Industry/TSTF Standard Technical Specification Change Traveler

Revise "RTBs open" & "CRDM de-energized" Actions to "incapable of rod withdrawal"

Priority/Classification 3) Improve Specifications

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

Description:

Revise "RTB open" and "CRDM de-energized" Actions to "Place the Rod Control System in a condition incapable of rod withdrawal".

Justification:

LCO 3.4.5 (Applicable in Mode 3), Actions C.2 and D.1 require "De-energize all CRDMs." LCO 3.4.9, Action A.1, requires RTBs to be open after reaching MODE 3. Each of these Actions is intended to assure that rods can not be withdrawn and thereby increase any potential heat input to the reactor coolant. While this change replaces these specific methods of precluding rod withdrawal, rod withdrawal remains assured of being prohibited by plant/system configuration.

This change provides for a consistent presentation of the required action. Only the specific method is relocated from the Technical Specifications to the Bases. Since the revised Actions still assure rod withdrawal is precluded, this detail is not required to be in the TS to provide adequate protection of the public health and safety. There is no overall effect from the change. The requirement that the control rods are inserted and are not capable of being withdrawn is maintained. Therefore, relocation of this detail is acceptable.

This change (allowing alternate options to preclude rod withdrawal) is necessary to eliminate undesirable secondary effects of opening the reactor trip breakers (RTBs). By opening the RTBs, plant interlock P-4 is tripped, which results in isolation of normal feedwater. Forcing reliance on AFW in this condition is not the intent nor is it desirable over continued use of normal feedwater.

Additionally, Conditions C of LCO 3.4.5 is modified to reflect the LCO. The status of the reactor trip breakers is not a requirement of the LCO; and is therefore inappropriate in the Condition. No technical changes result from this change.

Revision History

OG Revision 0 Revision Status: Closed

Revision Proposed by:

Revision Description:
Original Issue

Owners Group Review Information

Date Originated by OG: 18-Jan-96

Owners Group Comments
(No Comments)

Owners Group Resolution: Approved Date: 18-Jan-96

TSTF Review Information

TSTF Received Date: 20-Feb-96 Date Distributed for Review 12-Apr-96

OG Review Completed: ☑ BWOG ☑ WOG ☑ CEOG ☑ BWROG

TSTF Comments:

NA CEOG. Note that CEOG 3.4.9.A requires that RTBs be open, but our applicability is MODES 1-2, not 1-4 as in WOG. Therefore, no conflict with RTB testing exists.
NA BWOG, BWROG

TSTF Resolution: Approved Date: 28-May-96

NRC Review Information

NRC Received Date: 17-Jul-96 NRC Reviewer: M. Weston

NRC Comments:

9/18/96 - Review pending.
10/30/96 - NRC: The proposed changes to the LCO are acceptable. However, the proposed Bases statement needs to be supplemented to explain why this change is necessary. For example, describe the testing mentioned in your justification that could now be achieved in MODE 3 with this change, also describe or identify the more specific actions that may make up the general action of placing the Rod Control System in a condition incapable of rod withdrawal as your refer to in your justification.
1/17/97 - Revision provided to the NRC with additional Bases revisions needed to implement the proposed change. Note that this revision was developed prior the NRC's 10/30/96 comments.

Final Resolution: Superceded by Revision Final Resolution Date: 23-Jan-97

OG Revision 1 Revision Status: Closed

Revision Proposed by: WOG

Revision Description:
Identified additional Bases revisions needed to implement the proposed change.

Owners Group Review Information

Date Originated by OG: 01-Jul-96

Owners Group Comments
(No Comments)

Owners Group Resolution: Approved Date: 01-Jul-96

TSTF Review Information

TSTF Received Date: 30-Oct-96 Date Distributed for Review 20-Nov-96

OG Review Completed: ☑ BWOG ☑ WOG ☑ CEOG ☑ BWROG

TSTF Comments:

(No Comments)

TSTF Resolution: Approved Date: 19-Dec-96

NRC Review Information

NRC Received Date: 23-Jan-97 NRC Reviewer: M. Weston

NRC Comments:

3/18/97 - TSTF to prepare revision addressing NRC comments.

Final Resolution: Superceded by Revision Final Resolution Date: 02-Oct-97

TSTF Revision 2 Revision Status: Active Next Action:

Revision Proposed by: NRC

Revision Description:
Revised justification to address NRC questions. Also made minor editoral changes to the Bases.

TSTF Review Information

TSTF Received Date: 02-Oct-97 Date Distributed for Review 02-Oct-97

OG Review Completed: ☑ BWOG ☑ WOG ☑ CEOG ☑ BWROG

TSTF Comments:
(No Comments)

TSTF Resolution: Approved Date: 02-Oct-97

NRC Review Information

NRC Received Date: 02-Oct-97 NRC Reviewer: M. Weston

NRC Comments:

10/2/97 - Revision prepared and provided to NRC.

Final Resolution: NRC Approves Final Resolution Date: 03-Oct-97

Incorporation Into the NUREGs

File to BBS/LAN Date: TSTF Informed Date: TSTF Approved Date:

NUREG Rev Incorporated:

Affected Technical Specifications

S/A 3.4.5 Bases	RCS Loops - Mode 3
LCO 3.4.5 Bases	RCS Loops - Mode 3
Appl. 3.4.5 Bases	RCS Loops - Mode 3
Action 3.4.5.C	RCS Loops - Mode 3
Action 3.4.5.C Bases	RCS Loops - Mode 3
Action 3.4.5.D	RCS Loops - Mode 3
Action 3.4.5.D Bases	RCS Loops - Mode 3

Action 3.4.9.A	Pressurizer
Action 3.4.9.A Bases	Pressurizer

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Place the Rod Control System in a condition incapable of rod withdrawal.

ACTIONS (continued)

CONDITION		REQUIRED ACTION	COMPLETION TIME
C. One required RCS loop not in operation, with reactor trip breakers closed and Rod Control System capable of rod withdrawal.	C.1	Restore required RCS loop to operation.	1 hour
	OR		
	C.2	De-energize all control rod drive mechanisms (CRDMs).	1 hour
D. [Two] RCS loops inoperable.	D.1	De-energize all CRDMs	Immediately
OR	AND		
No RCS loop in operation.	D.2	Suspend all operations involving a reduction of RCS boron concentration.	Immediately
	AND		
	D.3	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 loops are in operation.	12 hours

(continued)

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B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.5 RCS Loops—MODE 3

BASES

BACKGROUND

In MODE 3, the primary function of the reactor coolant is removal of decay heat and transfer of this heat, via the steam generator (SG), to the secondary plant fluid. The secondary function of the reactor coolant is to act as a carrier for soluble neutron poison, boric acid.

The reactor coolant is circulated through [four] RCS loops, connected in parallel to the reactor vessel, each containing an SG, a reactor coolant pump (RCP), and appropriate flow, pressure, level, and temperature instrumentation for control, protection, and indication. The reactor vessel contains the clad fuel. The SGs provide the heat sink. The RCPs circulate the water through the reactor vessel and SGs at a sufficient rate to ensure proper heat transfer and prevent fuel damage.

In MODE 3, RCPs are used to provide forced circulation for heat removal during heatup and cooldown. The MODE 3 decay heat removal requirements are low enough that a single RCS loop with one RCP running is sufficient to remove core decay heat. However, [two] RCS loops are required to be OPERABLE to ensure redundant capability for decay heat removal.

APPLICABLE SAFETY ANALYSES

Whenever the reactor trip breakers (RTBs) are in the closed position and the control rod drive mechanisms (CRDMs) are energized, an inadvertent rod withdrawal from subcritical, resulting in a power excursion, is possible. Such a transient could be caused by a malfunction of the rod control system. In addition, the possibility of a power excursion due to the ejection of an inserted control rod is possible with the breakers closed or open. Such a transient could be caused by the mechanical failure of a CRDM.

Therefore, in MODE 3 with ~~RTBs in~~ the ~~closed position and~~ Rod Control System capable of rod withdrawal, accidental control rod withdrawal from subcritical is postulated and requires at least [two] RCS loops to be OPERABLE and in operation to ensure that the accident analyses limits are

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(continued)

APPLICABLE SAFETY ANALYSES (continued)

met. For those conditions when the Rod Control System is not capable of rod withdrawal, two RCS loops are required to be OPERABLE, but only one RCS loop is required to be in operation to be consistent with MODE 3 accident analyses.

Failure to provide decay heat removal may result in challenges to a fission product barrier. The RCS loops are part of the primary success path that functions or actuates to prevent or mitigate a Design Basis Accident or transient that either assumes the failure of, or presents a challenge to, the integrity of a fission product barrier.

RCS Loops—MODE 3 satisfy Criterion 3 of the NRC Policy Statement.

LCO

The purpose of this LCO is to require that at least [two] RCS loops be OPERABLE. In MODE 3 with the RTBs in the closed position and Rod Control System capable of rod withdrawal, [two] RCS loops must be in operation. [Two] RCS loops are required to be in operation in MODE 3 with RTBs the closed and Rod Control System capable of rod withdrawal due to the postulation of a power excursion because of an inadvertent control rod withdrawal. The required number of RCS loops in operation ensures that the Safety Limit criteria will be met for all of the postulated accidents. Rev. 1 Rev. 2

When → With the RTBs in the open position, or the CRDMs de-energized, the Rod Control System is not capable of rod withdrawal, therefore, only one RCS loop in operation is necessary to ensure removal of decay heat from the core and homogenous boron concentration throughout the RCS. An additional RCS loop is required to be OPERABLE to ensure that safety analyses limits are met. Rev. 1

The Note permits all RCPs to be de-energized for ≤ 1 hour per 8 hour period. The purpose of the Note is to perform tests that are designed to validate various accident analyses values. One of these tests is validation of the pump coastdown curve used as input to a number of accident analyses including a loss of flow accident. This test is generally performed in MODE 3 during the initial startup testing program, and as such should only be performed once. If, however, changes are made to the RCS that would cause a change to the flow characteristics of the RCS, the input

(continued)

BASES

LCO (continued)

values of the coastdown curve must be revalidated by conducting the test again. Another test performed during the startup testing program is the validation of rod drop times during cold conditions, both with and without flow.

The no flow test may be performed in MODE 3, 4, or 5 and requires that the pumps be stopped for a short period of time. The Note permits the de-energizing of the pumps in order to perform this test and validate the assumed analysis values. As with the validation of the pump coastdown curve, this test should be performed only once unless the flow characteristics of the RCS are changed. The 1 hour time period specified is adequate to perform the desired tests, and operating experience has shown that boron stratification is not a problem during this short period with no forced flow.

Utilization of the Note is permitted provided the following conditions are met, along with any other conditions imposed by initial startup test procedures:

a. No operations are permitted that would dilute the RCS boron concentration, thereby maintaining the margin to criticality. Boron reduction is prohibited because a uniform concentration distribution throughout the RCS cannot be ensured when in natural circulation; and

b. Core outlet temperature is maintained at least 10°F below saturation temperature, so that no vapor bubble may form and possibly cause a natural circulation flow obstruction.

An OPERABLE RCS loop consists of one OPERABLE RCP and one OPERABLE SG in accordance with the Steam Generator Tube Surveillance Program, which has the minimum water level specified in SR 3.4.5.2. An RCP is OPERABLE if it is capable of being powered and is able to provide forced flow if required.

APPLICABILITY

In MODE 3, this LCO ensures forced circulation of the reactor coolant to remove decay heat from the core and to provide proper boron mixing. The most stringent condition of the LCO, that is, two RCS loops OPERABLE and two RCS loops in operation, applies to MODE 3 with ~~RTBs in the~~ the Rod Control System capable of rod withdrawal. Rev. 1

(continued) Rev. 2

BASES

APPLICABILITY (continued) closed position. The least stringent condition, that is, two RCS loops OPERABLE and one RCS loop in operation, applies to MODE 3 with the RTBs open. Rev. 1

Rod Control System not capable of rod withdrawal.

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";
LCO 3.4.7, "RCS Loops—MODE 5, Loops Filled";
LCO 3.4.8, "RCS Loops—MODE 5, Loops Not Filled";
LCO 3.9.5, "Residual Heat Removal (RHR) and Coolant Circulation—High Water Level" (MODE 6); and
LCO 3.9.6, "Residual Heat Removal (RHR) and Coolant Circulation—Low Water Level" (MODE 6).

ACTIONS

A.1

If one required RCS loop is inoperable, redundancy for heat removal is lost. The Required Action is restoration of the required RCS loop to OPERABLE status within the 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 and because of the low probability of a failure in the remaining loop occurring during this period.

B.1

If restoration is not possible within 72 hours, the unit must be brought to MODE 4. In MODE 4, the unit may be placed on the Residual Heat Removal System. The additional Completion Time of 12 hours is compatible with required operations 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 the required RCS loop is not in operation, and the RTBs are closed and Rod Control System is capable of rod withdrawal, Rev. 1 Rev. 2

(continued)

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BASES

ACTIONS

C.1 and C.2 (continued)

the Required Action is either to restore the required RCS loop to operation or to de-energize all CRDMs by opening the RTBs or de-energizing the motor generator (MG) sets. When the RTBs are in the closed position and Rod Control System is capable of rod withdrawal, it is postulated that a power excursion could occur in the event of an inadvertent control rod withdrawal. This mandates having the heat transfer capacity of two RCS loops in operation. If only one loop is in operation, the RTBs must be opened. The Completion Times of 1 hour to restore the required RCS loop to operation or de-energize all CRDMs is adequate to perform these operations in an orderly manner without exposing the unit to risk for an undue time period.

Rev. 1

Rod Control System must be rendered incapable of rod withdrawal

Rev. 2 Rev. 1

place the Rod Control System in a condition incapable of rod withdrawal (e.g.,

Rev. 1

defeat the Rod Control System

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

If [two] RCS loops are inoperable or no RCS loop is in operation, except as during conditions permitted by the Note in the LCO section, all CRDMs must be de-energized by opening the RTBs or de-energizing the MG sets. All operations involving a reduction of RCS boron concentration must be suspended, and action to restore one of the RCS loops to OPERABLE status and operation must be initiated. Boron dilution requires forced circulation for proper mixing, and opening the RTBs or de-energizing the MG sets removes the possibility of an inadvertent rod withdrawal. The immediate Completion Time reflects the importance of maintaining operation for heat removal. The action to restore must be continued until one loop is restored to OPERABLE status and operation.

SURVEILLANCE REQUIREMENTS

SR 3.4.5.1

This SR requires verification every 12 hours that the required loops are in operation. Verification includes flow rate, temperature, and pump status monitoring, which help ensure that forced flow is providing heat removal. The Frequency of 12 hours is sufficient considering other indications and alarms available to the operator in the control room to monitor RCS loop performance.

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3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.9 Pressurizer

LCO 3.4.9 The pressurizer shall be OPERABLE with:

a. Pressurizer water level ≤ [92]%; and

b. Two groups of pressurizer heaters OPERABLE with the capacity of each group ≥ [125] kW [and capable of being powered from an emergency power supply].

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Pressurizer water level not within limit.	A.1	Be in MODE 3 with reactor trip breakers open.	6 hours
	AND		
	A.2 4	Be in MODE 4.	12 hours
B. One required group of pressurizer heaters inoperable.	B.1	Restore required group of pressurizer heaters to OPERABLE status.	72 hours
C. Required Action and associated Completion Time of Condition B not met.	C.1	Be in MODE 3.	6 hours
	AND		
	C.2	Be in MODE 4.	12 hours

Insert for 3.4.9

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INSERT for 3.4.9

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
	. . .	
	A.2 Fully insert all rods.	6 hours
	AND	
	A.3 Place Control Rod System in a condition incapable of rod withdrawal.	6 hours Rev 1
	AND	
	. . .	

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BASES

LCO (continued)

conditions, a wide margin to subcooling can be obtained in the loops. The exact design value of [125 kW is derived from the use of seven heaters rated at 17.9 kW each]. The amount needed to maintain pressure is dependent on the heat losses.

APPLICABILITY

The need for pressure control is most pertinent when core heat can cause the greatest effect on RCS temperature, resulting in the greatest effect on pressurizer level and RCS pressure control. Thus, applicability has been designated for MODES 1 and 2. The applicability is also provided for MODE 3. The purpose is to prevent solid water RCS operation during heatup and cooldown to avoid rapid pressure rises caused by normal operational perturbation, such as reactor coolant pump startup.

In MODES 1, 2, and 3, there is need to maintain the availability of pressurizer heaters, capable of being powered from an emergency power supply. In the event of a loss of offsite power, the initial conditions of these MODES give the greatest demand for maintaining the RCS in a hot pressurized condition with loop subcooling for an extended period. For MODE 4, 5, or 6, it is not necessary to control pressure (by heaters) to ensure loop subcooling for heat transfer when the Residual Heat Removal (RHR) System is in service, and therefore, the LCO is not applicable.

ACTIONS

A.1 ~~and~~ A.2, A.3 and A.4

Pressurizer water level control malfunctions or other plant evolutions may result in a pressurizer water level above the nominal upper limit, even with the plant at steady state conditions. Normally the plant will trip in this event since the upper limit of this LCO is the same as the Pressurizer Water Level—High Trip.

If the pressurizer water level is not within the limit, action must be taken to restore the plant to operation within the bounds of the safety analyses. To achieve this status, the unit must be brought to MODE 3, with ~~the reactor trip breakers open~~, within 6 hours ~~and~~ to MODE 4 within 12 hours. This takes the unit out of the applicable MODES

Insert B 4.2

(continued)

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INSERT B42 for 3.4.9

... all rods fully inserted and incapable of withdrawal. Additionally, the unit must be brought