
Industry/TSTF Standard Technical Specification Change Traveler

Bracket NUREG-1431 LCO 3.9.2, Unborated Water Source Isolation Valves

Priority/Classification 1) Correct Specifications

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

Description:

Bracket NUREG-1431 LCO 3.9.2, Unborated Water Source Isolation Valves, to address licensing basis for plants analyzed for dilution events in Mode 6. LCO 3.9.3 is modified to add a Reviewer's Note and bracketed options for audible alarm or count rate, when it is credited for the mitigation of a dilution event.

In addition, a new LCO statement and Condition C was added to provide the appropriate actions to be taken with the audible count rate indication is lost.

Justification:

There are three basic methods used to address boron dilution events for Westinghouse plants. Only two of these methods would require the application of this LCO. One method relies on precluding a boron dilution event by requiring all unborated water source isolation valves be closed. This is typically done at the source (makeup water storage tank outlet valve(s) and other potential sources). Plants using this method have clear statements in the FSARs that boron dilution is precluded by the Tech Spec requirement to isolate all potential sources of unborated water. No analyses are required or performed for the boron dilution event in this case. NUREG-1431, LCO 3.9.2, Unborated Water Source Isolation Valves, is intended only for those plants that preclude a boron dilution event by the closing of all unborated water isolation valves.

The other method used by Westinghouse plants to address boron dilution events is an analysis which assumes a maximum unborated water flow and determines that there is adequate time for operator action to mitigate the event. Plants which use this method to address a boron dilution event are not required to close all unborated water source isolation valves.

A Reviewer's Note which describes the use of LCO 3.9.2 was added to the Specification.

The proposed LCO statement and Condition C address the loss of the audible count and requires action to be initiated immediately to isolate all unborated water sources. The addition of this Condition and associated Required Action is necessary to address the safety analysis of units which assume a dilution event can occur. These safety analyses assume prompt identification of a boron dilution event to alert the operators to stop the dilution and protect the shutdown margin. When a plant is in Condition C, there is no assurance that prompt identification will occur, so Required Actions require the closure of all unborated water source isolation valves to preclude a boron dilution event. Since the event is precluded, prompt operator identification of the event is not required.

Revision History**OG Revision 0****Revision Status: Closed**

Revision Proposed by: Ginna

Revision Description:

Original Issue

Owners Group Review Information

Date Originated by OG: 14-Nov-95

Owners Group Comments
(No Comments)Owners Group Resolution: Approved Date: 14-Nov-95

4/22/98

TSTF Review Information

TSTF Received Date: 02-Nov-95 Date Distributed for Review 02-Nov-95

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

TSTF Comments:

(No Comments)

TSTF Resolution: Approved Date: 14-Nov-95

NRC Review Information

NRC Received Date: 16-Nov-95 NRC Reviewer: M. Weston

NRC Comments:

2/20/96 Reviewer approved change.

3/4/96 - package to C. Grimes to review

6/11/96 - C. Grimes comment: TSTF-23 to be referred to a Tech Br.

9/18/96 - Approved

11/19/97 - Reopened by the WOG. TSTF-23, R. 1 considered and rejected by the TSTF.

12/17/96 - New revision created. TSTF-23, R. 2 to be provided to the NRC

Final Resolution: Superseded by Revision

Final Resolution Date: 17-Dec-96

TSTF Revision 1**Revision Status: Closed**

Revision Proposed by: WOG

Revision Description:

This revision eliminates the new Action C for LCO 3.9.3 and substitutes a new Action B.2.

Owners Group Review Information

Date Originated by OG: 10-Oct-96

Owners Group Comments

(No Comments)

Owners Group Resolution: Withdrawn Date: 19-Nov-96

TSTF Revision 2**Revision Status: Closed**

Revision Proposed by: WOG

Revision Description:

Description and Justification revised. Action 3.9.3.C created. New Reviewer's Notes written.

Owners Group Review Information

Date Originated by OG: 17-Dec-96

Owners Group Comments

(No Comments)

Owners Group Resolution: Approved Date: 17-Dec-96

4/22/98

TSTF Review Information

TSTF Received Date: 17-Dec-96 Date Distributed for Review 03-Feb-97

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

TSTF Comments:

(No Comments)

TSTF Resolution: Approved Date: 21-Mar-97

NRC Review Information

NRC Received Date: 07-Apr-97

NRC Reviewer: WESTON, M.

NRC Comments:

4/10/97 - Forwarded to reviewer.

10/2/97 - During the 10/2/97 Owner's Group meeting, the reviewer recommended approval, but TSTF reported that they have a revision 3 under review and will submit it to the NRC. No further review will occur, pending Rev. 3

Final Resolution: Superseded by Revision

Final Resolution Date: 01-Dec-97

TSTF Revision 3**Revision Status: Active****Next Action:**

Revision Proposed by: WOG

Revision Description:

Revised justification and bracketed some material.

Owners Group Review Information

Date Originated by OG: 20-Nov-97

Owners Group Comments

(No Comments)

Owners Group Resolution: Approved Date: 20-Nov-97

TSTF Review Information

TSTF Received Date: 01-Dec-97 Date Distributed for Review 01-Dec-97

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

TSTF Comments:

(No Comments)

TSTF Resolution: Approved Date: 01-Dec-97

NRC Review Information

NRC Received Date: 01-Dec-97

NRC Reviewer:

NRC Comments:

(No Comments)

Final Resolution: NRC Approves

Final Resolution Date: 17-Apr-98

Incorporation Into the NUREGs

4/22/98

File to BBS/LAN Date:

TSTF Informed Date:

TSTF Approved Date:

NUREG Rev Incorporated:

Affected Technical Specifications

3.9.2	Unborated Water Source Isolation Valves
	Change Description: LCO and Bases are Bracketed.

3.9.2 Bases	Unborated Water Source Isolation Valves
	Change Description: LCO and Bases are Bracketed

LCO 3.9.2	Unborated Water Source Isolation Valves
	Change Description: Reviewer's Note added

Bkgnd 3.9.3 Bases	Nuclear Instrumentation
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S/A 3.9.3 Bases	Nuclear Instrumentation
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LCO 3.9.3 Bases	Nuclear Instrumentation
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Appl. 3.9.3 Bases	Nuclear Instrumentation
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Action 3.9.3.C	Nuclear Instrumentation
	Change Description: New Condition

Action 3.9.3.C Bases	Nuclear Instrumentation
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SR 3.9.3.2 Bases	Nuclear Instrumentation
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4/22/98

INSERT A

Unborated Water Source Isolation Valves
3.9.2

3.9 REFUELING OPERATIONS

3.9.2 Unborated Water Source Isolation Valves

LCO 3.9.2 Each valve used to isolate unborated water sources shall be secured in the closed position.

APPLICABILITY: MODE 6.

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each unborated water source isolation valve.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. -----NOTE----- Required Action A.3 must be completed whenever Condition A is entered. ----- One or more valves not secured in closed position.	A.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	A.2 Initiate actions to secure valve in closed position.	Immediately
	<u>AND</u>	
	A.3 Perform SR 3.9.1.1.	4 hours

INSERT A

[Reviewer's Note: This Technical Specification is not required for units that have analyzed a boron dilution event in MODE 6. It is required for those units that have not analyzed a boron dilution event in MODE 6. For units which have not analyzed a boron dilution event in MODE 6, the isolation of all unborated water sources is required to preclude this event from occurring.]

Unborated Water Source Isolation Valves
3.9.2SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.9.2.1	Verify each valve that isolates unborated water sources is secured in the closed position.	31 days

3.9 REFUELING OPERATIONS

3.9.3 Nuclear Instrumentation

LCO 3.9.3 Two source range neutron flux monitors shall be OPERABLE.

AND

One source range audible [alarm] [count rate]

APPLICABILITY: MODE 6. Circuit shall be OPERABLE.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One [required] source range neutron flux monitor inoperable.	A.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u> A.2 Suspend positive reactivity additions.	Immediately
B. Two [required] source range neutron flux monitors inoperable.	B.1 Initiate action to restore one source range neutron flux monitor 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

--- Reviewers Note ---

Condition C is included only for plants that assume a boron dilution event is mitigated by operator response to an audible source range indication.

C. Required source range audible [alarm] [count rate] circuit inoperable.

C.1 Initiate action to isolate unborated water sources.

Immediately

B 3.9 REFUELING OPERATIONS

B 3.9.2 Unborated Water Source Isolation Valves

BASES

BACKGROUND

During MODE 6 operations, all isolation valves for reactor makeup water sources containing unborated water that are connected to the Reactor Coolant System (RCS) must be closed to prevent unplanned boron dilution of the reactor coolant. The isolation valves must be secured in the closed position.

The Chemical and Volume Control System is capable of supplying borated and unborated water to the RCS through various flow paths. Since a positive reactivity addition made by reducing the boron concentration is inappropriate during MODE 6, isolation of all unborated water sources prevents an unplanned boron dilution.

APPLICABLE SAFETY ANALYSES

The possibility of an inadvertent boron dilution event (Ref. 1) occurring during MODE 6 refueling operations is precluded by adherence to this LCO, which requires that potential dilution sources be isolated. Closing the required valves during refueling operations prevents the flow of unborated water to the filled portion of the RCS. The valves are used to isolate unborated water sources. These valves have the potential to indirectly allow dilution of the RCS boron concentration in MODE 6. By isolating unborated water sources, a safety analysis for an uncontrolled boron dilution accident in accordance with the Standard Review Plan (Ref. 2) is not required for MODE 6.

The RCS boron concentration satisfies Criterion 2 of the NRC Policy Statement.

LCO

This LCO requires that flow paths to the RCS from unborated water sources be isolated to prevent unplanned boron dilution during MODE 6 and thus avoid a reduction in SDM.

(continued)

BASES (continued)

APPLICABILITY In MODE 6, this LCO is applicable to prevent an inadvertent boron dilution event by ensuring isolation of all sources of unborated water to the RCS.

For all other MODES, the boron dilution accident was analyzed and was found to be capable of being mitigated.

ACTIONS The ACTIONS table has been modified by a Note that allows separate Condition entry for each unborated water source isolation valve.

A.1

Continuation of CORE ALTERATIONS is contingent upon maintaining the unit in compliance with this LCO. With any valve used to isolate unborated water sources not secured in the closed position, all operations involving CORE ALTERATIONS must be suspended immediately. The Completion Time of "immediately" for performance of Required Action A.1 shall not preclude completion of movement of a component to a safe position.

Condition A has been modified by a Note to require that Required Action A.3 be completed whenever Condition A is entered.

A.2

Preventing inadvertent dilution of the reactor coolant boron concentration is dependent on maintaining the unborated water isolation valves secured closed. Securing the valves in the closed position ensures that the valves cannot be inadvertently opened. The Completion Time of "immediately" requires an operator to initiate actions to close an open valve and secure the isolation valve in the closed position immediately. Once actions are initiated, they must be continued until the valves are secured in the closed position.

(continued)

BASES

ACTIONS
(continued)

A.3

Due to the potential of having diluted the boron concentration of the reactor coolant, SR 3.9.1.1 (verification of boron concentration) must be performed whenever Condition A is entered to demonstrate that the required boron concentration exists. The Completion Time of 4 hours is sufficient to obtain and analyze a reactor coolant sample for boron concentration.

SURVEILLANCE
REQUIREMENTS

SR 3.9.2.1

These valves are to be secured closed to isolate possible dilution paths. The likelihood of a significant reduction in the boron concentration during MODE 6 operations is remote due to the large mass of borated water in the refueling cavity and the fact that all unborated water sources are isolated, precluding a dilution. The boron concentration is checked every 72 hours during MODE 6 under SR 3.9.1.1. This Surveillance demonstrates that the valves are closed through a system walkdown. The 31 day Frequency is based on engineering judgment and is considered reasonable in view of other administrative controls that will ensure that the valve opening is an unlikely possibility.

REFERENCES

1. FSAR, Section [15.2.4].
 2. NUREG-0800, Section 15.4.6.
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B 3.9 REFUELING OPERATIONS

B 3.9.3 Nuclear Instrumentation

BASES

INSERT B

BACKGROUND

The source range neutron flux monitors are used during refueling operations to monitor the core reactivity condition. The installed source range neutron flux monitors are part of the Nuclear Instrumentation System (NIS). These detectors are located external to the reactor vessel and detect neutrons leaking from the core.

The installed source range neutron flux monitors are BF₃ detectors operating in the proportional region of the gas filled detector characteristic curve. The detectors monitor the neutron flux in counts per second. The instrument range covers six decades of neutron flux ($1\text{E}+6$ cps) with a [5]% instrument accuracy. The detectors also provide continuous visual indication in the control room and an audible alarm [count rate] to alert operators to a possible dilution accident. The NIS is designed in accordance with the criteria presented in Reference 1.

APPLICABLE SAFETY ANALYSES

Two OPERABLE source range neutron flux monitors are required to provide a signal to alert the operator to unexpected changes in core reactivity such as with a boron dilution accident (Ref. 2) or an improperly loaded fuel assembly.

INSERT C

---Reviewers Note---

The need for a safety analysis for an uncontrolled boron dilution accident is eliminated by isolating all unborated water sources as required by LCO 3.9.2, "Unborated Water Source Isolation Valves."

The source range neutron flux monitors satisfy Criterion 3 of the NRC Policy Statement.

LCO

This LCO requires that two source range neutron flux monitors be OPERABLE to ensure that redundant monitoring capability is available to detect changes in core reactivity.

INSERT D

(continued)

INSERT B

[Reviewer's Note: Bracketed options are provided for source range OPERABILITY requirements to include audible alarm or count rate function. These options apply to plants that assume a boron dilution event that is mitigated by operator response to an audible indication. For plants that isolate all boron dilution paths (per LCO 3.9.2), the source range OPERABILITY includes only a visual monitoring function.]

INSERT C

[The audible count rate from the source range neutron flux monitors provides prompt and definite indication of any boron dilution. The count rate increase is proportional to the subcritical multiplication factor and allows operators to promptly recognize the initiation of a boron dilution event. Prompt recognition of the initiation of a boron dilution event is consistent with the assumptions of the safety analysis and is necessary to assure sufficient time is available for isolation of the primary water makeup source before SHUTDOWN MARGIN is lost [Ref. 2)]

INSERT D

To be OPERABLE, each monitor must provide visual indication [in the control room]. [In addition, at least one of the two monitors must provide an OPERABLE audible [alarm][count rate] function to alert the operators to the initiation of a boron dilution event.]

BASES (continued)

APPLICABILITY In MODE 6, the source range neutron flux monitors must be OPERABLE to determine changes in core reactivity. There are no other direct means available to check core reactivity levels. In MODES 2, 3, 4, and 5, these same installed source range detectors and circuitry are also required to be OPERABLE by LCO 3.3.1, "Reactor Trip System (RTS) Instrumentation." [and LCO 3.3.9, "BOPS".]

ACTIONS

A.1 and A.2

With only one source range neutron flux monitor 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.

B.1

With no source range neutron flux monitor OPERABLE, action to restore a monitor to OPERABLE status shall be initiated immediately. Once initiated, action shall be continued until a source range neutron flux monitor is restored to OPERABLE status.

B.2

With no source range neutron flux monitor OPERABLE, there are 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 source range neutron flux monitors are OPERABLE. This stabilized condition is determined by performing SR 3.9.1.1 to ensure that the required boron concentration exists.

The Completion Time of 4 hours is sufficient to obtain and analyze a reactor coolant sample for boron concentration. The Frequency of once per 12 hours ensures that unplanned changes in boron concentration would be identified. The 12 hour Frequency is reasonable, considering the low

(continued)

BASES

ACTIONS

B.2 (continued)

INSERT
E

probability of a change in core reactivity during this time period.

SURVEILLANCE REQUIREMENTS

SR 3.9.3.1

SR 3.9.3.1 is the performance of a CHANNEL CHECK, which is a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that the two indication channels should be consistent with core conditions. Changes in fuel loading and core geometry can result in significant differences between source range channels, but each channel should be consistent with its local conditions.

The Frequency of 12 hours is consistent with the CHANNEL CHECK Frequency specified similarly for the same instruments in LCO 3.3.1.

SR 3.9.3.2

SR 3.9.3.2 is the performance of a CHANNEL CALIBRATION every 18 months. This SR is modified by a Note stating that neutron detectors are excluded from the CHANNEL CALIBRATION. The CHANNEL CALIBRATION for the source range neutron flux monitors consists of obtaining the detector plateau or preamp discriminator curves, evaluating those curves, and comparing the curves to the manufacturer's data. The 18 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage. Operating experience has shown these components usually pass the Surveillance when performed at the 18 month Frequency.

[The CHANNEL CALIBRATION also includes verification of the audible [alarm] [count rate] function.]

REFERENCES

1. 10 CFR 50, Appendix A, GDC 13, GDC 26, GDC 28, and GDC 29.
2. FSAR, Section [15.2.4].

INSERT EC.1

With no audible [alarm][count rate] OPERABLE, prompt and definite indication of a boron dilution event, consistent with the assumptions of the safety analysis, is lost. In this situation, the boron dilution event may not be detected quickly enough to assure sufficient time is available for operators to manually isolate the unborated water source and stop the dilution prior to the loss of SHUTDOWN MARGIN. Therefore, action must be taken to prevent an inadvertent boron dilution event from occurring. This is accomplished by isolating all the unborated water flow paths to the reactor coolant system. Isolating these flow paths ensures that an inadvertent dilution of the reactor coolant boron concentration is prevented. The Completion Time of "Immediately" assures a prompt response by operations and requires an operator to initiate actions to isolate an affected flow path immediately. Once actions are initiated, they must be continued until all the necessary flow paths are isolated or the circuit is restored to OPERABLE status.