maximum RCS temperature is maintained ≤ 140°F.
b. No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than that required to meet the minimum required boron concentration of LCO 3.9.1.
c. The capability to close the containment penetrations with direct access to the outside atmosphere within the calculated time to boil is maintained.
d. The reactor cavity water level is maintained ≥ 20 feet above the top of the reactor pressure vessel flange, or, for core alterations, ≥ 23 feet above the top of the reactor pressure vessel flange.

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

A containment spray pump may be used in place of a low pressure safety injection pump in either or both shutdown cooling loops to provide shutdown cooling flow.

APPLICABILITY: MODE 6 with the water level ≥ 20 ft above the top of reactor vessel flange.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. SDC loop requirements not met.	A.1 Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet the boron concentration of LCO 3.9.1. AND	Immediately
		(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One SDC loop inoperable. (Applicable to initial conditions of two shutdown cooling loops OPERABLE)	A.1	Initiate action to restore SDC loop to OPERABLE status.	Immediately
	<u>OR</u>		
	A.2	Initiate actions to establish ≥ 20 ft of water above the top of reactor vessel flange.	Immediately
B. One SDC loop operable, less than 20 feet of water above the reactor vessel flange and any of the 8 requirements not met (Applicable to initial conditions of one shutdown cooling loop OPERABLE and operating with requirements 1-8)	B.1	Initiate actions to establish ≥ 20 feet of water.	Immediately
C. No SDC loop OPERABLE or in operation.	C.1	Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet the boron concentration of LCO 3.9.1.	Immediately
	<u>AND</u>		
			(continued)

BASES (continued)

ACTION

A.1

With no boron injection flow path to the reactor coolant System OPERABLE, all operations involving CORE ALTERATIONS or positive reactivity changes shall be suspended immediately. Required Action A.1 is modified by a note which permits plant temperature changes provided the temperature change is accounted for in the calculated SDM. Introduction of temperature changes, including temperature increases when a positive MTC exists, must be evaluated to ensure they do not result in a loss of required SDM.

A boron injection flow path is not OPERABLE if it is not capable of performing its boron injection function. In consideration of the stable reactor configuration and the initial boron concentration, a core alteration is the only possible source for a significant increase in reactivity.

SURVEILLANCE REQUIREMENTS

SR 3.1.10.1, SR 3.1.10.2, and SR 3.1.10.3

SRs 3.1.10.1, 3.1.10.2, and 3.1.10.3, ensure that the required borated water supply is available. SR 3.1.10.1 verifies that the temperature of the boric acid solution in the RWST is ≥ 40°F and ≤ 100°F. The RWST water temperature is not expected to approach 40°F or 100°F, considering local meteorology and the large heat capacity of the RWST. Furthermore, at 40°F boric acid precipitation will not occur below a concentration of 4720 ppm boron. The maximum boric acid concentration in the tanks is 2800 ppm boron. However, SR 3.1.10.1 is only applicable when the RWST is the source of borated water and the outside air temperature is not within the normally expected range of 40 to 100°F.

The solubility of boric acid at 50°F is about 3.5 wt%. There is no similar requirement to verify BAMU Tank temperature 50°F is within the normal operating range of the building.

SR 3.1.10.2 and 3.1.10.3 verify that a sufficient amount of boron is available for RCS injection from either the BAMU tanks or the RWST. This requires a minimum of 4150 gallons of boric acid solution at a concentration of 2350 PPM Boron in either the RWST (15.5%[1] level indication) or a BAMU tank. A maximum boric acid solution concentration of 6119 ppm is specified for the BAMU Tank. The water volume limits are

[1] 15.5% level with tanks T005 and T006 cross connected (Reference 4, CCN-1). 17.0% level with tanks T005 (Reference 6) and T006 (Reference 4, CCN-3) isolated.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.1.10.1, SR 3.1.10.2, and SR 3.1.10.3 (continued)

specified relative to the top of the highest suction connection to the tank and considers vortexing, internal structures and instrument errors. The 7 day Surveillance Frequency ensures that a sufficient initial water supply is available for boron injection.

SR 3.1.10.4

These SRs demonstrate that each automatic boration system pump and valve is operable and actuates as required. In response to an actual or simulated SIAS the charging pumps start, the VCT is isolated, and the charging pumps take suction from the OPERABLE BAMU tank(s) and RWST. Verification of the correct alignment for manual, power operated, and automatic valves in the Boration System Flow paths provides assurance that proper boration flow paths are available. These SRs do not apply to valves that are locked, sealed, or otherwise secured in position, because these valves were previously verified to be in the correct position.

1. A flow path from either boric acid makeup tank with a minimum boron concentration of 2350 ppm and a minimum borated water volume of 4150 gallons, via either one of the boric acid makeup pumps, the blending tee or the gravity feed connection and any charging pump to the RCS, or;

2. The flow path from the RWST with a minimum borated water level of 15.5%[1] (includes TLU and Design Basis Document margin), a minimum boron concentration of 2350 ppm, and a solution temperature ≥ 40°F and ≤ 100°F via either a charging pump or a high pressure safety injection pump to the RCS.

[1] 15.5% level with tanks T005 and T006 cross connected (Reference 4, CCN-1). 17.0% level with tanks T005 (Reference 6) and T006 (Reference 4, CCN-3) isolated.

(continued)

REFERENCES

1. 10 CFR 50, Appendix A, GDC 26.

2. 10 CFR 50, Appendix A, GDC 27.

3. 10 CFR 50, Appendix A, GDC 33.

4. J-BHB-029, "RWST Minimum Level to Maintain Safety Analysis Assumptions, Including TLU."

5. J-BGB-002, "TLU for Boric Acid Makeup Level Loops 2(3)LI0206C and 2(3)LI0208C."

6. J-BHB-021, "RWST 2(3)T005 & T006 Level Loop Uncertainties and Minimum Level Required During Modes 5 & 6."

ACTIONS (continued)

Condition B applies to the failure of CRIS Manual Trip, Actuation Logic, and required gaseous radiation monitor channels in Mode 5 or 6, or when moving irradiated assemblies. The Required Actions are immediately taken to place one OPERABLE CREACUS train in the emergency mode, or to suspend positive reactivity additions, and movement of irradiated fuel assemblies. The Completion Time recognizes the fact that the radiation signals are the only Functions available to initiate control room isolation in the event of a fuel handling accident.

Required Action B.2.2 is modified by a note to indicate that normal plant control operations that individually add limited positive reactivity (e.g., temperature or boron fluctuations associated with RCS inventory management or temperature control) are not precluded by this Action, provided they are accounted for in the calculated SDM.

SURVEILLANCE REQUIREMENTS

SR 3.3.9.1

Performance of the CHANNEL CHECK once every 12 hours ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value.

Significant deviations between the two instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

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

The Frequency, about once every shift, is based on operating experience that demonstrates the rarity of channel failure. Thus, performance of the CHANNEL CHECK guarantees that undetected overt channel failure is limited to 12 hours. Since the probability of two random failures in redundant channels in any 12 hour period is low, the CHANNEL CHECK minimizes the chance of loss of protective function due to failure of redundant channels. The CHANNEL CHECK

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.3.9.1 (continued)

supplements less formal, but more frequent, checks of channel OPERABILITY during normal operational use of the displays associated with the LCO required channels.

SR 3.3.9.2

A CHANNEL FUNCTIONAL TEST is performed on the required control room radiation monitoring channel to ensure the entire channel will perform its intended function. As found and as left setpoints are recorded.

The Frequency of 92 days is based on plant operating experience with regard to channel OPERABILITY and drift, which demonstrates that failure of more than one channel of a given Function in any 92 day interval is a rare event.

SR 3.3.9.3

Proper operation of the individual initiation relays is verified by de-energizing these relays during the CHANNEL FUNCTIONAL TEST of the Actuation Logic every 18 months. This will actuate the Function, operating all associated equipment. Proper operation of the equipment actuated by each train is thus verified.

The Frequency of 18 months is based on plant operating experience with regard to channel OPERABILITY, which demonstrates that failure of more than one channel of a given Function in any 18 month interval is a rare event.

A Note indicates this Surveillance includes verification of operation for each initiation relay.

SR 3.3.9.4

CHANNEL CALIBRATION is a complete check of the instrument channel including the sensor. The Surveillance verifies that the channel responds to a measured parameter within the necessary range and accuracy.

The Frequency of an 18 month calibration interval is based on experience with the magnitude of equipment drift in this period.

(continued)

BASES (continued)

LCO

The LCO on the source range monitoring channels ensures that adequate information is available to verify core reactivity conditions while shut down.

A minimum of two source range monitoring channels are required to be OPERABLE.

APPLICABILITY

In MODES 3, 4, and 5, with RTCBs open or the Control Element Assembly (CEA) Drive System not capable of CEA withdrawal, source range monitoring channels must be OPERABLE to monitor core power for reactivity changes. In MODES 1 and 2, and in MODES 3, 4, and 5, with the RTCBs shut and the CEAs capable of withdrawal, the Logarithmic Power Monitoring channels are addressed as part of the RPS in LCO 3.3.1, "Reactor Protective System (RPS) Instrumentation – Operating," and LCO 3.3.2, "Reactor Protective System (RPS) Instrumentation – Shutdown."

The requirements for source range neutron flux monitoring in MODE 6 are addressed in LCO 3.9.2, "Nuclear Instrumentation." The source range nuclear instrumentation channels provide neutron flux coverage extending an additional one to two decades below the logarithmic channels for use during refueling, when neutron flux may be extremely low.

ACTIONS

A channel is inoperable when it does not satisfy the OPERABILITY criteria for the channel's function. These criteria are outlined in the LCO section of the Bases.

A.1 and A.2

With one required channel inoperable, it may not be possible to perform a CHANNEL CHECK to verify that the other required channel is OPERABLE. Therefore, with one or more required channels inoperable, the source range monitoring Function cannot be reliably performed. Consequently, the Required Actions are the same for one required channel inoperable or more than one required channel inoperable. The absence of reliable neutron flux indication makes it difficult to ensure SDM is maintained. Required Action A.1 is modified

(continued)

BASES (continued)

ACTIONS

A.1 and A.2 (continued)

by a note to indicate that normal plant control operations that individually add limited positive reactivity (e.g., temperature or boron fluctuations associated with RCS inventory management or temperature control) are not precluded by this Action, provided they are accounted for in the calculated SDM.

SDM must be verified periodically to ensure that it is being maintained. Both required channels must be restored as soon as possible. The initial Completion Time of 4 hours and once every 12 hours thereafter to perform SDM verification takes into consideration that Required Action A.1 eliminates many of the means by which SDM can be reduced. These Completion Times are also based on operating experience in performing the Required Actions and the fact that plant conditions will change slowly.

SURVEILLANCE REQUIREMENTS

SR 3.3.13.1

SR 3.3.13.1 is the performance of a CHANNEL CHECK on each required channel every 12 hours. A CHANNEL CHECK is a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based upon the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying that the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria are determined by the plant staff and should be based on a combination of the channel instrument uncertainties including control isolation, indication, and readability. If a channel is outside of the match criteria, it may be an indication that the transmitter or the signal processing equipment has drifted outside of its limits. If the channels are within the match criteria, it is an indication that the channels are OPERABLE.

The Frequency, about once every shift, is based on operating experience that demonstrates the rarity of channel failure.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.3.13.1 (continued)

Thus, the performance of CHANNEL CHECK ensures that undetected overt channel failure is limited to 12 hours.

Since the probability of two random failures in redundant channels in any 12 hour period is extremely low, CHANNEL CHECK minimizes the chance of loss of protective function due to failure of redundant channels. CHANNEL CHECK supplements less formal, but more frequent, checks of channel OPERABILITY during normal operational use of displays associated with the LCO required channels.

SR 3.3.13.2

A CHANNEL FUNCTIONAL TEST is performed every 92 days to ensure that the entire channel is capable of properly indicating neutron flux. Internal test circuitry is used to feed test signals into the signal processor to verify channel alignment. It is not necessary to test the detector, because generating a meaningful test signal is difficult; the detectors are of simple construction, and any failures in the detectors will be apparent as change in channel output. This Frequency is the same as that employed for the same channels in the other applicable MODES.

SR 3.3.13.3

SR 3.3.13.3 is the performance of a CHANNEL CALIBRATION. A CHANNEL CALIBRATION is performed every 24 months. The Surveillance is a complete check and readjustment of the source range channel from the preamplifier input through to the remote indicators. The Surveillance verifies that the channel responds to a measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drift between successive calibrations to ensure that the channel remains operational. Measurement error determination, setpoint error determination, and calibration adjustment must be performed consistent with the plant specific setpoint analysis. The channel shall be left calibrated consistent with the assumptions of the current plant specific setpoint analysis.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.3.13.3 (continued)

This SR is modified by a Note to indicate that it is not necessary to test the detector, because generating a meaningful test signal is difficult; the detectors are of simple construction, and any failures in the detectors will be apparent as change in channel output. This test interval is the same as that employed for the same channels in the other applicable MODES.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 13.
2. SONGS Units 2 and 3 UFSAR, Chapter 7 and Chapter 15.

BASES (continued)

LCO (continued)

of requiring both SGs to be capable (> 50% wide range water level) of transferring heat from the reactor coolant at a controlled rate. Forced reactor coolant flow is the required way to transport heat, although natural circulation flow provides adequate removal. A minimum of one running RCP meets the LCO requirement for one loop in operation.

The Note permits a limited period of operation without RCPs. All RCPs may be de-energized for ≤ 1 hour per 8 hour period. This means that natural circulation has been established. When in natural circulation, a reduction in boron concentration with coolant at boron concentrations less than required to assure the SDM of LCO 3.1.1 is maintained is prohibited because an even concentration distribution throughout the RCS cannot be ensured. Core outlet temperature is to be maintained at least 10°F below the saturation temperature so that no vapor bubble may form and possibly cause a natural circulation flow obstruction.

In MODES 3, 4, and 5, it is sometimes necessary to stop all RCPs or shutdown cooling (SDC) pump forced circulation (e.g., to change operation from one SDC train to the other, to perform surveillance or startup testing, to perform the transition to and from SDC System cooling, or to avoid operation below the RCP minimum net positive suction head limit). The time period is acceptable because natural circulation is adequate for heat removal, or the reactor coolant temperature can be maintained subcooled and boron stratification affecting reactivity control is not expected.

An OPERABLE loop consists of at least one RCP providing forced flow for heat transport and an SG that is OPERABLE in accordance with the Steam Generator Tube Surveillance Program. An RCP is OPERABLE if it is capable of being powered and is able to provide forced flow if required.

APPLICABILITY

In MODE 3, the heat load is lower than at power; therefore, one RCS loop in operation is adequate for transport and heat removal. A second RCS loop is required to be OPERABLE but not in operation for redundant heat removal capability.

Operation in other MODES is covered by:

LCO 3.4.4, "RCS Loops – MODES 1 and 2";
LCO 3.4.6, "RCS Loops – MODE 4";

(continued)

BASES (continued)

APPLICABILITY (continued)

LCO 3.4.7, "RCS Loops – MODE 5, Loops Filled";
LCO 3.4.8, "RCS Loops – MODE 5, Loops Not Filled";
LCO 3.9.4, "Shutdown Cooling (SDC) and Coolant Circulation – High Water Level" (MODE 6); and
LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation – Low Water Level" (MODE 6).

ACTIONS

A.1

If one required RCS loop is inoperable, redundancy for forced flow heat removal is lost. The Required Action is restoration of the required RCS loop to OPERABLE status within a Completion Time of 72 hours. This time allowance is a justified period to be without the redundant, nonoperating loop because a single loop in operation has a heat transfer capability greater than that needed to remove the decay heat produced in the reactor core.

B.1

If restoration is not possible within 72 hours, the unit must be placed in MODE 4 within 12 hours. In MODE 4, the plant may be placed on the SDC System. The Completion Time of 12 hours is compatible with required operation to achieve cooldown and depressurization from the existing plant conditions in an orderly manner and without challenging plant systems.

C.1 and C.2

If no RCS loop is in operation, except as provided in Note 1 in the LCO section, all operations involving introduction of coolant into the RCS with boron concentration less than required to meet the minimum SDM of LCO 3.1.1 must be immediately suspended. Action to restore one RCS loop to OPERABLE status and operation shall be initiated immediately and continued until one RCS loop is restored to OPERABLE status and operation. Suspending the introduction into the RCS of coolant with boron concentration less than required to meet the minimum SDM of LCO 3.1.1 is required to assure continued safe operation. With coolant added without forced circulation, unmixed coolant could be

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

C.1 and C.2 (continued)

introduced to the core, however coolant added with boron concentration meeting the minimum SDM maintains acceptable margin to subcritical operations. The immediate Completion Times reflect the importance of maintaining operation for decay heat removal.

SR 3.4.5.1

This SR requires verification every 12 hours that the required number of RCS loops are in operation. Verification includes flow rate, temperature, or pump status monitoring, which help ensure that forced flow is providing heat removal. The 12 hour interval has been shown by operating practice to be sufficient to regularly assess degradation and verify operation within safety analyses assumptions. In addition, control room indication and alarms will normally indicate loop status.

SR 3.4.5.2

This SR requires verification every 12 hours that the secondary side water level in each SG is ≥ 50% wide range. An adequate SG water level is required in order to have a heat sink for removal of the core decay heat from the reactor coolant. The 12 hour interval has been shown by operating practice to be sufficient to regularly assess degradation and verify operation within the safety analyses assumptions.

SR 3.4.5.3

Verification that the required number of RCPs are OPERABLE ensures that the single failure criterion is met and that an additional RCS loop can be placed in operation, if needed, to maintain decay heat removal and reactor coolant circulation. Verification is performed by verifying proper breaker alignment and power availability to the required RCPs. The Frequency of 7 days is considered reasonable in view of other administrative controls available and has been shown to be acceptable by operating experience.

REFERENCES

1. UFSAR, Section 15.3.

BASES (continued)

LCO (continued)

prohibits boron dilution with coolant at boron concentrations less than required to assure the SDM of LCO 3.1.1 is maintained when forced flow is stopped because an even concentration distribution cannot be ensured. Core outlet temperature is to be maintained at least 10°F below saturation temperature so that no vapor bubble may form and possibly cause a natural circulation flow obstruction. The response of the RCS without the RCPs or SDC pumps depends on the core decay heat load and the length of time that the pumps are stopped. As decay heat diminishes, the effects on RCS temperature and pressure diminish. Without cooling by forced flow, higher heat loads will cause the reactor coolant temperature and pressure to increase at a rate proportional to the decay heat load. Because pressure can increase, the applicable system pressure limits (pressure and temperature (P/T) limits or low temperature overpressure protection (LTOP) limits) must be observed and forced SDC flow or heat removal via the SGs must be re-established prior to reaching the pressure limit. The circumstances for stopping both RCPs or SDC pumps are to be limited to situations where:

a. Pressure and temperature increases can be maintained well within the allowable pressure (P/T limits and LTOP) and 10°F subcooling limits; or

b. An alternate heat removal path through the SGs is in operation.

Note 2 requires that either of the following two conditions be satisfied before an RCP may be started with any RCS cold leg temperature ≤ 256°F.

a. Pressurizer water volume is < 900 ft^3; or

b. Secondary side water temperature in each SG is < 100°F above each of the RCS cold leg temperatures.

Satisfying the above condition will preclude a large pressure surge in the RCS when the RCP is started.

An OPERABLE RCS loop consists of at least one OPERABLE RCP and an SG that is OPERABLE in accordance with the Steam Generator Tube Surveillance Program and has the minimum water level specified in SR 3.4.6.2.

(continued)

BASES (continued)

ACTIONS

B.1 (continued)

reasonable, based on operating experience, to reach MODE 5 from MODE 4, with only one SDC train operating, in an orderly manner and without challenging plant systems.

C.1 and C.2

If no RCS loops or SDC trains are OPERABLE or in operation, except during conditions permitted by Note 1 in the LCO section, all operations involving introduction of coolant into the RCS with boron concentration less than required to meet the minimum SDM of LCO 3.1.1 must be suspended and action to restore one RCS loop or SDC train to OPERABLE status and operation must be initiated. The required margin to criticality must not be reduced in this type of operation. Suspending the introduction into the RCS of coolant with boron concentration less than required to meet the minimum SDM of LCO 3.1.1 is required to assure continued safe operation. With coolant added without forced circulation, unmixed coolant could be introduced to the core, however coolant added with boron concentration meeting the minimum SDM maintains acceptable margin to subcritical operations. The immediate Completion Times reflect the importance of decay heat removal. The action to restore must continue until one loop or train is restored to operation.

SURVEILLANCE REQUIREMENTS

SR 3.4.6.1

This SR requires verification every 12 hours that one required loop or train is in operation. This ensures forced flow is providing heat removal. Verification includes flow rate, temperature, or pump status monitoring. The 12 hour Frequency has been shown by operating practice to be sufficient to regularly assess RCS loop status. In addition, control room indication and alarms will normally indicate loop status.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.4.6.2

This SR requires verification every 12 hours of secondary side water level in the required SG(s) ≥ 50% (wide range). An adequate SG water level is required in order to have a heat sink for removal of the core decay heat from the reactor coolant. The 12 hour interval has been shown by operating practice to be sufficient to regularly assess degradation and verify operation within safety analyses assumptions.

SR 3.4.6.3

Verification that the required pump is OPERABLE ensures that an additional RCS loop or SDC train can be placed in operation, if needed to maintain decay heat removal and reactor coolant circulation. Verification is performed by verifying proper breaker alignment and power available to the required pumps. The Frequency of 7 days is considered reasonable in view of other administrative controls available and has been shown to be acceptable by operating experience.

REFERENCES

1. UFSAR, Section 15.4.1.4.

BASES (continued)

LCO

The purpose of this LCO is to require at least one of the SDC trains or RCS loops be OPERABLE and in operation with an additional SDC train or RCS loop OPERABLE or secondary side water level of each SG shall be ≥ 50% wide range. One SDC train or RCS loop provides sufficient forced circulation to perform the safety functions of the reactor coolant under these conditions. The second SDC or RCS loop train is normally maintained OPERABLE as a backup to the operating train/loop to provide redundant paths for decay heat removal. However, if the standby SDC train/RCS loop is not OPERABLE, a sufficient alternate method to provide redundant paths for decay heat removal is two SGs with their secondary side water levels ≥ 50% wide range. Should the operating SDC train/RCS loop fail, the SGs could be used to remove the decay heat.

Note 1 permits all RCPs and SDC pumps to be de-energized ≤ 1 hour per 8 hour period. The circumstances for stopping both SDC trains/RCS loops are to be limited to situations where pressure and temperature increases can be maintained well within the allowable pressure (pressure and temperature and low temperature overpressure protection) and 10°F subcooling limits, or an alternate heat removal path through the SG(s) is in operation.

This LCO is modified by a Note that prohibits boron dilution with coolant at boron concentrations less than required to assure the SDM of LCO 3.1.2 is maintained when forced flow is stopped because an even concentration distribution cannot be ensured. Core outlet temperature is to be maintained at least 10°F below saturation temperature, so that no vapor bubble would form and possibly cause a natural circulation flow obstruction. In this MODE, the SG(s) can be used as the backup for heat removal. To ensure their availability, the RCS loop flow path is to be maintained with subcooled liquid.

In MODE 5, it is sometimes necessary to stop all RCP or SDC forced circulation. This is permitted to change operation from one SDC train or RCS loop to the other, perform surveillance or startup testing, perform the transition to and from the SDC, or to avoid operation below the RCP minimum net positive suction head limit. The time period is acceptable because natural circulation is acceptable for decay heat removal, the reactor coolant temperature can be

(continued)

BASES (continued)

LCO (continued)

maintained subcooled, and boron stratification affecting reactivity control is not expected.

Note 2 allows one SDC train to be inoperable for a period of up to 2 hours provided that the other SDC train is OPERABLE and in operation. This permits periodic surveillance tests to be performed on the inoperable train during the only time when such testing is safe and possible.

Note 3 allows one RCS loop to be inoperable for a period of up to 2 hours provided that the other RCS loop is OPERABLE and in operation. This permits periodic surveillance tests to be performed on the inoperable loop during the only time when such testing is safe and possible.

Note 4 requires that either of the following two conditions be satisfied before an RCP may be started:

a. Pressurizer water volume must be < 900 ft^3; or

b. Secondary side water temperature in each SG must be < 100°F above each of the RCS cold leg temperatures.

Satisfying either of the above conditions will preclude a low temperature overpressure event due to a thermal transient when the RCP is started.

Note 5 specifies that a containment spray (CS) pump may be used in place of a low pressure safety injection (LPSI) pump in either or both shutdown cooling trains to provide shutdown cooling (SDC) flow based on the calculated heat load of the core 24 hours after the reactor is sub-critical with the reactor coolant system (RCS) fully depressurized and vented in accordance with TS 3.4.12.

Note 6 provides for an orderly transition from MODE 5 to MODE 4 during a planned heatup by permitting removal of SDC trains from operation when at least one RCP is in operation.

An OPERABLE SDC train is composed of an OPERABLE SDC pump and an OPERABLE SDC heat exchanger.

SDC pumps are OPERABLE if they are capable of being powered and are able to provide flow if required. An OPERABLE RCS loop consists of at least one OPERABLE RCP and an OPERABLE SG. An OPERABLE SG can perform as a heat sink when it has

(continued)

BASES (continued)

LCO (continued)

an adequate water level and is OPERABLE in accordance with the SG Tube Surveillance Program.

An OPERABLE RCS loop consists of at least one RCP providing forced flow for heat transport and an SG that is OPERABLE in accordance with the Steam Generator Tube Surveillance Program. An RCP is OPERABLE if it is capable of being powered and is able to provide forced flow if required.

APPLICABILITY

In MODE 5 with RCS loops filled, this LCO requires forced circulation to remove decay heat from the core and to provide proper boron mixing. One SDC train/RCS loop provides sufficient circulation for these purposes.

Operation in other MODES is covered by:

LCO 3.4.4, "RCS Loops – MODES 1 and 2";
LCO 3.4.5, "RCS Loops – MODE 3";
LCO 3.4.6, "RCS Loops – MODE 4";
LCO 3.4.8, "RCS Loops – MODE 5, Loops Not Filled";
LCO 3.9.4, "Shutdown Cooling (SDC) and Coolant Circulation – High Water Level" (MODE 6); and
LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation – Low Water Level" (MODE 6).

ACTIONS

A.1 and A.2

If the required SDC train/RCS loop is inoperable and any SGs have secondary side water levels < 50% wide range, redundancy for heat removal is lost. Action must be initiated immediately to restore a second SDC train/RCS loop to OPERABLE status or to restore the water level in the required SGs. Either Required Action A.1 or Required Action A.2 will restore redundant decay heat removal paths. The immediate Completion Times reflect the importance of maintaining the availability of two paths for decay heat removal.

B.1 and B.2

If no SDC train/RCS loop is in operation, except as permitted in Note 1, all operations involving introduction of coolant into the RCS with boron concentration less than required to meet the minimum SDM of LCO 3.1.2 must be

(continued)

BASES (continued)

ACTIONS

B.1 and B.2 (continued)

suspended. Action to restore one SDC train/RCS loop to operation must be initiated. The required margin to criticality must not be reduced in this type of operation. Suspending the introduction into the RCS of coolant with boron concentration less than required to meet the minimum SDM of LCO 3.1.2 is required to assure continued safe operation. With coolant added without forced circulation, unmixed coolant could be introduced to the core, however coolant added with boron concentration meeting the minimum SDM maintains acceptable margin to subcritical operations. The immediate Completion Times reflect the importance of maintaining operation for decay heat removal.

SURVEILLANCE REQUIREMENTS

SR 3.4.7.1

This SR requires verification every 12 hours that at least one SDC train/RCS loop is in operation. Verification includes flow rate, temperature, or pump status monitoring, which help ensure that forced flow is providing decay heat removal. The 12 hour Frequency has been shown by operating practice to be sufficient to regularly assess degradation and verify operation is within safety analyses assumptions. In addition, control room indication and alarms will normally indicate loop status.

The SDC/RCS flow is established to ensure that core outlet temperature is maintained sufficiently below saturation to allow time for swap over to the standby SDC train/RCS loop should the operating train be lost.

SR 3.4.7.2

Verifying the SGs are OPERABLE by ensuring their secondary side water levels are ≥ 50% wide range ensures that redundant heat removal paths are available if the second SDC train/RCS loop is inoperable. The Surveillance is required to be performed when the LCO requirement is being met by use of the SGs. If both SDC trains are OPERABLE and one SDC train is in operation, this SR is not needed. The 12 hour Frequency has been shown by operating practice to be sufficient to regularly assess degradation and verify operation within safety analyses assumptions.

(continued)

BASES (continued)

LCO

The purpose of this LCO is to require a minimum of two SDC trains be OPERABLE and at least one of these trains be in operation. An OPERABLE train is one that is capable of transferring heat from the reactor coolant at a controlled rate. Heat cannot be removed via the SDC System unless forced flow is used. A minimum of one running SDC pump meets the LCO requirement for one train in operation. An additional SDC train is required to be OPERABLE to meet the single failure criterion.

Note 1 permits the SDC pumps to be de-energized for ≤ 15 minutes when switching from one train to another. The circumstances for stopping both SDC pumps are to be limited to situations when the outage time is short and the core outlet temperature is maintained > 10°F below saturation temperature. The Note prohibits boron dilution with coolant at boron concentrations less than required to assure the SDM of LCO 3.1.2 is maintained or draining operations when SDC forced flow is stopped.

Note 2 specifies the pump providing shutdown cooling may be de-energized for up to 1 hour per 8 hour period provided 1) no operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.2, and 2) core outlet temperature is maintained at least 10°F below saturation temperature.

Note 3 allows one SDC train to be inoperable for a period of 2 hours provided that the other train is OPERABLE and in operation. This permits periodic surveillance tests to be performed on the inoperable train during the only time when these tests are safe and possible.

Note 4 specifies that a containment spray pump may be used in place of a low pressure safety injection pump in either or both shutdown cooling trains to provide shutdown cooling flow provided the reactor has been sub-critical for a period greater than 24 hours and the reactor coolant system is fully depressurized and vented in accordance with TS 3.4.12.1.

(continued)

BASES (continued)

LCO (continued)

An OPERABLE SDC train is composed of an OPERABLE SDC pump capable of providing forced flow to an OPERABLE SDC heat exchanger, along with the appropriate flow and temperature instrumentation for control, protection, and indication. SDC pumps are OPERABLE if they are capable of being powered and are able to provide flow if required.

APPLICABILITY

In MODE 5 with loops not filled, this LCO requires core heat removal and coolant circulation by the SDC System.

Operation in other MODES is covered by:

LCO 3.4.4, "RCS Loops – MODES 1 and 2";
LCO 3.4.5, "RCS Loops – MODE 3";
LCO 3.4.6, "RCS Loops – MODE 4";
LCO 3.4.7, "RCS Loops – MODE 5, Loops Filled";
LCO 3.9.4, "Shutdown Cooling (SDC) and Coolant Circulation – High Water Level" (MODE 6); and
LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation – Low Water Level" (MODE 6).

ACTIONS

A.1

If the required SDC train is inoperable, redundancy for heat removal is lost. Action must be initiated immediately to restore a second train to OPERABLE status. The Completion Time reflects the importance of maintaining the availability of two paths for heat removal.

B.1 and B.2

If no SDC train is OPERABLE or in operation, except as provided in Note 1 or in Note 2, all operations involving introduction of coolant into the RCS with boron concentration less than required to meet the minimum SDM of LCO 3.1.2 must be suspended. Action to restore one SDC train to OPERABLE status and operation must be initiated immediately. The required margin to criticality must not be reduced in this type of operation. Suspending the introduction into the RCS of coolant with boron concentration less than required to meet the minimum SDM of LCO 3.1.2 is required to assure continued safe

(continued)

BASES (continued)

ACTIONS

B.1 and B.2 (continued)

operation. With coolant added without forced circulation, unmixed coolant could be introduced to the core, however coolant added with boron concentration meeting the minimum SDM maintains acceptable margin to subcritical operations. The immediate Completion Time reflects the importance of maintaining operation for decay heat removal.

SURVEILLANCE REQUIREMENTS

SR 3.4.8.1

This SR requires verification every 12 hours that at least one SDC train is in operation. Verification includes flow rate, temperature, or pump status monitoring, which help ensure that forced flow is providing decay heat removal. The 12 hour Frequency has been shown by operating practice to be sufficient to regularly assess degradation and verify operation is within safety analyses assumptions.

SR 3.4.8.2

Verification that the required number of trains are OPERABLE ensures that redundant paths for heat removal are available and that additional trains can be placed in operation, if needed, to maintain decay heat removal and reactor coolant circulation. Verification is performed by verifying proper breaker alignment and indicated power available to the required pumps. The Frequency of 7 days is considered reasonable in view of other administrative controls available and has been shown to be acceptable by operating experience.

REFERENCES

1. UFSAR, Section 5.4.7.

BASES (continued)

ACTIONS (continued)

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

With the offsite circuit not available to the required train (Condition A), the option exists to declare all required features inoperable. Since this option may involve undesired administrative efforts, the allowance for sufficiently conservative actions is made. With the required DG inoperable (Condition B), the minimum required diversity of AC power sources is not available. It is, therefore, required to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions that could result in loss of required SDM (Mode 5) or boron concentration (Mode 6). Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM.

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

Notwithstanding performance of the conservative Required Actions, the unit is still without sufficient AC power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required AC power sources and continue until the LCO requirements are restored.

(continued)

BASES (continued)

ACTIONS

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

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

Pursuant to LCO 3.0.6, the Distribution System's (LCO 3.8.10) ACTIONS are not entered even if all AC sources to it are inoperable, resulting in de-energization. Therefore, the Required Actions of Condition A are modified by a Note to indicate that when Condition A is entered with no AC power to one ESF bus, the ACTIONS for LCO 3.8.10 must be immediately entered. This Note allows Condition A to provide requirements for the loss of the offsite circuit, whether or not a train is de-energized. LCO 3.8.10 provides the appropriate restrictions for the situation involving a de-energized train.

SURVEILLANCE REQUIREMENTS

SR 3.8.2.1

SR 3.8.2.1 requires the SRs from LCO 3.8.1 that are necessary for ensuring the OPERABILITY of the AC sources in other than MODES 1, 2, 3, and 4. SR 3.8.1.17 is not required to be met because the required OPERABLE DG is not required to undergo periods of being synchronized to the offsite circuit. SR 3.8.1.20 is excepted because starting independence is not required with DG(s) that are not required to be OPERABLE.

This SR is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE DG from being paralleled with the offsite power network or otherwise rendered inoperable. With limited AC Sources available, a single event could unnecessarily compromise both the required circuit and the DG. The SRs listed in the Note are not required to be performed for the OPERABLE AC sources during Modes 5 and 6, and during movement of irradiated fuel assemblies. However, these AC sources are presumed to be able to meet these surveillances. If it is discovered (through analysis or unplanned events, for example) that the required AC sources could not meet these surveillances, then the equipment must be considered inoperable. Refer to the corresponding Bases for LCO 3.8.1 for a discussion of each SR.

(continued)

REFERENCES	1.	UFSAR, Chapter 15.

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, and A.2.4 (continued)

positive reactivity additions that could result in loss of required SDM (Mode 5) or boron concentration (Mode 6)). Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM.

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize probability of the occurrence of postulated events.

Notwithstanding performance of the above conservative Required Actions, the unit is still without sufficient DC power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required DC power sources and continue until the LCO requirements are restored.

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

B.1

Condition B represents one train with a loss of ability to completely respond to an event, and a potential loss of ability to remain energized during normal operation. Since eventual failure of the battery to maintain the required

(continued)

BASES

ACTIONS

B.1 (continued)

battery cell parameters is highly probable, it is imperative that the operator's attention focus on minimizing the potential for complete loss of DC power to the affected train. The additional time provided by the Completion Time is consistent with the battery's capability to maintain its short term capability to respond to a design basis event.

C.1

If the battery cell parameters cannot be maintained within Category A limits, the short term capability of the battery is also degraded and the battery must be declared inoperable.

SURVEILLANCE REQUIREMENTS

SR 3.8.5.1

SR 3.8.5.1 states that Surveillances required by SR 3.8.4.1 through SR 3.8.4.8 are applicable in these MODES. See the corresponding Bases for LCO 3.8.4 for a discussion of each SR.

This SR is modified by a Note which indicates that SR 3.8.4.6 (battery charger capacity), SR 3.8.4.7 (battery service test), and SR 3.8.4.8 (battery performance test), if expired, are not required to be performed for the OPERABLE DC subsystems in Modes 5 and 6, and during movement of irradiated fuel assemblies. However, the DC subsystems are presumed to be able to meet these surveillances. If it is discovered (through analysis or unplanned events, for example) that the charger and/or battery could not meet these surveillances, then the equipment must be considered inoperable.

REFERENCES

1. UFSAR, Chapter 6.

2. UFSAR, Chapter 15.

BASES (continued)

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, and A.2.4 (continued)

reactivity additions that could result in loss of required SDM (Mode 5) or boron concentration (Mode 6). Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM. By the allowance of the option to declare required features inoperable with the associated inverter(s) inoperable, appropriate restrictions will be implemented in accordance with the affected required features LCOs' Required ACTIONS. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions).

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

Notwithstanding performance of the above conservative Required Actions, the unit is still without sufficient AC vital power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required AC vital power source and continue until the LCO requirements are restored.

(continued)

BASES (continued)

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, and A.2.4 (continued)

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required inverters should be completed as quickly as possible in order to minimize the time the unit safety systems may be without power or powered from a constant voltage source transformer.

SURVEILLANCE REQUIREMENTS

SR 3.8.8.1

This Surveillance verifies that the inverters are functioning properly with all required circuit breakers closed and AC vital buses energized from the inverter. The verification of proper voltage output ensures that the required power is readily available for the instrumentation connected to the AC vital buses. The 7 day Frequency takes into account the redundant capability of the inverters and other indications available in the control room that alert the operator to inverter malfunctions.

REFERENCES

1. UFSAR, Chapter 6.
2. UFSAR, Chapter 15.

BASES (continued)

ACTIONS

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

Although redundant required features may require redundant trains of electrical power distribution subsystems to be OPERABLE, one OPERABLE distribution subsystem train may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS and fuel movement. By allowing the option to declare required features associated with an inoperable distribution subsystem inoperable, appropriate restrictions are implemented in accordance with the affected distribution subsystems LCO's Required Actions. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions that could result in loss of required SDM (Mode 5) or boron concentration (Mode 6)). Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM.

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

Notwithstanding performance of the above conservative Required Actions, a required shutdown cooling (SDC) subsystem may be inoperable. In this case, these Required Actions of Condition A do not adequately address the concerns relating to coolant circulation and heat removal. Pursuant to LCO 3.0.6, the SDC ACTIONS would not be entered.

(continued)

BASES (continued)

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, A.2.4, and A.2.5 (continued)

Therefore, the Required Actions of Condition A direct declaring SDC inoperable, which results in taking the appropriate SDC actions.

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

SURVEILLANCE REQUIREMENTS

SR 3.8.10.1

This Surveillance verifies that the AC, DC, and AC vital bus electrical power distribution system is functioning properly, with all the buses energized. The verification of proper voltage availability on the buses ensures that the required power is readily available for motive as well as control functions for critical system loads connected to these buses. The 7 day Frequency takes into account the redundant capability of the electrical power distribution subsystems, and other indications available in the control room that alert the operator to subsystem malfunctions.

REFERENCES

1. UFSAR, Chapter 6.

2. UFSAR, Chapter 15.

BASES (continued)

LCO (continued)	COLR ensures a core k_{eff} of ≤ 0.95 is maintained during fuel handling operations. Violation of the LCO could lead to an inadvertent criticality during MODE 6.
APPLICABILITY	This LCO is applicable in MODE 6 to ensure that the fuel in the reactor vessel will remain subcritical. The required boron concentration ensures a $k_{eff} \leq 0.95$. Above MODE 6, LCO 3.1.1, "SHUTDOWN MARGIN (SDM) – $T_{avg} > 200°F$," and LCO 3.1.2, "SHUTDOWN MARGIN – $T_{avg} \leq 200°F$," ensure that an adequate amount of negative reactivity is available to shut down the reactor and to maintain it subcritical.

ACTIONS

A.1 and A.2

Continuation of CORE ALTERATIONS or positive reactivity additions (including actions to reduce boron concentration) is contingent upon maintaining the unit in compliance with the LCO. If the boron concentration of any coolant volume in the RCS, or the refueling canal is less than its limit, all operations involving CORE ALTERATIONS or positive reactivity additions must be suspended immediately. Operations that individually add limited positive reactivity (e.g., temperature fluctuations from inventory addition or temperature control fluctuations), but when combined with all other operations affecting core reactivity (e.g., intentional boration) result in overall net negative reactivity addition, are not precluded by this action.

Suspension of CORE ALTERATIONS and positive reactivity additions shall not preclude moving a component to a safe position.

A.3

In addition to immediately suspending CORE ALTERATIONS and positive reactivity additions, boration to restore the concentration must be initiated immediately.

In determining the required combination of boration flow rate and concentration, there is no unique design basis event that must be satisfied. The only requirement is to restore the boron concentration to its required value as

(continued)

BASES (continued)

APPLICABILITY

In MODE 6, the SRMs must be OPERABLE to determine changes in core reactivity. There is no other direct means available to check core reactivity levels.

In MODES 3, 4, and 5, the installed source range detectors and circuitry are required to be OPERABLE by LCO 3.3.13, "Source Range Monitors."

ACTIONS

A.1 and A.2

With only one SRM OPERABLE, redundancy has been lost. Since these instruments are the only direct means of monitoring core reactivity conditions, CORE ALTERATIONS and introduction of coolant into the RCS with boron concentration less than required to meet the minimum boron concentration of LCO 3.9.1 must be suspended immediately. Suspending positive reactivity additions that could result in failure to meet the minimum boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Performance of Required Action A.1 shall not preclude completion of movement of a component to a safe position.

Temperature fluctuations associated with maintaining the plant status are permissible provided they remain within limits established for the plant conditions.

B.1

With no SRM OPERABLE, actions to restore a monitor to OPERABLE status shall be initiated immediately. Once initiated, actions shall be continued until an SRM is restored to OPERABLE status.

B.2

With no SRM OPERABLE, there is no direct means of detecting changes in core reactivity. However, since CORE ALTERATIONS and positive reactivity additions are not to be made, the core reactivity condition is stabilized until the SRMs are OPERABLE. This stabilized condition is determined by performing SR 3.9.1.1 to verify that the required boron concentration exists.

(continued)

BASES (continued)

LCO (continued)

The flow path starts in one of the RCS hot legs and is returned to the RCS cold legs.

The LCO is modified by two Notes. With the upper guide structure removed from the reactor vessel Note 1 allows the required operating SDC loop to be removed from service for up to 2 hours in each 8 hour period, provided that:

a. The maximum RCS temperature is maintained ≤ 140°F.
b. No operations are permitted that would dilute the RCS boron concentration to less than that required to meet the minimum required boron concentration of LCO 3.9.1.
c. The capability to close the containment penetrations with direct access to the outside temperature within the calculated time to boil is maintained.
d. The reactor cavity water level is maintained ≥ 20 feet above the top of the reactor pressure vessel flange, or, for core alterations, ≥ 23 feet above the top of the reactor pressure vessel flange.

This permits operations such as core mapping or alterations in the vicinity of the reactor vessel hot leg nozzles, RCS to SDC isolation valve testing, and inservice testing of LPSI system components. During this 2 hour period, decay heat is removed by natural convection to the large mass of water in the refueling canal.

Note 2 allows Operations to use a containment spray pump in place of a low pressure safety injection pump to provide shutdown cooling flow.

APPLICABILITY

One SDC loop must be in operation in MODE 6, with the water level ≥ 20 ft above the top of the reactor vessel flange, to provide decay heat removal. Requirements for the SDC System in other MODES are covered by LCOs in Section 3.4, Reactor Coolant System (RCS), and Section 3.5, Emergency Core Cooling Systems (ECCS). SDC loop requirements in MODE 6, with the water level < 20 ft above the top of the reactor vessel flange, are located in LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation – Low Water Level."

ACTIONS

SDC loop requirements are met by having one SDC loop OPERABLE and in operation, except as permitted in the Note to the LCO.

(continued)

BASES (continued)

ACTIONS (continued)

A.1

If SDC loop requirements are not met, there will be no forced circulation to provide mixing to establish uniform boron concentrations. Suspending positive reactivity additions that could result in failure to meet the minimum boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation.

A.2

If SDC loop requirements are not met, actions shall be taken immediately to suspend loading irradiated fuel assemblies in the core. With no forced circulation cooling, decay heat removal from the core occurs by natural convection to the heat sink provided by the water above the core. A minimum refueling water level of 20 ft above the reactor vessel flange provides an adequate available heat sink. Suspending any operation that would increase the decay heat load, such as loading a fuel assembly, is a prudent action under this condition.

A.3

If SDC loop requirements are not met, actions shall be initiated and continued in order to satisfy SDC loop requirements.

A.4

If SDC loop requirements are not met, all containment penetrations to the outside atmosphere must be closed to prevent fission products, if released by a loss of decay heat event, from escaping the containment building. The 4 hour or within the calculated time to boil Completion Time allows fixing most SDC problems without incurring the additional action of violating the containment atmosphere.

(continued)

BASES (continued)

ACTIONS

A.1 and A.2

When two SDC loops are operable and if one SDC loop becomes inoperable, actions shall be immediately initiated and continued until the SDC loop is restored to OPERABLE status and to operation, or until ≥ 20 ft of water level is established above the reactor vessel flange. When the water level is established at ≥ 20 ft above the reactor vessel flange, the Applicability will change to that of LCO 3.9.4, "Shutdown Cooling and Coolant Circulation—High Water Level," and only one SDC loop is required to be OPERABLE and in operation. An immediate Completion Time is necessary for an operator to initiate corrective actions.

B.1

When one loop of the SDC is operable with requirements 1-8 satisfied and the SDC loop becomes inoperable or any of the 8 requirements are not met, actions shall be immediately initiated to establish a water level > 20 feet above the reactor flange. When the water level is established at > 20 feet above the reactor vessel flange, the applicability will change to that of LCO 3.9.4, "Shutdown Cooling and Coolant Circulation-High Water Level," and only one SDC loop is required to be OPERABLE and in operation. An immediate Completion Time is necessary for an operator to initiate corrective actions.

C.1

If no SDC loop is in operation or no SDC loops are OPERABLE, there will be no forced circulation to provide mixing to establish uniform boron concentrations. Suspending positive reactivity additions that could result in failure to meet the minimum boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation.

(continued)

BASES (continued)

ACTIONS (continued)

C.2

If no SDC loop is in operation or no SDC loops are OPERABLE, actions shall be initiated immediately and continued without interruption to restore one SDC loop to OPERABLE status and operation. Since the unit is in Conditions A and B concurrently, the restoration of two OPERABLE SDC loops and one operating SDC loop should be accomplished expeditiously.

C.3

If SDC loops requirements are not met, all containment penetrations to the outside atmosphere must be closed to prevent fission products, if released by a loss of decay heat event, from escaping the containment building. The 4 hour or within the calculated time to boil Completion Time allows fixing most SDC problems without incurring the additional action of violating the containment atmosphere.

SURVEILLANCE REQUIREMENTS

SR 3.9.5.1

This Surveillance demonstrates that one SDC loop is operating and circulating reactor coolant. The flow rate is determined by the flow rate necessary to provide sufficient decay heat removal capability and to prevent thermal and boron stratification in the core. In addition, this Surveillance demonstrates that the other SDC loop is OPERABLE.

In addition, during operation of the SDC loop with the water level in the vicinity of the reactor vessel nozzles, the SDC loop flow rate determination must also consider the SDC pump suction requirements. The Frequency of 12 hours is sufficient, considering the flow, temperature, pump control, and alarm indications available to the operator to monitor the SDC System in the control room.

Verification that the required loops are OPERABLE and in operation ensures that loops can be placed in operation as needed, to maintain decay heat and retain forced circulation. The Frequency of 12 hours is considered reasonable, since other administrative controls are available and have proven to be acceptable by operating experience.

REFERENCE

1. UFSAR, Section 7.4.

ATTACHMENT F

PROPOSED TECHNICAL SPECIFICATIONS AND BASES

SONGS UNIT 3

3.1 REACTIVITY CONTROL SYSTEMS

3.1.10 Boration Systems - Shutdown

LCO 3.1.10 One RCS boron injection flow path shall be OPERABLE.

APPLICABILITY: MODES 5 and 6.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. No boron injection flow path OPERABLE.	A.1	--------NOTE-------- Plant temperature changes are allowed provided the temperature change is accounted for in the calculated SDM. -------------------- Suspend all operations involving CORE ALTERATIONS or positive reactivity changes.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
	-----------------NOTE------------------- Only required when the Refueling Water Storage Tank (RWST) is the source of borated water and the outside temperature is < 40°F or > 100°F. ---	
SR 3.1.10.1	Verify RWST temperature is within limits.	24 hours
SR 3.1.10.2	Verify volume of available borated water is within limits.	7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. CRIS Manual Trip, Actuation Logic, or required control room airborne radiation monitors inoperable in MODE 5 or 6, or during movement of irradiated fuel assemblies.	B.1	--------NOTE--------- Place CREACUS in isolation mode if automatic transfer to isolation mode inoperable. --------------------- Place one CREACUS train in emergency mode.	Immediately
	<u>OR</u>		
	B.2.1	Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>		
	B.2.2	--------NOTE--------- Limited plant control operations are allowed provided the changes are accounted for in the calculated SDM. --------------------- Suspend positive reactivity additions.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.9.1	Perform a CHANNEL CHECK on the required control room airborne radiation monitor channel.	12 hours

(continued)

3.3 INSTRUMENTATION

3.3.13 Source Range Monitoring Channels

LCO 3.3.13 Two channels of source range monitoring instrumentation shall be OPERABLE.

APPLICABILITY: MODES 3, 4, and 5, with the reactor trip circuit breakers open or Control Element Assembly (CEA) Drive System not capable of CEA withdrawal.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more required channels inoperable.	A.1	--------NOTE--------- Limited plant control operations are allowed provided the changes are accounted for in the calculated SDM. --------------------- Suspend all operations involving positive reactivity additions.	Immediately
	AND		
	A.2	Perform SDM verification in accordance with SR 3.1.1.2, if $T_{avg} > 200°F$, or SR 3.1.2.1, if $T_{avg} \leq 200°F$.	4 hours AND Once per 12 hours thereafter

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.5 RCS Loops – MODE 3

LCO 3.4.5 Two RCS loops shall be OPERABLE and one RCS loop shall be in operation.

---------------------------NOTE---------------------------
All reactor coolant pumps may be de-energized for ≤ 1 hour per 8 hour period, provided:

a. No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.1; and

b. Core outlet temperature is maintained at least 10°F below saturation temperature.

APPLICABILITY: MODE 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required RCS loop inoperable.	A.1 Restore required RCS loop to OPERABLE status.	72 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Be in MODE 4.	12 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. No RCS loop OPERABLE. OR No RCS loop in operation.	C.1 Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet SDM of LCO 3.1.1.	Immediately
	AND	
	C.2 Initiate action to restore one RCS loop to OPERABLE status and operation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.4.5.1 Verify required RCS loop is in operation.	12 hours
SR 3.4.5.2 Verify secondary side water level in each steam generator ≥ 50% (wide range).	12 hours
SR 3.4.5.3 Verify correct breaker alignment and indicated power available to the required pump that is not in operation.	7 days

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.6 RCS Loops – MODE 4

LCO 3.4.6 Two loops or trains consisting of any combination of RCS loops and shutdown cooling (SDC) trains shall be OPERABLE and at least one loop or train shall be in operation.

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

1. All reactor coolant pumps (RCPs) and SDC pumps may be de-energized for ≤ 1 hour per 8 hour period, provided:

   a. No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.1; and

   b. Core outlet temperature is maintained at least 10°F below saturation temperature.

2. No RCP shall be started with any RCS cold leg temperature ≤ 246°F unless:

   a. Pressurizer water volume is < 900 ft^3, or

   b. Secondary side water temperature in each steam generator (SG) is < 100°F above each of the RCS cold leg temperatures.

APPLICABILITY: MODE 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required RCS loop inoperable. AND Two SDC trains inoperable.	A.1 Initiate action to restore a second loop or train to OPERABLE status.	Immediately
B. One required SDC train inoperable. AND Two required RCS loops inoperable.	B.1 Be in MODE 5.	24 hours
C. Required RCS loop(s) or SDC train(s) inoperable. OR No RCS loop or SDC train in operation.	C.1 Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet SDM of LCO 3.1.1. AND C.2 Initiate action to restore one loop or train to OPERABLE status and operation.	Immediately Immediately

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.7 RCS Loops – MODE 5, Loops Filled

LCO 3.4.7 At least one of the following loop(s)/trains listed below shall be OPERABLE and in operation:

a. Reactor Coolant Loop 1 and its associated steam generator and at least one associated Reactor Coolant Pump;

b. Reactor Coolant Loop 2 and its associated steam generator and at least one associated Reactor Coolant Pump;

c. Shutdown Cooling Train A; or

d. Shutdown Cooling Train B

One additional Reactor Coolant Loop/shutdown cooling train shall be OPERABLE, or

The secondary side water level of each steam generator shall be greater than 50% (wide range).

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

1. All reactor coolant pumps (RCPs) and pumps providing shutdown cooling may be de-energized for ≤ 1 hour per 8 hour period, provided:

    a. No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.2; and

    b. Core outlet temperature is maintained at least 10°F below saturation temperature.

2. One required SDC train may be inoperable for up to 2 hours for surveillance testing provided that the other SDC train or RCS loop is OPERABLE and in operation.

3. One required RCS loop may be inoperable for up to 2 hours for surveillance testing provided that the other RCS loop or SDC train is OPERABLE and in operation.

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
B. No SDC train/RCS loop in operation.	B.1	Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet SDM of LCO 3.1.2.	Immediately
	<u>AND</u>		
	B.2	Initiate action to restore required SDC train/RCS loop to operation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.7.1	Verify at least one RCS loop or SDC train is in operation.	12 hours
SR 3.4.7.2	Verify required SG secondary side water level is > 50% (wide range).	12 hours
SR 3.4.7.3	Verify the second required RCS loop, SDC train or steam generator secondary is OPERABLE.	7 days

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.8 RCS Loops – MODE 5, Loops Not Filled

LCO 3.4.8 Two shutdown cooling (SDC) trains shall be OPERABLE and at least one SDC train shall be in operation.

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

1. All SDC pumps may be de-energized for ≤ 15 minutes when switching from one train to another provided:
   a. The core outlet temperature is maintained > 10°F below saturation temperature;
   b. No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.2; and
   c. No draining operations to further reduce the RCS water volume are permitted.
2. The pump providing shutdown cooling may be de-energized for ≤ 1 hour per 8 hour period provided:
   a. The core outlet temperature is maintained > 10°F below saturation temperature; and
   b. No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.2.
3. One SDC train may be inoperable for ≤ 2 hours for surveillance testing provided the other SDC train is OPERABLE and in operation.
4. A containment spray pump may be used in place of a low pressure safety injection pump in either or both shutdown cooling trains to provide shutdown cooling flow provided the reactor has been sub-critical for a period > 24 hours and the RCS is fully depressurized and vented in accordance with LCO 3.4.12.1.

APPLICABILITY: MODE 5 with RCS loops not filled.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One SDC train inoperable.	A.1 Initiate action to restore SDC train to OPERABLE status.	Immediately
B. Both SDC trains inoperable. OR No SDC train in operation.	B.1 Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet SDM of LCO 3.1.2. AND B.2 Initiate action to restore one SDC train to OPERABLE status and operation.	Immediately Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.8.1	Verify at least one SDC train is in operation.	12 hours
SR 3.4.8.2	Verify correct breaker alignment and indicated power available to the required SDC pump that is not in operation.	7 days

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	AND	
	A.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	AND	
	A.2.4 Initiate action to restore required offsite power circuit to OPERABLE status.	Immediately
B. One required DG inoperable.	B.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	B.2 Suspend movement of irradiated fuel assemblies.	Immediately
	AND	
	B.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	AND	
	B.4 Initiate action to restore required DG to OPERABLE status.	Immediately

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources – Shutdown

LCO 3.8.5 DC electrical power subsystem shall be OPERABLE to support the DC electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems – Shutdown."

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One battery or associated control equipment or cabling inoperable.	A.1 Declare affected required feature(s) inoperable.	Immediately
	<u>OR</u>	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>	
	A.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	<u>AND</u>	
		(continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.8 Inverters – Shutdown

LCO 3.8.8 Required inverters shall be OPERABLE to support the onsite Class 1E AC vital bus electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems – Shutdown."

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required inverters inoperable.	A.1 Declare affected required feature(s) inoperable.	Immediately
	<u>OR</u>	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>	
	A.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	<u>AND</u>	
		(continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.10 Distribution Systems – Shutdown

LCO 3.8.10 The necessary portion of AC, DC, and AC vital bus electrical power distribution subsystems shall be OPERABLE to support equipment required to be OPERABLE.

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more required AC, DC, or AC vital bus electrical power distribution subsystems inoperable.	A.1	Declare associated supported required feature(s) inoperable.	Immediately
	<u>OR</u>		
	A.2.1	Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>		
	A.2.2	Suspend movement of irradiated fuel assemblies.	Immediately
	<u>AND</u>		
	A.2.3	Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	<u>AND</u>		
			(continued)

3.9 REFUELING OPERATIONS

3.9.2 Nuclear Instrumentation

LCO 3.9.2 Two source range monitors (SRMs) shall be OPERABLE.

APPLICABILITY: MODE 6.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One SRM inoperable.	A.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	A.2 Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet the boron concentration of LCO 3.9.1.	Immediately
B. Two SRMs inoperable.	B.1 Initiate actions to restore one SRM to OPERABLE status.	Immediately
	<u>AND</u>	
	B.2 Perform SR 3.9.1.1.	4 hours <u>AND</u> Once per 12 hours thereafter

3.9 REFUELING OPERATIONS

3.9.4 Shutdown Cooling (SDC) and Coolant Circulation – High Water Level

LCO 3.9.4 One SDC loop shall be OPERABLE and in operation.

---------------------------NOTES---------------------------
With the upper guide structure removed from the reactor vessel the required SDC loop may be removed from operation for ≤ 2 hours per 8-hour period, provided:

a. The maximum RCS temperature is maintained ≤ 140°F.
b. No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than that required to meet the minimum required boron concentration of LCO 3.9.1.
c. The capability to close the containment penetrations with direct access to the outside atmosphere within the calculated time to boil is maintained.
d. The reactor cavity water level is maintained ≥ 20 feet above the top of the reactor pressure vessel flange, or, for core alterations, ≥ 23 feet above the top of the reactor pressure vessel flange.

---------------------------NOTE---------------------------
A containment spray pump may be used in place of a low pressure safety injection pump in either or both shutdown cooling loops to provide shutdown cooling flow.

APPLICABILITY: MODE 6 with the water level ≥ 20 ft above the top of reactor vessel flange.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. SDC loop requirements not met.	A.1 Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet the boron concentration of LCO 3.9.1. <u>AND</u>	Immediately
		(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One SDC loop inoperable. (Applicable to initial conditions of two shutdown cooling loops OPERABLE)	A.1	Initiate action to restore SDC loop to OPERABLE status.	Immediately
	<u>OR</u>		
	A.2	Initiate actions to establish ≥ 20 ft of water above the top of reactor vessel flange.	Immediately
B. One SDC loop operable, less than 20 feet of water above the reactor vessel flange and any of the 8 requirements not met (Applicable to initial conditions of one shutdown cooling loop OPERABLE and operating with requirements 1-8)	B.1	Initiate actions to establish ≥ 20 feet of water.	Immediately
C. No SDC loop OPERABLE or in operation.	C.1	Suspend operations that would cause introduction into the RCS, coolant with boron concentration less than required to meet the boron concentration of LCO 3.9.1.	Immediately
	<u>AND</u>		
			(continued)

BASES (continued)

ACTION

A.1

With no boron injection flow path to the reactor coolant System OPERABLE, all operations involving CORE ALTERATIONS or positive reactivity changes shall be suspended immediately. Required Action A.1 is modified by a note which permits plant temperature changes provided the temperature change is accounted for in the calculated SDM. Introduction of temperature changes, including temperature increases when a positive MTC exists, must be evaluated to ensure they do not result in a loss of required SDM.

A boron injection flow path is not OPERABLE if it is not capable of performing its boron injection function. In consideration of the stable reactor configuration and the initial boron concentration, a core alteration is the only possible source for a significant increase in reactivity.

SURVEILLANCE REQUIREMENTS

SR 3.1.10.1, SR 3.1.10.2, and SR 3.1.10.3

SRs 3.1.10.1, 3.1.10.2, and 3.1.10.3, ensure that the required borated water supply is available. SR 3.1.10.1 verifies that the temperature of the boric acid solution in the RWST is ≥ 40°F and ≤ 100°F. The RWST water temperature is not expected to approach 40°F or 100°F, considering local meteorology and the large heat capacity of the RWST. Furthermore, at 40°F boric acid precipitation will not occur below a concentration of 4720 ppm boron. The maximum boric acid concentration in the tanks is 2800 ppm boron. However, SR 3.1.10.1 is only applicable when the RWST is the source of borated water and the outside air temperature is not within the normally expected range of 40 to 100°F.

The solubility of boric acid at 50°F is about 3.5 wt%. There is no similar requirement to verify BAMU Tank temperature 50°F is within the normal operating range of the building.

SR 3.1.10.2 and 3.1.10.3 verify that a sufficient amount of boron is available for RCS injection from either the BAMU tanks or the RWST. This requires a minimum of 4150 gallons of boric acid solution at a concentration of 2350 PPM Boron in either the RWST (15.5%[1] level indication) or a BAMU tank. A maximum boric acid solution concentration of 6119 ppm is specified for the BAMU Tank. The water volume limits are

[1] 15.5% level with tanks T005 and T006 cross connected (Reference 4, CCN-1). 17.0% level with tanks T005 (Reference 6) and T006 (Reference 4, CCN-3) isolated.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.1.10.1, SR 3.1.10.2, and SR 3.1.10.3 (continued)

specified relative to the top of the highest suction connection to the tank and considers vortexing, internal structures and instrument errors. The 7 day Surveillance Frequency ensures that a sufficient initial water supply is available for boron injection.

SR 3.1.10.4

These SRs demonstrate that each automatic boration system pump and valve is operable and actuates as required. In response to an actual or simulated SIAS the charging pumps start, the VCT is isolated, and the charging pumps take suction from the OPERABLE BAMU tank(s) and RWST. Verification of the correct alignment for manual, power operated, and automatic valves in the Boration System Flow paths provides assurance that proper boration flow paths are available. These SRs do not apply to valves that are locked, sealed, or otherwise secured in position, because these valves were previously verified to be in the correct position.

1. A flow path from either boric acid makeup tank with a minimum boron concentration of 2350 ppm and a minimum borated water volume of 4150 gallons, via either one of the boric acid makeup pumps, the blending tee or the gravity feed connection and any charging pump to the RCS, or;

2. The flow path from the RWST with a minimum borated water level of 15.5%[1] (includes TLU and Design Basis Document margin), a minimum boron concentration of 2350 ppm, and a solution temperature ≥ 40°F and ≤ 100°F via either a charging pump or a high pressure safety injection pump to the RCS.

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[1] 15.5% level with tanks T005 and T006 cross connected (Reference 4, CCN-1). 17.0% level with tanks T005 (Reference 6) and T006 (Reference 4, CCN-3) isolated.

(continued)

REFERENCES

1. 10 CFR 50, Appendix A, GDC 26.
2. 10 CFR 50, Appendix A, GDC 27.
3. 10 CFR 50, Appendix A, GDC 33.
4. J-BHB-029, "RWST Minimum Level to Maintain Safety Analysis Assumptions, Including TLU."
5. J-BGB-002, "TLU for Boric Acid Makeup Level Loops 2(3)LI0206C and 2(3)LI0208C."
6. J-BHB-021, "RWST 2(3)T005 & T006 Level Loop Uncertainties and Minimum Level Required During Modes 5 & 6."

ACTIONS (continued)

Condition B applies to the failure of CRIS Manual Trip, Actuation Logic, and required gaseous radiation monitor channels in Mode 5 or 6, or when moving irradiated assemblies. The Required Actions are immediately taken to place one OPERABLE CREACUS train in the emergency mode, or to suspend positive reactivity additions, and movement of irradiated fuel assemblies. The Completion Time recognizes the fact that the radiation signals are the only Functions available to initiate control room isolation in the event of a fuel handling accident.

Required Action B.2.2 is modified by a note to indicate that normal plant control operations that individually add limited positive reactivity (e.g., temperature or boron fluctuations associated with RCS inventory management or temperature control) are not precluded by this Action, provided they are accounted for in the calculated SDM.

SURVEILLANCE REQUIREMENTS

SR 3.3.9.1

Performance of the CHANNEL CHECK once every 12 hours ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value.

Significant deviations between the two instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

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

The Frequency, about once every shift, is based on operating experience that demonstrates the rarity of channel failure. Thus, performance of the CHANNEL CHECK guarantees that undetected overt channel failure is limited to 12 hours. Since the probability of two random failures in redundant channels in any 12 hour period is low, the CHANNEL CHECK minimizes the chance of loss of protective function due to failure of redundant channels. The CHANNEL CHECK

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.3.9.1 (continued)

supplements less formal, but more frequent, checks of channel OPERABILITY during normal operational use of the displays associated with the LCO required channels.

SR 3.3.9.2

A CHANNEL FUNCTIONAL TEST is performed on the required control room radiation monitoring channel to ensure the entire channel will perform its intended function. As found and as left setpoints are recorded.

The Frequency of 92 days is based on plant operating experience with regard to channel OPERABILITY and drift, which demonstrates that failure of more than one channel of a given Function in any 92 day interval is a rare event.

SR 3.3.9.3

Proper operation of the individual initiation relays is verified by de-energizing these relays during the CHANNEL FUNCTIONAL TEST of the Actuation Logic every 18 months. This will actuate the Function, operating all associated equipment. Proper operation of the equipment actuated by each train is thus verified.

The Frequency of 18 months is based on plant operating experience with regard to channel OPERABILITY, which demonstrates that failure of more than one channel of a given Function in any 18 month interval is a rare event.

A Note indicates this Surveillance includes verification of operation for each initiation relay.

SR 3.3.9.4

CHANNEL CALIBRATION is a complete check of the instrument channel including the sensor. The Surveillance verifies that the channel responds to a measured parameter within the necessary range and accuracy.

The Frequency of an 18 month calibration interval is based on experience with the magnitude of equipment drift in this period.

(continued)

BASES (continued)

LCO

The LCO on the source range monitoring channels ensures that adequate information is available to verify core reactivity conditions while shut down.

A minimum of two source range monitoring channels are required to be OPERABLE.

APPLICABILITY

In MODES 3, 4, and 5, with RTCBs open or the Control Element Assembly (CEA) Drive System not capable of CEA withdrawal, source range monitoring channels must be OPERABLE to monitor core power for reactivity changes. In MODES 1 and 2, and in MODES 3, 4, and 5, with the RTCBs shut and the CEAs capable of withdrawal, the Logarithmic Power Monitoring channels are addressed as part of the RPS in LCO 3.3.1, "Reactor Protective System (RPS) Instrumentation – Operating," and LCO 3.3.2, "Reactor Protective System (RPS) Instrumentation – Shutdown."

The requirements for source range neutron flux monitoring in MODE 6 are addressed in LCO 3.9.2, "Nuclear Instrumentation." The source range nuclear instrumentation channels provide neutron flux coverage extending an additional one to two decades below the logarithmic channels for use during refueling, when neutron flux may be extremely low.

ACTIONS

A channel is inoperable when it does not satisfy the OPERABILITY criteria for the channel's function. These criteria are outlined in the LCO section of the Bases.

A.1 and A.2

With one required channel inoperable, it may not be possible to perform a CHANNEL CHECK to verify that the other required channel is OPERABLE. Therefore, with one or more required channels inoperable, the source range monitoring Function cannot be reliably performed. Consequently, the Required Actions are the same for one required channel inoperable or more than one required channel inoperable. The absence of reliable neutron flux indication makes it difficult to ensure SDM is maintained. Required Action A.1 is modified

(continued)

BASES (continued)

ACTIONS

A.1 and A.2 (continued)

by a note to indicate that normal plant control operations that individually add limited positive reactivity (e.g., temperature or boron fluctuations associated with RCS inventory management or temperature control) are not precluded by this Action, provided they are accounted for in the calculated SDM.

SDM must be verified periodically to ensure that it is being maintained. Both required channels must be restored as soon as possible. The initial Completion Time of 4 hours and once every 12 hours thereafter to perform SDM verification takes into consideration that Required Action A.1 eliminates many of the means by which SDM can be reduced. These Completion Times are also based on operating experience in performing the Required Actions and the fact that plant conditions will change slowly.

SURVEILLANCE REQUIREMENTS

SR 3.3.13.1

SR 3.3.13.1 is the performance of a CHANNEL CHECK on each required channel every 12 hours. A CHANNEL CHECK is a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based upon the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying that the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria are determined by the plant staff and should be based on a combination of the channel instrument uncertainties including control isolation, indication, and readability. If a channel is outside of the match criteria, it may be an indication that the transmitter or the signal processing equipment has drifted outside of its limits. If the channels are within the match criteria, it is an indication that the channels are OPERABLE.

The Frequency, about once every shift, is based on operating experience that demonstrates the rarity of channel failure.

(continued)

SURVEILLANCE REQUIREMENTS

SR 3.3.13.1 (continued)

Thus, the performance of CHANNEL CHECK ensures that undetected overt channel failure is limited to 12 hours.

Since the probability of two random failures in redundant channels in any 12 hour period is extremely low, CHANNEL CHECK minimizes the chance of loss of protective function due to failure of redundant channels. CHANNEL CHECK supplements less formal, but more frequent, checks of channel OPERABILITY during normal operational use of displays associated with the LCO required channels.

SR 3.3.13.2

A CHANNEL FUNCTIONAL TEST is performed every 92 days to ensure that the entire channel is capable of properly indicating neutron flux. Internal test circuitry is used to feed test signals into the signal processor to verify channel alignment. It is not necessary to test the detector, because generating a meaningful test signal is difficult; the detectors are of simple construction, and any failures in the detectors will be apparent as change in channel output. This Frequency is the same as that employed for the same channels in the other applicable MODES.

SR 3.3.13.3

SR 3.3.13.3 is the performance of a CHANNEL CALIBRATION. A CHANNEL CALIBRATION is performed every 24 months. The Surveillance is a complete check and readjustment of the source range channel from the preamplifier input through to the remote indicators. The Surveillance verifies that the channel responds to a measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drift between successive calibrations to ensure that the channel remains operational. Measurement error determination, setpoint error determination, and calibration adjustment must be performed consistent with the plant specific setpoint analysis. The channel shall be left calibrated consistent with the assumptions of the current plant specific setpoint analysis.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS	SR 3.3.13.3 (continued) This SR is modified by a Note to indicate that it is not necessary to test the detector, because generating a meaningful test signal is difficult; the detectors are of simple construction, and any failures in the detectors will be apparent as change in channel output. This test interval is the same as that employed for the same channels in the other applicable MODES.
REFERENCES	1. 10 CFR 50, Appendix A, GDC 13. 2. SONGS Units 2 and 3 UFSAR, Chapter 7 and Chapter 15.

BASES

LCO (continued)

of requiring both SGs to be capable (> 50% wide range water level) of transferring heat from the reactor coolant at a controlled rate. Forced reactor coolant flow is the required way to transport heat, although natural circulation flow provides adequate removal. A minimum of one running RCP meets the LCO requirement for one loop in operation.

The Note permits a limited period of operation without RCPs. All RCPs may be de-energized for ≤ 1 hour per 8 hour period. This means that natural circulation has been established. When in natural circulation, a reduction in boron concentration with coolant at boron concentrations less than required to assure the SDM of LCO 3.1.1 is maintained is prohibited because an even concentration distribution throughout the RCS cannot be ensured. Core outlet temperature is to be maintained at least 10°F below the saturation temperature so that no vapor bubble may form and possibly cause a natural circulation flow obstruction.

In MODES 3, 4, and 5, it is sometimes necessary to stop all RCPs or shutdown cooling (SDC) pump forced circulation (e.g., to change operation from one SDC train to the other, to perform surveillance or startup testing, to perform the transition to and from SDC System cooling, or to avoid operation below the RCP minimum net positive suction head limit). The time period is acceptable because natural circulation is adequate for heat removal, or the reactor coolant temperature can be maintained subcooled and boron stratification affecting reactivity control is not expected.

An OPERABLE loop consists of at least one RCP providing forced flow for heat transport and an SG that is OPERABLE in accordance with the Steam Generator Tube Surveillance Program. An RCP is OPERABLE if it is capable of being powered and is able to provide forced flow if required.

APPLICABILITY

In MODE 3, the heat load is lower than at power; therefore, one RCS loop in operation is adequate for transport and heat removal. A second RCS loop is required to be OPERABLE but not in operation for redundant heat removal capability.

Operation in other MODES is covered by:

LCO 3.4.4, "RCS Loops – MODES 1 and 2";
LCO 3.4.6, "RCS Loops – MODE 4";

(continued)

BASES

APPLICABILITY (continued)

LCO 3.4.7, "RCS Loops – MODE 5, Loops Filled";
LCO 3.4.8, "RCS Loops – MODE 5, Loops Not Filled";
LCO 3.9.4, "Shutdown Cooling (SDC) and Coolant Circulation – High Water Level" (MODE 6); and
LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation – Low Water Level" (MODE 6).

ACTIONS

A.1

If one required RCS loop is inoperable, redundancy for forced flow heat removal is lost. The Required Action is restoration of the required RCS loop to OPERABLE status within a Completion Time of 72 hours. This time allowance is a justified period to be without the redundant, nonoperating loop because a single loop in operation has a heat transfer capability greater than that needed to remove the decay heat produced in the reactor core.

B.1

If restoration is not possible within 72 hours, the unit must be placed in MODE 4 within 12 hours. In MODE 4, the plant may be placed on the SDC System. The Completion Time of 12 hours is compatible with required operation to achieve cooldown and depressurization from the existing plant conditions in an orderly manner and without challenging plant systems.

C.1 and C.2

If no RCS loop is in operation, except as provided in Note 1 in the LCO section, all operations involving introduction of coolant into the RCS with boron concentration less than required to meet the minimum SDM of LCO 3.1.1 must be immediately suspended. Action to restore one RCS loop to OPERABLE status and operation shall be initiated immediately and continued until one RCS loop is restored to OPERABLE status and operation. Suspending the introduction into the RCS of coolant with boron concentration less than required to meet the minimum SDM of LCO 3.1.1 is required to assure continued safe operation. With coolant added without forced circulation, unmixed coolant could be

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

C.1 and C.2 (continued)

introduced to the core, however coolant added with boron concentration meeting the minimum SDM maintains acceptable margin to subcritical operations. The immediate Completion Times reflect the importance of maintaining operation for decay heat removal.

SR 3.4.5.1

This SR requires verification every 12 hours that the required number of RCS loops are in operation. Verification includes flow rate, temperature, or pump status monitoring, which help ensure that forced flow is providing heat removal. The 12 hour interval has been shown by operating practice to be sufficient to regularly assess degradation and verify operation within safety analyses assumptions. In addition, control room indication and alarms will normally indicate loop status.

SR 3.4.5.2

This SR requires verification every 12 hours that the secondary side water level in each SG is ≥ 50% wide range. An adequate SG water level is required in order to have a heat sink for removal of the core decay heat from the reactor coolant. The 12 hour interval has been shown by operating practice to be sufficient to regularly assess degradation and verify operation within the safety analyses assumptions.

SR 3.4.5.3

Verification that the required number of RCPs are OPERABLE ensures that the single failure criterion is met and that an additional RCS loop can be placed in operation, if needed, to maintain decay heat removal and reactor coolant circulation. Verification is performed by verifying proper breaker alignment and power availability to the required RCPs. The Frequency of 7 days is considered reasonable in view of other administrative controls available and has been shown to be acceptable by operating experience.

REFERENCES

1. UFSAR, Section 15.3.

BASES (continued)

LCO (continued)

prohibits boron dilution with coolant at boron concentrations less than required to assure the SDM of LCO 3.1.1 is maintained when forced flow is stopped because an even concentration distribution cannot be ensured. Core outlet temperature is to be maintained at least 10°F below saturation temperature so that no vapor bubble may form and possibly cause a natural circulation flow obstruction. The response of the RCS without the RCPs or SDC pumps depends on the core decay heat load and the length of time that the pumps are stopped. As decay heat diminishes, the effects on RCS temperature and pressure diminish. Without cooling by forced flow, higher heat loads will cause the reactor coolant temperature and pressure to increase at a rate proportional to the decay heat load. Because pressure can increase, the applicable system pressure limits (pressure and temperature (P/T) limits or low temperature overpressure protection (LTOP) limits) must be observed and forced SDC flow or heat removal via the SGs must be re-established prior to reaching the pressure limit. The circumstances for stopping both RCPs or SDC pumps are to be limited to situations where:

a. Pressure and temperature increases can be maintained well within the allowable pressure (P/T limits and LTOP) and 10°F subcooling limits; or

b. An alternate heat removal path through the SGs is in operation.

Note 2 requires that either of the following two conditions be satisfied before an RCP may be started with any RCS cold leg temperature ≤ 256°F.

a. Pressurizer water volume is < 900 ft^3; or

b. Secondary side water temperature in each SG is < 100°F above each of the RCS cold leg temperatures.

Satisfying the above condition will preclude a large pressure surge in the RCS when the RCP is started.

An OPERABLE RCS loop consists of at least one OPERABLE RCP and an SG that is OPERABLE in accordance with the Steam Generator Tube Surveillance Program and has the minimum water level specified in SR 3.4.6.2.

(continued)

BASES (continued)

ACTIONS

B.1 (continued)

reasonable, based on operating experience, to reach MODE 5 from MODE 4, with only one SDC train operating, in an orderly manner and without challenging plant systems.

C.1 and C.2

If no RCS loops or SDC trains are OPERABLE or in operation, except during conditions permitted by Note 1 in the LCO section, all operations involving introduction of coolant into the RCS with boron concentration less than required to meet the minimum SDM of LCO 3.1.1 must be suspended and action to restore one RCS loop or SDC train to OPERABLE status and operation must be initiated. The required margin to criticality must not be reduced in this type of operation. Suspending the introduction into the RCS of coolant with boron concentration less than required to meet the minimum SDM of LCO 3.1.1 is required to assure continued safe operation. With coolant added without forced circulation, unmixed coolant could be introduced to the core, however coolant added with boron concentration meeting the minimum SDM maintains acceptable margin to subcritical operations. The immediate Completion Times reflect the importance of decay heat removal. The action to restore must continue until one loop or train is restored to operation.

SURVEILLANCE REQUIREMENTS

SR 3.4.6.1

This SR requires verification every 12 hours that one required loop or train is in operation. This ensures forced flow is providing heat removal. Verification includes flow rate, temperature, or pump status monitoring. The 12 hour Frequency has been shown by operating practice to be sufficient to regularly assess RCS loop status. In addition, control room indication and alarms will normally indicate loop status.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.4.6.2

This SR requires verification every 12 hours of secondary side water level in the required SG(s) ≥ 50% (wide range). An adequate SG water level is required in order to have a heat sink for removal of the core decay heat from the reactor coolant. The 12 hour interval has been shown by operating practice to be sufficient to regularly assess degradation and verify operation within safety analyses assumptions.

SR 3.4.6.3

Verification that the required pump is OPERABLE ensures that an additional RCS loop or SDC train can be placed in operation, if needed to maintain decay heat removal and reactor coolant circulation. Verification is performed by verifying proper breaker alignment and power available to the required pumps. The Frequency of 7 days is considered reasonable in view of other administrative controls available and has been shown to be acceptable by operating experience.

REFERENCES

1. UFSAR, Section 15.4.1.4.

BASES (continued)

LCO

The purpose of this LCO is to require at least one of the SDC trains or RCS loops be OPERABLE and in operation with an additional SDC train or RCS loop OPERABLE or secondary side water level of each SG shall be ≥ 50% wide range. One SDC train or RCS loop provides sufficient forced circulation to perform the safety functions of the reactor coolant under these conditions. The second SDC or RCS loop train is normally maintained OPERABLE as a backup to the operating train/loop to provide redundant paths for decay heat removal. However, if the standby SDC train/RCS loop is not OPERABLE, a sufficient alternate method to provide redundant paths for decay heat removal is two SGs with their secondary side water levels ≥ 50% wide range. Should the operating SDC train/RCS loop fail, the SGs could be used to remove the decay heat.

Note 1 permits all RCPs and SDC pumps to be de-energized ≤ 1 hour per 8 hour period. The circumstances for stopping both SDC trains/RCS loops are to be limited to situations where pressure and temperature increases can be maintained well within the allowable pressure (pressure and temperature and low temperature overpressure protection) and 10°F subcooling limits, or an alternate heat removal path through the SG(s) is in operation.

This LCO is modified by a Note that prohibits boron dilution with coolant at boron concentrations less than required to assure the SDM of LCO 3.1.2 is maintained when forced flow is stopped because an even concentration distribution cannot be ensured. Core outlet temperature is to be maintained at least 10°F below saturation temperature, so that no vapor bubble would form and possibly cause a natural circulation flow obstruction. In this MODE, the SG(s) can be used as the backup for heat removal. To ensure their availability, the RCS loop flow path is to be maintained with subcooled liquid.

In MODE 5, it is sometimes necessary to stop all RCP or SDC forced circulation. This is permitted to change operation from one SDC train or RCS loop to the other, perform surveillance or startup testing, perform the transition to and from the SDC, or to avoid operation below the RCP minimum net positive suction head limit. The time period is acceptable because natural circulation is acceptable for decay heat removal, the reactor coolant temperature can be

(continued)

BASES (continued)

LCO (continued)

maintained subcooled, and boron stratification affecting reactivity control is not expected.

Note 2 allows one SDC train to be inoperable for a period of up to 2 hours provided that the other SDC train is OPERABLE and in operation. This permits periodic surveillance tests to be performed on the inoperable train during the only time when such testing is safe and possible.

Note 3 allows one RCS loop to be inoperable for a period of up to 2 hours provided that the other RCS loop is OPERABLE and in operation. This permits periodic surveillance tests to be performed on the inoperable loop during the only time when such testing is safe and possible.

Note 4 requires that either of the following two conditions be satisfied before an RCP may be started:

a. Pressurizer water volume must be < 900 ft^3; or

b. Secondary side water temperature in each SG must be < 100°F above each of the RCS cold leg temperatures.

Satisfying either of the above conditions will preclude a low temperature overpressure event due to a thermal transient when the RCP is started.

Note 5 specifies that a containment spray (CS) pump may be used in place of a low pressure safety injection (LPSI) pump in either or both shutdown cooling trains to provide shutdown cooling (SDC) flow based on the calculated heat load of the core 24 hours after the reactor is sub-critical with the reactor coolant system (RCS) fully depressurized and vented in accordance with TS 3.4.12.

Note 6 provides for an orderly transition from MODE 5 to MODE 4 during a planned heatup by permitting removal of SDC trains from operation when at least one RCP is in operation.

An OPERABLE SDC train is composed of an OPERABLE SDC pump and an OPERABLE SDC heat exchanger.

SDC pumps are OPERABLE if they are capable of being powered and are able to provide flow if required. An OPERABLE RCS loop consists of at least one OPERABLE RCP and an OPERABLE SG. An OPERABLE SG can perform as a heat sink when it has

(continued)

BASES (continued)

LCO (continued)

an adequate water level and is OPERABLE in accordance with the SG Tube Surveillance Program.

An OPERABLE RCS loop consists of at least one RCP providing forced flow for heat transport and an SG that is OPERABLE in accordance with the Steam Generator Tube Surveillance Program. An RCP is OPERABLE if it is capable of being powered and is able to provide forced flow if required.

APPLICABILITY

In MODE 5 with RCS loops filled, this LCO requires forced circulation to remove decay heat from the core and to provide proper boron mixing. One SDC train/RCS loop provides sufficient circulation for these purposes.

Operation in other MODES is covered by:

LCO 3.4.4, "RCS Loops — MODES 1 and 2";
LCO 3.4.5, "RCS Loops — MODE 3";
LCO 3.4.6, "RCS Loops — MODE 4";
LCO 3.4.8, "RCS Loops — MODE 5, Loops Not Filled";
LCO 3.9.4, "Shutdown Cooling (SDC) and Coolant Circulation — High Water Level" (MODE 6); and
LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation — Low Water Level" (MODE 6).

ACTIONS

A.1 and A.2

If the required SDC train/RCS loop is inoperable and any SGs have secondary side water levels < 50% wide range, redundancy for heat removal is lost. Action must be initiated immediately to restore a second SDC train/RCS loop to OPERABLE status or to restore the water level in the required SGs. Either Required Action A.1 or Required Action A.2 will restore redundant decay heat removal paths. The immediate Completion Times reflect the importance of maintaining the availability of two paths for decay heat removal.

B.1 and B.2

If no SDC train/RCS loop is in operation, except as permitted in Note 1, all operations involving introduction of coolant into the RCS with boron concentration less than required to meet the minimum SDM of LCO 3.1.2 must be

(continued)

BASES (continued)

ACTIONS

B.1 and B.2 (continued)

suspended. Action to restore one SDC train/RCS loop to operation must be initiated. The required margin to criticality must not be reduced in this type of operation. Suspending the introduction into the RCS of coolant with boron concentration less than required to meet the minimum SDM of LCO 3.1.2 is required to assure continued safe operation. With coolant added without forced circulation, unmixed coolant could be introduced to the core, however coolant added with boron concentration meeting the minimum SDM maintains acceptable margin to subcritical operations. The immediate Completion Times reflect the importance of maintaining operation for decay heat removal.

SURVEILLANCE REQUIREMENTS

SR 3.4.7.1

This SR requires verification every 12 hours that at least one SDC train/RCS loop is in operation. Verification includes flow rate, temperature, or pump status monitoring, which help ensure that forced flow is providing decay heat removal. The 12 hour Frequency has been shown by operating practice to be sufficient to regularly assess degradation and verify operation is within safety analyses assumptions. In addition, control room indication and alarms will normally indicate loop status.

The SDC/RCS flow is established to ensure that core outlet temperature is maintained sufficiently below saturation to allow time for swap over to the standby SDC train/RCS loop should the operating train be lost.

SR 3.4.7.2

Verifying the SGs are OPERABLE by ensuring their secondary side water levels are ≥ 50% wide range ensures that redundant heat removal paths are available if the second SDC train/RCS loop is inoperable. The Surveillance is required to be performed when the LCO requirement is being met by use of the SGs. If both SDC trains are OPERABLE and one SDC train is in operation, this SR is not needed. The 12 hour Frequency has been shown by operating practice to be sufficient to regularly assess degradation and verify operation within safety analyses assumptions.

(continued)

BASES (continued)

LCO

The purpose of this LCO is to require a minimum of two SDC trains be OPERABLE and at least one of these trains be in operation. An OPERABLE train is one that is capable of transferring heat from the reactor coolant at a controlled rate. Heat cannot be removed via the SDC System unless forced flow is used. A minimum of one running SDC pump meets the LCO requirement for one train in operation. An additional SDC train is required to be OPERABLE to meet the single failure criterion.

Note 1 permits the SDC pumps to be de-energized for ≤ 15 minutes when switching from one train to another. The circumstances for stopping both SDC pumps are to be limited to situations when the outage time is short and the core outlet temperature is maintained > 10°F below saturation temperature. The Note prohibits boron dilution with coolant at boron concentrations less than required to assure the SDM of LCO 3.1.2 is maintained or draining operations when SDC forced flow is stopped.

Note 2 specifies the pump providing shutdown cooling may be de-energized for up to 1 hour per 8 hour period provided 1) no operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.2, and 2) core outlet temperature is maintained at least 10°F below saturation temperature.

Note 3 allows one SDC train to be inoperable for a period of 2 hours provided that the other train is OPERABLE and in operation. This permits periodic surveillance tests to be performed on the inoperable train during the only time when these tests are safe and possible.

Note 4 specifies that a containment spray pump may be used in place of a low pressure safety injection pump in either or both shutdown cooling trains to provide shutdown cooling flow provided the reactor has been sub-critical for a period greater than 24 hours and the reactor coolant system is fully depressurized and vented in accordance with TS 3.4.12.1.

(continued)

BASES (continued)

LCO (continued)

An OPERABLE SDC train is composed of an OPERABLE SDC pump capable of providing forced flow to an OPERABLE SDC heat exchanger, along with the appropriate flow and temperature instrumentation for control, protection, and indication. SDC pumps are OPERABLE if they are capable of being powered and are able to provide flow if required.

APPLICABILITY

In MODE 5 with loops not filled, this LCO requires core heat removal and coolant circulation by the SDC System.

Operation in other MODES is covered by:

LCO 3.4.4, "RCS Loops – MODES 1 and 2";
LCO 3.4.5, "RCS Loops – MODE 3";
LCO 3.4.6, "RCS Loops – MODE 4";
LCO 3.4.7, "RCS Loops – MODE 5, Loops Filled";
LCO 3.9.4, "Shutdown Cooling (SDC) and Coolant Circulation – High Water Level" (MODE 6); and
LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation – Low Water Level" (MODE 6).

ACTIONS

A.1

If the required SDC train is inoperable, redundancy for heat removal is lost. Action must be initiated immediately to restore a second train to OPERABLE status. The Completion Time reflects the importance of maintaining the availability of two paths for heat removal.

B.1 and B.2

If no SDC train is OPERABLE or in operation, except as provided in Note 1 or in Note 2, all operations involving introduction of coolant into the RCS with boron concentration less than required to meet the minimum SDM of LCO 3.1.2 must be suspended. Action to restore one SDC train to OPERABLE status and operation must be initiated immediately. The required margin to criticality must not be reduced in this type of operation. Suspending the introduction into the RCS of coolant with boron concentration less than required to meet the minimum SDM of LCO 3.1.2 is required to assure continued safe

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

B.1 and B.2 (continued)

operation. With coolant added without forced circulation, unmixed coolant could be introduced to the core, however coolant added with boron concentration meeting the minimum SDM maintains acceptable margin to subcritical operations. The immediate Completion Time reflects the importance of maintaining operation for decay heat removal.

SR 3.4.8.1

This SR requires verification every 12 hours that at least one SDC train is in operation. Verification includes flow rate, temperature, or pump status monitoring, which help ensure that forced flow is providing decay heat removal. The 12 hour Frequency has been shown by operating practice to be sufficient to regularly assess degradation and verify operation is within safety analyses assumptions.

SR 3.4.8.2

Verification that the required number of trains are OPERABLE ensures that redundant paths for heat removal are available and that additional trains can be placed in operation, if needed, to maintain decay heat removal and reactor coolant circulation. Verification is performed by verifying proper breaker alignment and indicated power available to the required pumps. The Frequency of 7 days is considered reasonable in view of other administrative controls available and has been shown to be acceptable by operating experience.

REFERENCES

1. UFSAR, Section 5.4.7.

BASES (continued)

ACTIONS (continued)

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

With the offsite circuit not available to the required train (Condition A), the option exists to declare all required features inoperable. Since this option may involve undesired administrative efforts, the allowance for sufficiently conservative actions is made. With the required DG inoperable (Condition B), the minimum required diversity of AC power sources is not available. It is, therefore, required to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions that could result in loss of required SDM (Mode 5) or boron concentration (Mode 6). Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM.

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

Notwithstanding performance of the conservative Required Actions, the unit is still without sufficient AC power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required AC power sources and continue until the LCO requirements are restored.

(continued)

BASES (continued)

ACTIONS

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

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

Pursuant to LCO 3.0.6, the Distribution System's (LCO 3.8.10) ACTIONS are not entered even if all AC sources to it are inoperable, resulting in de-energization. Therefore, the Required Actions of Condition A are modified by a Note to indicate that when Condition A is entered with no AC power to one ESF bus, the ACTIONS for LCO 3.8.10 must be immediately entered. This Note allows Condition A to provide requirements for the loss of the offsite circuit, whether or not a train is de-energized. LCO 3.8.10 provides the appropriate restrictions for the situation involving a de-energized train.

SURVEILLANCE REQUIREMENTS

SR 3.8.2.1

SR 3.8.2.1 requires the SRs from LCO 3.8.1 that are necessary for ensuring the OPERABILITY of the AC sources in other than MODES 1, 2, 3, and 4. SR 3.8.1.17 is not required to be met because the required OPERABLE DG is not required to undergo periods of being synchronized to the offsite circuit. SR 3.8.1.20 is excepted because starting independence is not required with DG(s) that are not required to be OPERABLE.

This SR is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE DG from being paralleled with the offsite power network or otherwise rendered inoperable. With limited AC Sources available, a single event could unnecessarily compromise both the required circuit and the DG. The SRs listed in the Note are not required to be performed for the OPERABLE AC sources during Modes 5 and 6, and during movement of irradiated fuel assemblies. However, these AC sources are presumed to be able to meet these surveillances. If it is discovered (through analysis or unplanned events, for example) that the required AC sources could not meet these surveillances, then the equipment must be considered inoperable. Refer to the corresponding Bases for LCO 3.8.1 for a discussion of each SR.

(continued)

REFERENCES 1. UFSAR, Chapter 15.

BASES (continued)

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, and A.2.4 (continued)

positive reactivity additions that could result in loss of required SDM (Mode 5) or boron concentration (Mode 6)). Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM.

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize probability of the occurrence of postulated events.

Notwithstanding performance of the above conservative Required Actions, the unit is still without sufficient DC power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required DC power sources and continue until the LCO requirements are restored.

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

B.1

Condition B represents one train with a loss of ability to completely respond to an event, and a potential loss of ability to remain energized during normal operation. Since eventual failure of the battery to maintain the required

(continued)

BASES (continued)

ACTIONS

B.1 (continued)

battery cell parameters is highly probable, it is imperative that the operator's attention focus on minimizing the potential for complete loss of DC power to the affected train. The additional time provided by the Completion Time is consistent with the battery's capability to maintain its short term capability to respond to a design basis event.

C.1

If the battery cell parameters cannot be maintained within Category A limits, the short term capability of the battery is also degraded and the battery must be declared inoperable.

SURVEILLANCE REQUIREMENTS

SR 3.8.5.1

SR 3.8.5.1 states that Surveillances required by SR 3.8.4.1 through SR 3.8.4.8 are applicable in these MODES. See the corresponding Bases for LCO 3.8.4 for a discussion of each SR.

This SR is modified by a Note which indicates that SR 3.8.4.6 (battery charger capacity), SR 3.8.4.7 (battery service test), and SR 3.8.4.8 (battery performance test), if expired, are not required to be performed for the OPERABLE DC subsystems in Modes 5 and 6, and during movement of irradiated fuel assemblies. However, the DC subsystems are presumed to be able to meet these surveillances. If it is discovered (through analysis or unplanned events, for example) that the charger and/or battery could not meet these surveillances, then the equipment must be considered inoperable.

REFERENCES

1. UFSAR, Chapter 6.

2. UFSAR, Chapter 15.

BASES (continued)

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, and A.2.4 (continued)

reactivity additions that could result in loss of required SDM (Mode 5) or boron concentration (Mode 6). Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM. By the allowance of the option to declare required features inoperable with the associated inverter(s) inoperable, appropriate restrictions will be implemented in accordance with the affected required features LCOs' Required ACTIONS. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions).

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

Notwithstanding performance of the above conservative Required Actions, the unit is still without sufficient AC vital power sources to operate in a safe manner. Therefore, action must be initiated to restore the minimum required AC vital power source and continue until the LCO requirements are restored.

(continued)

BASES (continued)

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, and A.2.4 (continued)

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required inverters should be completed as quickly as possible in order to minimize the time the unit safety systems may be without power or powered from a constant voltage source transformer.

SURVEILLANCE REQUIREMENTS

SR 3.8.8.1

This Surveillance verifies that the inverters are functioning properly with all required circuit breakers closed and AC vital buses energized from the inverter. The verification of proper voltage output ensures that the required power is readily available for the instrumentation connected to the AC vital buses. The 7 day Frequency takes into account the redundant capability of the inverters and other indications available in the control room that alert the operator to inverter malfunctions.

REFERENCES

1. UFSAR, Chapter 6.

2. UFSAR, Chapter 15.

BASES (continued)

ACTIONS

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

Although redundant required features may require redundant trains of electrical power distribution subsystems to be OPERABLE, one OPERABLE distribution subsystem train may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS and fuel movement. By allowing the option to declare required features associated with an inoperable distribution subsystem inoperable, appropriate restrictions are implemented in accordance with the affected distribution subsystems LCO's Required Actions. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions that could result in loss of required SDM (Mode 5) or boron concentration (Mode 6)Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM.

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

Notwithstanding performance of the above conservative Required Actions, a required shutdown cooling (SDC) subsystem may be inoperable. In this case, these Required Actions of Condition A do not adequately address the concerns relating to coolant circulation and heat removal. Pursuant to LCO 3.0.6, the SDC ACTIONS would not be entered.

(continued)

BASES (continued)

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, A.2.4, and A.2.5 (continued)

Therefore, the Required Actions of Condition A direct declaring SDC inoperable, which results in taking the appropriate SDC actions.

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

SURVEILLANCE REQUIREMENTS

SR 3.8.10.1

This Surveillance verifies that the AC, DC, and AC vital bus electrical power distribution system is functioning properly, with all the buses energized. The verification of proper voltage availability on the buses ensures that the required power is readily available for motive as well as control functions for critical system loads connected to these buses. The 7 day Frequency takes into account the redundant capability of the electrical power distribution subsystems, and other indications available in the control room that alert the operator to subsystem malfunctions.

REFERENCES

1. UFSAR, Chapter 6.

2. UFSAR, Chapter 15.

BASES (continued)

LCO (continued)

COLR ensures a core k_{eff} of ≤ 0.95 is maintained during fuel handling operations. Violation of the LCO could lead to an inadvertent criticality during MODE 6.

APPLICABILITY

This LCO is applicable in MODE 6 to ensure that the fuel in the reactor vessel will remain subcritical. The required boron concentration ensures a $k_{eff} \leq 0.95$. Above MODE 6, LCO 3.1.1, "SHUTDOWN MARGIN (SDM) – $T_{avg} > 200°F$," and LCO 3.1.2, "SHUTDOWN MARGIN – $T_{avg} \leq 200°F$," ensure that an adequate amount of negative reactivity is available to shut down the reactor and to maintain it subcritical.

ACTIONS

A.1 and A.2

Continuation of CORE ALTERATIONS or positive reactivity additions (including actions to reduce boron concentration) is contingent upon maintaining the unit in compliance with the LCO. If the boron concentration of any coolant volume in the RCS, or the refueling canal is less than its limit, all operations involving CORE ALTERATIONS or positive reactivity additions must be suspended immediately.

Operations that individually add limited positive reactivity (e.g., temperature fluctuations from inventory addition or temperature control fluctuations), but when combined with all other operations affecting core reactivity (e.g., intentional boration) result in overall net negative reactivity addition, are not precluded by this action.

Suspension of CORE ALTERATIONS and positive reactivity additions shall not preclude moving a component to a safe position.

A.3

In addition to immediately suspending CORE ALTERATIONS and positive reactivity additions, boration to restore the concentration must be initiated immediately.

In determining the required combination of boration flow rate and concentration, there is no unique design basis event that must be satisfied. The only requirement is to restore the boron concentration to its required value as

(continued)

BASES (continued)

APPLICABILITY

In MODE 6, the SRMs must be OPERABLE to determine changes in core reactivity. There is no other direct means available to check core reactivity levels.

In MODES 3, 4, and 5, the installed source range detectors and circuitry are required to be OPERABLE by LCO 3.3.13, "Source Range Monitors."

ACTIONS

A.1 and A.2

With only one SRM OPERABLE, redundancy has been lost. Since these instruments are the only direct means of monitoring core reactivity conditions, CORE ALTERATIONS and introduction of coolant into the RCS with boron concentration less than required to meet the minimum boron concentration of LCO 3.9.1 must be suspended immediately. Suspending positive reactivity additions that could result in failure to meet the minimum boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Performance of Required Action A.1 shall not preclude completion of movement of a component to a safe position.

Temperature fluctuations associated with maintaining the plant status are permissible provided they remain within limits established for the plant conditions.

B.1

With no SRM OPERABLE, actions to restore a monitor to OPERABLE status shall be initiated immediately. Once initiated, actions shall be continued until an SRM is restored to OPERABLE status.

B.2

With no SRM OPERABLE, there is no direct means of detecting changes in core reactivity. However, since CORE ALTERATIONS and positive reactivity additions are not to be made, the core reactivity condition is stabilized until the SRMs are OPERABLE. This stabilized condition is determined by performing SR 3.9.1.1 to verify that the required boron concentration exists.

(continued)

BASES (continued)

LCO (continued)

The flow path starts in one of the RCS hot legs and is returned to the RCS cold legs.

The LCO is modified by two Notes. With the upper guide structure removed from the reactor vessel Note 1 allows the required operating SDC loop to be removed from service for up to 2 hours in each 8 hour period, provided that:

a. The maximum RCS temperature is maintained ≤ 140°F.
b. No operations are permitted that would dilute the RCS boron concentration to less than that required to meet the minimum required boron concentration of LCO 3.9.1.
c. The capability to close the containment penetrations with direct access to the outside temperature within the calculated time to boil is maintained.
d. The reactor cavity water level is maintained ≥ 20 feet above the top of the reactor pressure vessel flange, or, for core alterations, ≥ 23 feet above the top of the reactor pressure vessel flange.

This permits operations such as core mapping or alterations in the vicinity of the reactor vessel hot leg nozzles, RCS to SDC isolation valve testing, and inservice testing of LPSI system components. During this 2 hour period, decay heat is removed by natural convection to the large mass of water in the refueling canal.

Note 2 allows Operations to use a containment spray pump in place of a low pressure safety injection pump to provide shutdown cooling flow.

APPLICABILITY

One SDC loop must be in operation in MODE 6, with the water level ≥ 20 ft above the top of the reactor vessel flange, to provide decay heat removal. Requirements for the SDC System in other MODES are covered by LCOs in Section 3.4, Reactor Coolant System (RCS), and Section 3.5, Emergency Core Cooling Systems (ECCS). SDC loop requirements in MODE 6, with the water level < 20 ft above the top of the reactor vessel flange, are located in LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation — Low Water Level."

ACTIONS

SDC loop requirements are met by having one SDC loop OPERABLE and in operation, except as permitted in the Note to the LCO.

(continued)

BASES (continued)

ACTIONS (continued)

A.1

If SDC loop requirements are not met, there will be no forced circulation to provide mixing to establish uniform boron concentrations. Suspending positive reactivity additions that could result in failure to meet the minimum boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation.

A.2

If SDC loop requirements are not met, actions shall be taken immediately to suspend loading irradiated fuel assemblies in the core. With no forced circulation cooling, decay heat removal from the core occurs by natural convection to the heat sink provided by the water above the core. A minimum refueling water level of 20 ft above the reactor vessel flange provides an adequate available heat sink. Suspending any operation that would increase the decay heat load, such as loading a fuel assembly, is a prudent action under this condition.

A.3

If SDC loop requirements are not met, actions shall be initiated and continued in order to satisfy SDC loop requirements.

A.4

If SDC loop requirements are not met, all containment penetrations to the outside atmosphere must be closed to prevent fission products, if released by a loss of decay heat event, from escaping the containment building. The 4 hour or within the calculated time to boil Completion Time allows fixing most SDC problems without incurring the additional action of violating the containment atmosphere.

(continued)

BASES (continued)

ACTIONS

A.1 and A.2

When two SDC loops are operable and if one SDC loop becomes inoperable, actions shall be immediately initiated and continued until the SDC loop is restored to OPERABLE status and to operation, or until ≥ 20 ft of water level is established above the reactor vessel flange. When the water level is established at ≥ 20 ft above the reactor vessel flange, the Applicability will change to that of LCO 3.9.4, "Shutdown Cooling and Coolant Circulation – High Water Level," and only one SDC loop is required to be OPERABLE and in operation. An immediate Completion Time is necessary for an operator to initiate corrective actions.

B.1

When one loop of the SDC is operable with requirements 1-8 satisfied and the SDC loop becomes inoperable or any of the 8 requirements are not met, actions shall be immediately initiated to establish a water level > 20 feet above the reactor flange. When the water level is established at > 20 feet above the reactor vessel flange, the applicability will change to that of LCO 3.9.4, "Shutdown Cooling and Coolant Circulation-High Water Level," and only one SDC loop is required to be OPERABLE and in operation. An immediate Completion Time is necessary for an operator to initiate corrective actions.

C.1

If no SDC loop is in operation or no SDC loops are OPERABLE, there will be no forced circulation to provide mixing to establish uniform boron concentrations. Suspending positive reactivity additions that could result in failure to meet the minimum boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation.

(continued)

BASES (continued)

ACTIONS (continued)

C.2

If no SDC loop is in operation or no SDC loops are OPERABLE, actions shall be initiated immediately and continued without interruption to restore one SDC loop to OPERABLE status and operation. Since the unit is in Conditions A and B concurrently, the restoration of two OPERABLE SDC loops and one operating SDC loop should be accomplished expeditiously.

C.3

If SDC loops requirements are not met, all containment penetrations to the outside atmosphere must be closed to prevent fission products, if released by a loss of decay heat event, from escaping the containment building. The 4 hour or within the calculated time to boil Completion Time allows fixing most SDC problems without incurring the additional action of violating the containment atmosphere.

SURVEILLANCE REQUIREMENTS

SR 3.9.5.1

This Surveillance demonstrates that one SDC loop is operating and circulating reactor coolant. The flow rate is determined by the flow rate necessary to provide sufficient decay heat removal capability and to prevent thermal and boron stratification in the core. In addition, this Surveillance demonstrates that the other SDC loop is OPERABLE.

In addition, during operation of the SDC loop with the water level in the vicinity of the reactor vessel nozzles, the SDC loop flow rate determination must also consider the SDC pump suction requirements. The Frequency of 12 hours is sufficient, considering the flow, temperature, pump control, and alarm indications available to the operator to monitor the SDC System in the control room.

Verification that the required loops are OPERABLE and in operation ensures that loops can be placed in operation as needed, to maintain decay heat and retain forced circulation. The Frequency of 12 hours is considered reasonable, since other administrative controls are available and have proven to be acceptable by operating experience.

REFERENCE

1. UFSAR, Section 7.4.