

**Advanced Passive 1000 (AP1000)  
Generic Technical Specification Traveler (GTST)**

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**Title: Revision of AP1000 GTS Subsection 3.9.2, Unborated Water Source Flow Paths**

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**I. Technical Specifications Task Force (TSTF) Travelers, Approved Since Revision 2 of STS NUREG-1431, and Used to Develop this GTST**

**TSTF Number and Title:**

TSTF-440-A, Rev. 0, Eliminate Bases Requirement for Performing a System Walkdown  
TSTF-471-A, Rev. 1: Eliminate use of term CORE ALTERATIONS in ACTIONS and Notes

**STS NUREGs Affected:**

TSTF-440-A, Rev. 0: NUREG-1430, 1431, 1432  
TSTF-471-A, Rev. 1: NUREG-1430, -1431, -1432

**NRC Approval Date:**

TSTF-440-A, Rev. 0: 11-Oct-02  
TSTF-471-A Rev. 1: 07-Dec-06

**TSTF Classification:**

TSTF-440-A, Rev. 0: Bases Only Change  
TSTF-471-A, Rev. 1: Technical Change

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**II. Reference Combined License (RCOL) Standard Departures (Std. Dep.), RCOL COL Items, and RCOL Plant-Specific Technical Specifications (PTS) Changes Used to Develop this GTST**

**RCOL Std. Dep. Number and Title:**

Not Applicable

**RCOL COL Item Number and Title:**

Not Applicable

**RCOL PTS Change Number and Title:**

The Vogtle Electric Generating Plant Units 3 and 4 License Amendment Request (VEGP LAR) proposed the following changes to the initial version of the PTS (referred to as the current TS by the VEGP LAR).

These changes include Administrative Changes (A) and Less Restrictive Changes (L) and are discussed in enumerated discussions of change (DOCs). These changes are discussed in Sections VI and VII of this GTST.

DOC A115: Editorial/clarification changes

DOC L03: Deletion of the Required Action A.1 and renumbering subsequent Actions

**III. Comments on Relations Among TSTFs, RCOL Std. Dep., RCOL COL Items, and RCOL PTS Changes**

This section discusses the considered changes that are: (1) applicable to operating reactor designs, but not to the AP1000 design; (2) already incorporated in the GTS; or (3) superseded by another change.

Based on TSTF 471-A, Rev. 1, this GTST removes the term “CORE ALTERATIONS” and makes corresponding adjustments to the text of the AP1000 LCO and Bases of GTS 3.9.2, Unborated Water Sources Isolation Valves.

The effects of these changes are visible in NUREG-1431, Rev. 4.

Similar to TSTF 471-A, Rev. 1, DOC L03 also removes Required Action A.1 for “CORE ALTERATIONS” and makes corresponding adjustments to the text in this subsection.

DOC A115 makes several editorial changes that are discussed later in Section VI of this traveler.

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**IV. Additional Changes Proposed as Part of this GTST (modifications proposed by NRC staff and/or clear editorial changes or deviations identified by preparer of GTST)**

Revise the title for Ref. 2, in the list of references in Bases, which was taken from initial version of SRP 15.4.6 issued in Nov 1975, to the title of Rev. 2, which was issued in March 2007.

**APOG Recommended Changes to Improve Bases 3.9.2**

Delete the phrase “through a system walkdown” from SR 3.9.2.1 Surveillance Requirements. (APOG #490) The phrase “through a system walkdown” was eliminated from STS SR 3.9.2.1 based on TSTF-440-A. TSTF-440-A indicated that specifying a system walkdown is inconsistent with the remainder of TS.

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**V. Applicability****Affected Generic Technical Specifications and Bases:**

Section 3.9.2, Unborated Water Source Flow Paths

**Changes to the Generic Technical Specifications and Bases:**

Remove Required Action A.1 for "CORE ALTERATIONS" and makes corresponding adjustments to the text in this subsection and Bases. (TSTF-471-A, Rev. 1 and DOC L03)

Revise TS 3.9.2 LCO from "Each unborated water source flow path shall be isolated," to "One valve in each unborated water source flow path shall be secured in the closed position." (DOC A115)

Revise TS 3.9.2 Condition A from "One or more flow paths not isolated," to "One or more unborated water source flow paths with no valve secured in the closed position." (DOC A115)

Revise TS 3.9.2 Required Action A.2 from "Initiate actions to isolate flow paths" to "Initiate actions to secure one valve in the flow path in the closed position." (DOC A115)

Revise SR 3.9.2.1 from "Verify each unborated water source flow path is isolated by at least one valve secured in the closed position," to "Verify one valve in each unborated water source flow path is secured in the closed position." (DOC A115)

Revise the text in B 3.9.2 LCO paragraph. (DOC A115)

Delete the phrase "through a system walkdown" from Bases, SR 3.9.2.1 Surveillance Requirements. (APOG #490) (TSTF-440-A)

Revise the title for Ref. 2, in the list of references in Bases, from "Chemical and Volume Control System Malfunction that Results in a Decrease in Boron Concentration in the RCS" to "Inadvertent Decrease in Boron Concentration in the Reactor Coolant System (PWR)."

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## **VI. Traveler Information**

### **Description of TSTF changes:**

TSTF-471-A, Rev. 1 made the following changes to WOG STS 3.9.2, Rev. 3:

In LCO Subsection 3.9.2:

- Required Action A.1, "Suspend CORE ALTERATIONS." and its completion time are removed.
- The underlined word AND is removed.
- The following Item A.2 "Initiate actions to isolate flow paths" becomes the new item A.1, with its corresponding completion time (Immediately).
- Item A.3 (and its completion time of 4 hours) is renumbered to A.2.
- The - NOTE - in CONDITION A. is revised from "Required Action A.3..." to read "Required Action A.2..."

In the Bases subsection B 3.9.2, the ACTIONS section has three parts: A.1, A.2, and A.3.

- Part A.1 is removed in its entirety.
- Part A.2 becomes part A.1;
- Part A.3 becomes part A.2.

It appears that the second paragraph in the deleted part A.1 under Actions in the Bases has been inadvertently removed. This paragraph is the only place in the Bases that explains the presence of the Note under Condition A in LCO 3.9.2. This reviewer will restore this paragraph to the Bases before the newly renumbered part A.1. The restored paragraph states:

"Condition A has been modified by a Note to require that Required Action A.2 must be completed whenever Condition A is entered."

where Action 'A.3' is renumbered as 'A.2.'

### **Rationale for TSTF changes:**

TSTF-51-A, Rev. 2 eliminated all uses of the defined term "CORE ALTERATIONS" from Applicability statements in the PWR NUREGs and most uses of "CORE ALTERATIONS" in Required Actions. TSTF-471-A, Rev. 1 eliminates the few remaining instances of the defined term "CORE ALTERATIONS" from the PWR IRS NUREGs. This GTST continues the removal of the defined term "CORE ALTERATIONS" from the AP1000 Technical Specifications. This includes the removal of the defined term "CORE ALTERATIONS" from the list of definitions found in GTS 1.1

### **Description of changes in RCOL Std. Dep., RCOL COL Item(s), and RCOL PTS Changes:**

Administrative Changes (A):

DOC A115:

TS 3.9.2 is revised as follows:

- TS 3.9.2 LCO statement is revised from “Each unborated water source flow path shall be isolated,” to “One valve in each unborated water source flow path shall be secured in the closed position.”
- TS 3.9.2 Condition A is revised from “One or more flow paths not isolated,” to “One or more unborated water source flow paths with no valve secured in the closed position.”
- TS 3.9.2 Required Action A.2 is revised from “Initiate actions to isolate flow paths” to “Initiate actions to secure one valve in the flow path in the closed position.”
- SR 3.9.2.1 is revised from “Verify each unborated water source flow path is isolated by at least one valve secured in the closed position,” to “Verify one valve in each unborated water source flow path is secured in the closed position.”
- In the Bases subsection B 3.9.2, the ACTIONS section has three parts: A.1, A.2, and A.3.
  - Part A.1 is removed in its entirety.
  - Part A.2 becomes part A.1;
  - Part A.3 becomes part A.2.

These changes are similar to those described before for TSTF-471-A, Rev. 1.

- In the Bases subsection B 3.9.2, the LCO paragraph is revised from:
 

“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 SHUTDOWN MARGIN.”

to:

“This LCO requires that at least one valve in each flow paths to the RCS from unborated water sources be secured in the closed position to prevent unplanned boron dilution during MODE 6 and, thus, avoid a reduction in SHUTDOWN MARGIN.”

where the changes are underlined.

Less Restrictive Changes (L):

DOC L03:

Similar to TSTF-471-A, Rev. 1, DOC L03 deletes the Required Action A.1 from LCO 3.9.2 and renumbers the subsequent Required Actions.

#### **Rationale for changes in RCOL Std. Dep., RCOL COL Item(s), and RCOL PTS Changes:**

According to DOC A115, the changes described above “are made to make the LCO, Action, and SR consistent with each other. The current LCO requires that each unborated water source flow path shall be isolated. One valve secured in the closed position, as is required by current SR 3.9.2.1, ensures this requirement is met. Therefore, to provide clarity between the LCO and SR, the LCO, Action (Condition and Required Action), and SR are all revised to clearly state that one valve per unborated water source flow path is required to be secured in the closed position. These changes are designated as administrative changes and are acceptable because they do not result in technical changes to the TS.”

According to DOC L03 for Condition A for current TS 3.9.1, "If one or more unborated water source isolation valves are not secured in the closed position, current actions require that core alterations must be suspended and actions taken to secure the valve in the closed position. The purpose of this Specification is to prevent a boron dilution incident."

As discussed, core alterations have no effect on a boron dilution incident, either as an initiator or as a mitigator. Suspending core alterations when a valve is not secured does not provide compensation or reduce the probability of the event. Therefore, the action to suspend core alterations provides no safety benefit and is not needed.

Accordingly, the changes made by DOC A115 and DOC L03 are acceptable and are implemented by this GTST in AP1000 STS 3.9.1, Rev. 0.

**Description of additional changes proposed by NRC staff/preparer of GTST:**

The phrase "through a system walkdown" was eliminated from the Bases for GTS SR 3.9.2.1.

Revised the title for Ref. 2, in the list of references in Bases, which was taken from initial version of SRP 15.4.6 issued in Nov 1975, to the title of Rev. 2, which was issued in March 2007.

**Rationale for additional changes proposed by NRC staff/preparer of GTST:**

The phrase "through a system walkdown" was eliminated from the Bases for STS SR 3.9.2.1 based on TSTF-440. TSTF-440 indicated that specifying a system walkdown is inconsistent with the remainder of TS.

Updating title for Reference 2 is an administrative change.

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## **VII. GTST Safety Evaluation**

### **Technical Analysis:**

In the WOG and BWOGE NUREGs CORE ALTERATION is defined as “the movement of any fuel, sources, or reactivity control components, within the reactor vessel with the vessel head removed and fuel in the vessel.” Suspension of CORE ALTERATIONS shall not preclude completion of movement of a component to a safe position.

Evaluations performed for TSTF-471-A, Rev. 1 indicate that CORE ALTERATIONS can only occur in Mode 6 when the reactor vessel head is removed. The only accidents considered for Mode 6 for PWR reactors is a fuel handling accident and a boron dilution accident. If all Required Actions that require suspension of CORE ALTERATIONS also require suspension of movement of [recently] irradiated fuel, suspension of CORE ALTERATIONS provides no safety benefit.

The removal of the term CORE ALTERATIONS is usually replaced by or leaves remaining, the term “positive reactivity additions.” A review of circumstances related to fuel handling accidents and boron dilution accidents concludes that the action to suspend CORE ALTERATIONS provides no benefit, and is not needed. Hence a finding of “no significant hazards consideration” is justified.

TSTF-51-A, Rev. 2 eliminated all uses of the defined term CORE ALTERATIONS from Applicability statements in the PWR NUREGs and most uses of CORE ALTERATIONS in Required Actions.

Thus the term CORE ALTERATIONS can be removed from the definitions of Chapter 1 and removed from usage in all other places in the Technical Specifications of NUREG-1431 and AP1000 GTS 1.1.

Removing the phrase “through a system walkdown” from the Bases for SR 3.9.2.1 is appropriate because the Bases for this SR need not limit the procedure used to complete the surveillance to one method of verification, when several methods may be permissible.

The above changes are implemented by this GTS in AP1000 STS 3.9.2, Rev. 0 to comply with TSTF-471-A, Rev.1 and TSTF-440, and to be consistent with the corresponding sections of NUREG-1431, Rev. 4.

Technical discussion for the changes proposed by DOC A115 and DOC L03 are covered in the previous section VI of this GTST under “Rationale for changes in RCOL Std. Dep., RCOL COL Item(s), and RCOL PTS Changes.”

The remaining changes are editorial, clarifying, grammatical, or otherwise considered administrative. These changes do not affect the technical content, but improve the readability, implementation, and understanding of the requirements, and are therefore acceptable. Having found that this GTST’s proposed changes to the GTS and Bases are acceptable, the NRC staff concludes that AP1000 STS Subsection 3.9.2 is an acceptable model Specification for the AP1000 standard reactor design.

**References to Previous NRC Safety Evaluation Reports (SERs): None**

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## **VIII. Review Information**

### **Evaluator Comments:**

None

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### **Review Information:**

Availability for public review and comment on Revision 0 of this traveler approved by NRC staff on 5/21/2014.

### **APOG Comments (Ref. 7) and Resolutions:**

1. (Internal #490) 3.9.2 Bases, Surveillance Requirements: APOG comments that the phrase “through a system walkdown” should be eliminated from SR 3.9.2.1 as indicated in TSTF-440. TSTF-440 indicated that specifying a system walkdown is inconsistent with the remainder of TS. This change is made as recommended by eliminating the subject phrase.
2. (Internal #3) 3.9.2 Bases, References: Insert the “FSAR” modifier before “Chapter 15” in Ref. 1. Throughout the Bases, references to Sections and Chapters of the FSAR do not include the “FSAR” clarifier. Since these Section and Chapter references are to an external document, it is appropriate to include the “FSAR” modifier.

**NRC Final Approval Date:** 12/14/2015

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**IX. Evaluator Comments for Consideration in Finalizing Technical Specifications and Bases**

Revised the title for Ref. 2, in the list of references in Bases, which was taken from initial version of SRP 15.4.6 issued in Nov 1975, to the title of Rev. 2, which was issued in March 2007.

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**X. References Used in GTST**

1. AP1000 DCD, Revision 19, Section 16, "Technical Specifications," June 2011 (ML11171A500).
2. Southern Nuclear Operating Company, Vogtle Electric Generating Plant, Units 3 and 4, Technical Specifications Upgrade License Amendment Request, February 24, 2011 (ML12065A057).
3. NRC Safety Evaluation (SE) for Amendment No. 13 to Combined License (COL) No. NPF-91 for Vogtle Electric Generating Plant (VEGP) Unit 3, and Amendment No. 13 to COL No. NPF-92 for VEGP Unit 4, September 9, 2013, ADAMS Package Accession No. ML13238A337, which contains:

ML13238A355	Cover Letter - Issuance of License Amendment No. 13 for Vogtle Units 3 and 4 (LAR 12-002).
ML13238A359	Enclosure 1 - Amendment No. 13 to COL No. NPF-91
ML13239A256	Enclosure 2 - Amendment No. 13 to COL No. NPF-92
ML13239A284	Enclosure 3 - Revised plant-specific TS pages (Attachment to Amendment No. 13)
ML13239A287	Enclosure 4 - Safety Evaluation (SE), and Attachment 1 - Acronyms
ML13239A288	SE Attachment 2 - Table A - Administrative Changes
ML13239A319	SE Attachment 3 - Table M - More Restrictive Changes
ML13239A333	SE Attachment 4 - Table R - Relocated Specifications
ML13239A331	SE Attachment 5 - Table D - Detail Removed Changes
ML13239A316	SE Attachment 6 - Table L - Less Restrictive Changes

The following documents were subsequently issued to correct an administrative error in Enclosure 3:

- |             |   |
|-------------|---|
| ML13277A616 | Letter - Correction To The Attachment (Replacement Pages) - Vogtle Electric Generating Plant Units 3 and 4-Issuance of Amendment Re: Technical Specifications Upgrade (LAR 12-002) (TAC No. RP9402) |
| ML13277A637 | Enclosure 3 - Revised plant-specific TS pages (Attachment to Amendment No. 13) (corrected)  |
4. TSTF-GG-05-01, "Writer's Guide for Plant-Specific Improved Technical Specifications," June 2005.
  5. RAI Letter No. 01 Related to License Amendment Request (LAR) 12-002 for the Vogtle Electric Generating Plant Units 3 and 4 Combined Licenses, September 7, 2012 (ML12251A355).
  6. Southern Nuclear Operating Company, Vogtle Electric Generating Plant, Units 3 and 4, Response to Request for Additional Information Letter No. 01 Related to License Amendment Request LAR-12-002, ND-12-2015, October 04, 2012 (ML12286A363 and ML12286A360).

7. APOG-2014-008, APOG (AP1000 Utilities) Comments on AP1000 Standardized Technical Specifications (STS) Generic Technical Specification Travelers (GTSTs), Docket ID NRC-2014-0147, September 22, 2014 (ML 14265A493).
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**XI. MARKUP of the Applicable GTS Subsection for Preparation of the STS NUREG**

The entire section of the Specifications and the Bases associated with this GTST is presented next.

Changes to the Specifications and Bases are denoted as follows: Deleted portions are marked in strikethrough red font, and inserted portions in bold blue font.

Unborated Water Source Flow Paths  
3.9.2

## 3.9 REFUELING OPERATIONS

## 3.9.2 Unborated Water Source Flow Paths

LCO 3.9.2 ~~Each~~**One valve in each** unborated water source flow path shall be ~~isolated~~**secured in the closed position.**

APPLICABILITY: MODE 6

## ACTIONS

----- **NOTE** -----  
Separate condition entry is allowed for each unborated water source flow path.  
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CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ----- <b>NOTE</b> ----- Required Action A. <del>32</del> must be completed whenever Condition A is entered. ----- One or more <b>unborated water source</b> flow paths <del>not isolated with no valve secured in the closed position.</del>	<del>A.1 Suspend CORE ALTERATIONS.</del>	<del>Immediately</del>
	<del>AND</del> A. <del>21</del> Initiate actions to <del>isolate flow paths</del> <b>secure one valve in the flow path in the closed position.</b>	Immediately
	<del>AND</del> A. <del>32</del> Perform SR 3.9.1.1.	4 hours

## SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.9.2.1 Verify <b>one valve in</b> each unborated water source flow path is <del>isolated by at least one valve</del> secured in the closed position.	31 days

Unborated Water Source Flow Paths  
B 3.9.2

## B 3.9 REFUELING OPERATIONS

## B 3.9.2 Unborated Water Source Flow Paths

BASES

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**BACKGROUND** During MODE 6 operation, all flow paths for reactor makeup water sources containing unborated water which are connected to the Reactor Coolant System (RCS) must be closed to prevent an unplanned dilution of the reactor coolant. At least one isolation valve in each flow path 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 event.

**APPLICABLE SAFETY ANALYSES** The possibility of an unplanned boron dilution event (Ref. 1) in MODE 6 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 portions 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 in MODE 6.

The RCS boron concentration satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

**LCO** This LCO requires that **at least one valve in each** flow path ~~s~~ to the RCS from unborated water sources be **secured in the closed position** ~~isolated~~ to prevent unplanned boron dilution during MODE 6 and, thus, avoid a reduction in SHUTDOWN MARGIN.

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



## BASES

## APPLICABILITY (continued)

In MODES 1 through 5, the requirements of LCO 3.1.9, "Chemical and Volume Control System (CVS) Demineralized Water Isolation Valves and Makeup Line Isolation Valves," apply.

## ACTIONS

The ACTIONS Table has been modified by a Note which allows separate Condition entry for each unborated water source flow path.

~~A.1~~

~~Continuation of CORE ALTERATIONS is contingent upon maintaining the plant 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" shall not preclude completion of actions to establish a safe condition, including movement of a component to a safe location.~~

Condition A has been modified by a Note to require that Required Action A.32 must be completed whenever Condition A is entered.

~~A.21~~

Preventing unplanned 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 verifies 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.

~~A.32~~

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 verify 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.

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BASES

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SURVEILLANCE  
REQUIREMENTSSR 3.9.2.1

These valves are to be secured closed to isolate possible dilution flow 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 source flow paths 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 verify that the valve opening is an unlikely possibility.

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## REFERENCES

1. **FSAR** Chapter 15, "Accident Analyses."
  2. NUREG-0800, Standard Review Plan, Section 15.4.6, "**Inadvertent Decrease in Boron Concentration in the Reactor Coolant System (PWR)**~~Chemical and Volume Control System Malfunction that Results in a Decrease in Boron Concentration in the RCS.~~"
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**XII. Applicable STS Subsection After Incorporation of this GTST's Modifications**

The entire subsection of the Specifications and the Bases associated with this GTST, following incorporation of the modifications, is presented next.

Unborated Water Source Flow Paths  
3.9.2

### 3.9 REFUELING OPERATIONS

#### 3.9.2 Unborated Water Source Flow Paths

LCO 3.9.2                      One valve in each unborated water source flow path shall be secured in the closed position.

APPLICABILITY:      MODE 6

#### ACTIONS

----- NOTE -----  
Separate condition entry is allowed for each unborated water source flow path.  
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CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ----- NOTE ----- Required Action A.2 must be completed whenever Condition A is entered. -----  One or more unborated water source flow paths with no valve secured in the closed position.	A.1      Initiate actions to secure one valve in the flow path in the closed position.	Immediately
	<u>AND</u>  A.2      Perform SR 3.9.1.1.	4 hours

#### SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.9.2.1      Verify one valve in each unborated water source flow path is secured in the closed position.	31 days

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Unborated Water Source Flow Paths  
B 3.9.2

B 3.9 REFUELING OPERATIONS

B 3.9.2 Unborated Water Source Flow Paths

BASES

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**BACKGROUND** During MODE 6 operation, all flow paths for reactor makeup water sources containing unborated water which are connected to the Reactor Coolant System (RCS) must be closed to prevent an unplanned dilution of the reactor coolant. At least one isolation valve in each flow path 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 event.

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**APPLICABLE SAFETY ANALYSES** The possibility of an unplanned boron dilution event (Ref. 1) in MODE 6 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 portions 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 in MODE 6.

The RCS boron concentration satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

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**LCO** This LCO requires that at least one valve in each flow path to the RCS from unborated water sources be secured in the closed position to prevent unplanned boron dilution during MODE 6 and, thus, avoid a reduction in SHUTDOWN MARGIN.

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

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Unborated Water Source Flow Paths  
B 3.9.2

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BASES

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## APPLICABILITY (continued)

In MODES 1 through 5, the requirements of LCO 3.1.9, "Chemical and Volume Control System (CVS) Demineralized Water Isolation Valves and Makeup Line Isolation Valves," apply.

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## ACTIONS

The ACTIONS Table has been modified by a Note which allows separate Condition entry for each unborated water source flow path.

Condition A has been modified by a Note to require that Required Action A.2 must be completed whenever Condition A is entered.

A.1

Preventing unplanned 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 verifies 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.

A.2

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 verify 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.

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SURVEILLANCE  
REQUIREMENTSSR 3.9.2.1

These valves are to be secured closed to isolate possible dilution flow 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 source flow paths 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. The 31 day Frequency is based on engineering judgment and is considered

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BASES

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## SURVEILLANCE REQUIREMENTS (continued)

reasonable in view of other administrative controls that will verify that the valve opening is an unlikely possibility.

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## REFERENCES

1. FSAR Chapter 15, "Accident Analyses."
  2. NUREG-0800, Standard Review Plan, Section 15.4.6, "Inadvertent Decrease in Boron Concentration in the Reactor Coolant System (PWR)."
-